

THE JOURNEY TO SAFETY EXCELLENCE IN THE GARMENT INDUSTRY IN BANGLADESH: PAST, PRESENT AND FUTURE

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Major Incidents

- **Spectrum garment factory collapse**, April 11, 2005
 - Killed 64 people and injured another 80
 - Cause: Structural failure, construction of additional floor
- **That's It sportswear fire**, December 14, 2010
 - Killed 29 people
 - Cause: Fire from electrical short-circuit
- **Tazreen fashion factory fire**, November 24, 2012
 - 112 people were killed and 200 injured
 - Cause: Fire from electrical short-circuit
- **Rana plaza collapse**, April 24, 2013
 - More than 1,100 people were killed and about 2,500 people were injured
 - Cause: Structural failure, building planning and construction
- **Tung Hai sweater factory fire**, May 9, 2013
 - 9 people were killed
 - Cause: Fire initiated from electrical malfunction



Source: CNN.com
 URL:<http://www.cnn.com/2012/12/17/world/asia/bangladesh-factory-fire/>



Source: Vogue;
 URL:<http://www.vogue.co.uk/news/2014/07/15/bangladesh-factory-owner-charged-rana-plaza-collapse>

Reference: Timeline: Deadly factory accidents in Bangladesh, CBC News, URL:
<http://www.cbc.ca/news2/interactives/timeline-bangladesh/>

Why accidents happened.....

- MFA of GATT and supportive government policies enabled rapid growth of RMG sector.
- Competition to provide lowest rates have left safety unattended.
- Lack of proper inspection and enforcement built a culture of non-compliance.
- Working conditions frequently violates standards.
- Providing for safety has been seen as a cost without any benefits.
- Lack of awareness for fire safety amongst workers.
- Lack of training or preparedness.
- Insufficient compliance to regulations.
- Lack of sufficient fire fighting knowledge/skills/ equipment.
- Protection systems suggested are more mitigative than preventive.



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Existing Legal Provisions for Fire Safety

- Fire Protection Act, 2003
- Labor Act, 2006
- The 2006 Bangladesh National Building Code (BNBC) was enacted into Bangladesh Law on November 16, 2006.
- Dhaka Metropolitan Building Construction Act, 2007



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Amendments to Legal Provisions After 2012

- Bangladesh Labor (Amendment) Act, 2013 (Issued on September 2015)
 - *Emergency Exits*
 - *Access to stairs, etc.*
 - *Mandatory use of personal safety equipment*
 - *Formation of a safety committee*
- Adoption of National Occupational Health and Safety Policy, 2013
- New Fire Regulation, 2014
- Bangladesh National Building Code (under review)



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The Government and ILO response (1)

- Created the National Tripartite of Action on fire safety and structural integrity (NTPA).
- Committed to rebuild the Department of Inspections of Factories and Establishments (DIFE).
- Launched a comprehensive labor inspection training program.
- Developed a 40-day course intended to enhance the professional skills of inspectors,
- Planned Establishment of an accountability unit within DIFE.
- Planned the launch of a public data base and website where inspection reports can be accessed.



International Labour Organization. Improving working conditions in the ready made garment industry: Progress and achievements



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The Government and ILO Response (2)

- Inspected over 1,000 factories under the government's National Initiative under the Tripartite Plan of Action.
- Implemented key elements including building and fire safety assessments; labor inspection reforms; occupational safety trainings.
- Launched Better Work Bangladesh.
- Enhanced the capacity of the Fire Service and Civil Defense Department (FSCD) to carry out inspections and respond to incidents.



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Government and ILO Future Actions

- National Initiative is moving towards to a remediation phase.
- Creation of a data base of exporting RMG factories to follow-up activities and knowledge management systems.
- Establishment of management processes within regulators to effectively follow up on inspection reports in a systematic and transparent manner.



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Areas of improvement – Regulations (1)

Fire Hydrant

- Water requirement for fire hydrants should be consistent with water supply/storage for any size facility.
- Fire regulation 2014 requires each RMG facility to have a water reservoir with a minimum capacity of 200 thousand (2 lac) gallons of water, irrespective of the size of the facility.
- Although BNBC specifies required water supply according to building size/hazard, the amount of storage remains fixed (by Fire Regulation 2014).
- Categorization of reservoir size should be done according to size of facility.



Distance from fire station

- Fire protection systems to be incorporated in a RMG facility should be based on the distance of the facility from the nearest fire station and the time it would require for fire fighters to arrive to the facility.
- Guideline should include measures facilities will take depending on time required for external help to arrive.



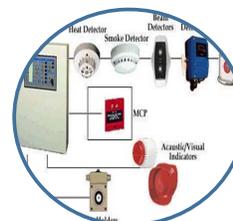
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Areas of improvement – Regulations (2)

Automatic fire detection systems

- Although automatic fire alarm systems have been made mandatory, no specification has been provided for the number and spacing of such detectors.
- The new Fire Regulations 2014 does not cover fire detection systems.



