The Jahangirnagar Review: Part II: Social Sciences, Vol. XLIV, 2020
Printed in June 2021, ISSN 1682-422

A Planning Perspective on Fire Hazard Vulnerability of Shopping Centers in Dhaka City: A Case Study Base Approach

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Abstract: Now-a-days, fire hazard has become a very common issue for Bangladesh, especially in urban areas. Shopping is an important and essential routine of urban life. Day by day the need for organized shopping centre is gaining importance in our society. The current trend in Dhaka is to accommodate various functions such as office, hotels, apartments etc. along with the shopping facilities within the same structure. These have increased the potential danger of fire hazard in these mixed uses, multi-storied and usually introvert building type. Fire at different shopping malls is a very common phenomenon nowadays. Shopping centers have large numbers of people passing through. So if any fire incidences occur in shopping centers it can causes human losses and damage properties. In recent few years, many fire incidents have taken place in different shopping centers at Dhaka City and other areas of the country. In this context, the present study tries to assess fire hazard vulnerability level of shopping centers. From the research findings it is observed that most of the case study shopping centers are highly vulnerable for fire hazard. There are several reasons behind the present situation. At the same time, these shopping centers are not well equipped with fire fighting tools to prevent fire hazard. At last, this study comes up with some recommendations. The implementation of these recommendations can help to reduce the risk of fire hazard vulnerability of these shopping centers, as well as other shopping centers of Dhaka City and the entire country.

Introduction

Fire is the rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light and various reaction products (Sultana, 2017). From early of the "Stone Age", fire was used for various purposes. At first the purposes were primitive but as the time passed by and development took place, the uses of fire changed. It became more complex and this change was taken as a positive outcome of development. More the civilization grew, more the development took place and the use of fire was exploited more. Along with its positive sides, fire is one of the most destructive forces of nature (Hossain, 2019). The number of fires hazard has increased across Bangladesh since 1997; with the year 2018 seeing a daily average of 53. Fire and Civil Defense statistics showed that around 250,000 fires occurred in the country between January 1, 1997 and December 31, 2018. These fires also caused an estimated financial loss of around Tk. 6,400 crore to the nation. At least 1,970 people were killed in around 200,000 fires across the country between 2004 and 2018, according to available fire service data. However, the highest number of causalities - 365 dead and 1,385 injured was recorded in 2011. In terms of financial losses, 2015 was the deadliest year as the country suffered a loss of an estimated Tk. 850 crore in 17,488 fires (https://www.dhakatribune.com).

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Now-a-days, fire hazard has become a very common issue for Bangladesh, especially in urban areas. In recent few years, many fire incidents have taken place in urban areas. Most of the time, the victims of fire hazard are garments factories, industries, slums, chemical factories, high rise appartments, shopping centers and commercial buildings. And Dhaka, the capital of Bangladesh, has been the main victim of this type of occurrences. The possibility of a fire breaking, the potential fire area, the likelihood of a fire starting, the possible risks to life and the extent of damage increase with the size of a building; the increase in height can only make the situation worse (Tabassum, et al, 2014). Shopping is an important and essential routine of urban life. Day by day the need for organized shopping centre is gaining importance in our society. The current trend in Dhaka is to accommodate various functions such as office, hotels, apartments etc. along with the shopping facilities within the same structure. These have increased the potential danger of fire hazard in these mixed uses, multi-storied and usually introvert building type (https://journals.abc.us.org). Fire risk is considered as the major catastrophic risk for any shopping center. Moreover, the use of decorative materials that are highly combustible has