Fire Extinguishers

Certain regulations are too stringent but at times lag clarification:

- Fire Extinguishers are to be placed every 500 ft² according to Fire Regulation 2014.
- Area to be covered by each fire extinguisher should be based on occupancy
- There should a guideline regarding the maximum distance to reach a fire extinguisher .



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The Alliance Achievement (1)



Protecting and Empowering Bangladesh's Garment Workers, Alliance for Bangladesh Worker Safety 2015.



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11

Inspection Summary of Alliance (September, 2015)

- Current number of active factories are 662.
- Number of factories inspected 661.
- Number of corrective action plan 591.
- Number of repairs required in categories of structural, fire and electrical are 17, 32 and 37 respectively.
- Remediation Verification Visit completed in 528 factories.

The Alliance Achievement (2)

- The Alliance sponsored the Second International Trade Expo for Fire and Building Safety which provided a platform for Bangladesh Manufacturing Industry to learn more about the latest technology, services and support for building, electrical and fire safety.
- Earthquake preparedness has been introduced in employee training.
- The Alliance worked with the IFC and USAID to develop two separate credit facilities that will be available to qualified garment factories in Bangladesh.

Development of Best Practices

Based on a case study of Columbia Garments in Gazipur, the Alliance came up with following best practices that can guide other factories struggling to follow a sound project plan:

- Engage with leadership on the benefits of successful remediation.
- Work as a team with a project management approach.
- Create a maintenance plan for sustainability
- Ask questions to avoid mistakes and build knowledge.

Protecting and Empowering Bangladesh's Garment Workers, Alliance for Bangladesh Worker Safety 2015.



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12

The Accord Achievement (1)

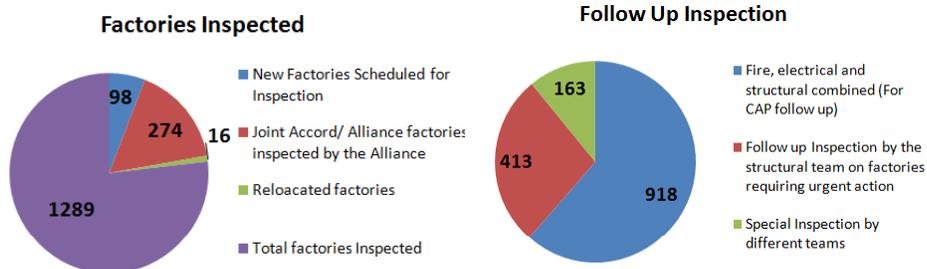
- Accord has completed the initial inspections at more than 1,100 factories.
- Substantial safety requirements such as installing fire doors and automated fire alarm systems, establishing fire protected exits from factory buildings, and strengthening of columns in the buildings etc. have been identified.
- Corrective actions such as reducing weight loads and adhering to load management plans are being implemented and monitored.
- In terms of remediation, 1160 Corrective Actions Plans (CAPs) have been developed by factories and brands of which 1080 have been technically approved by the Accord.

Transforming Bangladesh's Garment Sector, International Finance Corporation.
Quarterly Aggregate Report on remediation progress at RMG factories covered by the Accord, 2015.

13

The Accord Achievement (2)

Current Status of the Accord Inspection and Follow up



Transforming Bangladesh's Garment Sector, International Finance Corporation.
Quarterly Aggregate Report on remediation progress at RMG factories covered by the Accord, 2015.

14

Employee Empowerment

- The Alliance partnered with ILO to launch pilots of occupational safety and health committees in 12 Alliance factories.
- The Alliance has extended the **Helpline- 'Amader Kotha'** in 414 factories.
- 93% of the employee and 82% of the security guard of the factories under Alliance have been given **training** on fire safety
- The project of **Promoting Social Dialogue and Harmonious Industrial Relations** organized by **ILO** aims to create sustainable improvement in social dialogue, workplace cooperation; effective mechanisms for conciliation and arbitration and establish communication to prevent gender discrimination.
- ILO is working with the government of Bangladesh to establish a permanent national employment injury insurance (EII) scheme, initially for the Bangladesh Ready Made Garment (RMG) sector.



Protecting and Empowering Bangladesh's Garment Workers, Alliance for Bangladesh Worker Safety 2015.
 Quarterly Aggregate Report on remediation progress at RMG factories covered by the Accord, Accord on Fire and Building Safety in Bangladesh, 2015.
 Promoting Social Dialogue and Harmonious Industrial Relations in Bangladesh Ready-Made Garment Industry, International Labour Organization.
 Developing a National Employment Injury Insurance (EII) Scheme for the Bangladesh Ready-Made Garment Sector, International Labour Organization.

15

15

Key Issues with RMG, Bangladesh (1)

Key Issues identified by the Alliance

- Noncompliance is one of the major issues. Many factories fail to make progress on remediation. There are few expert engineers to support remediation process.
- Government must institutionalize enforcement of building regulations
- Limited availability of key goods and services
- Fire doors, sprinklers and other fire protection equipment are not manufactured locally
- Unauthorized subcontracting
- Many factory owners lack access to affordable funding/financing



Protecting and Empowering Bangladesh's Garment Workers, Alliance for Bangladesh Worker Safety 2015.

16

Key Issues with RMG, Bangladesh (2)

Key Issues identified by the Accord

- Most buildings are not constructed according to structural design drawing
- Lack of management load plans to avoid excess weight in certain parts of the building
- Unsafe means of exit
- Unsafe electrical Installation
- Lack of fire separations between floors and lack of certified fire doors in stairwells
- Inadequate automatic fire alarm
- Excess combustible material (fire load) in areas where people are working



Quarterly Aggregate Report on remediation progress at RMG factories covered by the Accord, Accord on Fire and Building Safety in Bangladesh, 2015.



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17

Key Issues with RMG, Bangladesh (3)

Key Issues identified by the Accord (cont'd)

- Long waiting time for concrete tests to be conducted in the authorized testing laboratories (for inspection)
- Large number of factories falling behind in schedule for CAP
- Under-reporting of financial support from signatory companies which makes it hard for Accord to realize which factory is receiving assistance and in which form



Quarterly Aggregate Report on remediation progress at RMG factories covered by the Accord, Accord on Fire and Building Safety in Bangladesh, 2015.



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18

Recommendations (1)

Recommendation made by the Alliance

- According to the Alliance, ensuring short-term safety of RMG is not the goal, rather they plan to meet with the GoB and other stakeholders to develop a plan for sustainability of Alliance's work in Bangladesh.
- Remediation must be represented as investment rather than expense so the factories are more interested.
- Compliance should not end after CAP and maintenance plan should be sustainable.
- Sustainability of the training program should be there to improve the understanding of fire safety and risk.
- Effective worker representative structure should be built.



Protecting and Empowering Bangladesh's Garment Workers, Alliance for Bangladesh Worker Safety 2015.



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19

Recommendations (2)

Recommendation made by the Accord

- In order to ensure factories are safe it is important that the speed and efficiency of remediation be improved.
- More accurate data should be there on financing remediation process for factories.
- Recruit more structural engineers to speed up the review process
- Ensure wages are paid, and verifying employment is maintained.



Quarterly Aggregate Report on remediation progress at RMG factories covered by the Accord, Accord on Fire and Building Safety in Bangladesh, 2015.



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What Needs to be Done?

- Partnership and collaboration between the government, garment company owners, associations and other local/ international organization
- Forum for dialogue between all parties to seek for a comprehensive safety and development program
- Campaign on industrial safety and hazard mitigation
- Plan to organize a “Safety Summit” to address successful safety measures and recognition
- Need to look for more sustainable approach to ensure workplace safety rather than focusing on short-term goals



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21

Why Safety Summit?

- Congregation of all the stakeholders – owners, buyers, suppliers, regulatory bodies, local and international organization
- Interactive session to address development and identify issues to be focused on
- To come up with practical solutions and achievable goals
- Recognition of the companies with best safety program and performance – organizational safety culture and excellence



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Award and Recognition

- Need to focus on Leading Safety Indicators, not only on absence of fire, injury, fatalities etc.
- *Total injury free workdays, total recordable incident rate etc.* provide very little idea on overall organizational safety practices and performances
- Organization should be recognized and awarded based on their effort and effectiveness of safety program – *number of employees trained on safety, number of emergency and evacuation drill, number of inspection and audit, programs to raise awareness*
- Address and share success stories



Role of The Government

- Education and training on workplace safety and risk management for policymakers, inspectors and auditors.
- Arrange for necessary resources and training for the emergency responders, *i.e.*, firefighters.
- Work with RMG to come up with sustainable and sensible rules and guidelines.
- Institutionalization of the concept of workplace safety and raise awareness among general people.



HELP

Role of The Industries

- Develop a comprehensive safety program and benchmark progress and performances.
- Visible leadership engagement with the process and competency development of the mid-level leaders and managers.
- Focus on -
 - *Workplace design and layout*
 - *Worker training and awareness*
 - *Maintenance*
 - *Compliance Inspection*
 - *Emergency management plan*
- Develop and monitor leading safety indicators and identify the scope of improvement.



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25

Safety Management Program: Risk Assessment

Risk Matrix

- The risk value for each threat is calculated as the product of consequence and likelihood values, illustrated in a two-dimensional matrix

| Frequency | Consequence | | | | |
|------------|---------------|----------|----------|----------|---------|
| | Insignificant | Minor | Moderate | Major | Severe |
| Frequent | Moderate | High | High | Extreme | Extreme |
| Probable | Moderate | Moderate | High | High | Extreme |
| Occasional | Low | Moderate | Moderate | High | Extreme |
| Remote | Low | Moderate | Moderate | Moderate | High |
| Rare | Low | Low | Moderate | Moderate | High |



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26

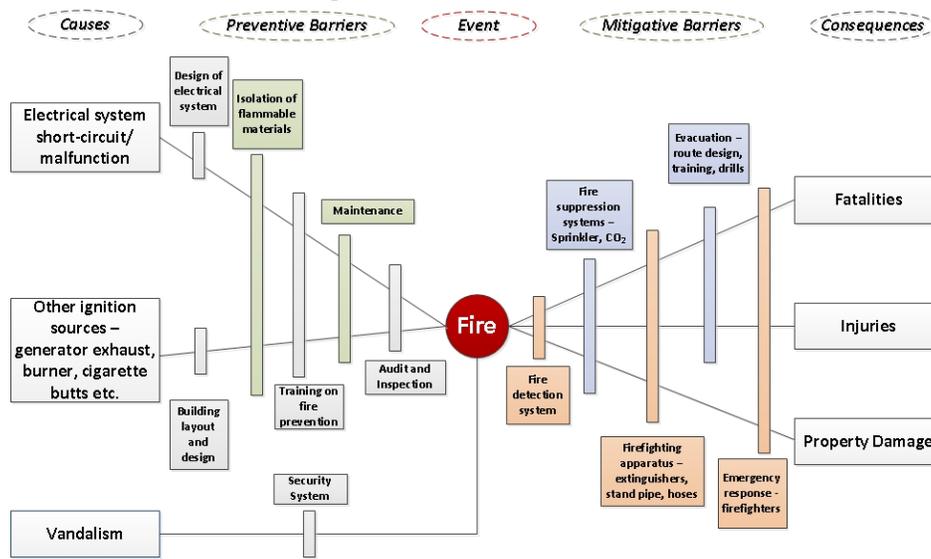
Safety Management Program: Risk Assessment

- Similar risk matrix can be prepared for identifying critically risky factories by calculating the risk value.
- The frequency and consequence data can be directly obtained or derived from the data collected from the inspection reports of the Accord and the Alliance
- *e.g., the 'priority level' data found in the inspection reports of the Alliance can be further derived into consequence data*
- *Previous incident reports can be utilized to determine the frequency*
- 'Remediation timeframe' suggestion can be based on this risk value calculated from the risk matrix rather than expert judgment alone.



27

Safety Management Program: Bow-tie Diagram



28

The Need for a Safety Culture

- Safety culture is how the organization and individual behave when no one is watching
- The challenges to the leadership of an organization are to:
 - determine the current safety culture
 - decide where they wish to take the culture; and
 - chart and navigate a path from here to there.



A positive culture will inspire people to support safety and metrics efforts

Everyone
 Success
 Inspire
 Knowledge Innovation
 Confidence Potential
 Futures



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29

References

- [1] WORKER SAFETY AND LABOR RIGHTS IN BANGLADESH'S GARMENT SECTOR COMMITTEE ON FOREIGN RELATIONS UNITED STATES SENATE 2013.
- [2] D.M.a.A.L. T. Blackmore, Light ends Composition in Dilbit and Conventional Crude, Alberta Innovates Energy and Environment Solutions.
- [3] R.D.M.a.F. Valenti, Working conditions in the Bangladeshi garment sector: Social dialogue and compliance, Delft University of Technology and Fair Wear Foundation.
- [4] M. Islam, N. Adri, Fire Hazard Management of Dhaka City : Addressing Issues Relating to Institutional Capacity and Public Perception, Jahangirnagar Plan. Rev. 6 (2008) 57-68.
- [5] Quarterly Aggregate Report on remediation progress at RMG factories covered by the Accord, Accord on Fire and Building Safety in Bangladesh, 2015.
- [6] Accord on Fire and Building Safety in Bangladesh.
- [7] A. Roberts, The Bangladesh Accord factory audits finds more than 80,000 safety hazards, the Gaurdian, 2014.
- [8] Protecting and Empowering Bangladesh's Garment Workers, Alliance for Bangladesh Worker Safety 2015.
- [9] Promoting Social Dialogue and Harmonious Industrial Relations in Bangladesh Ready-Made Garment Industry, International Labour Organization.
- [10] Developing a National Employment Injury Insurance (EII) Scheme for the Bangladesh Ready-Made Garment Sector, International Labour Organization.
- [11] Improving working conditions in ready made garment industry: Progress and Achievements

30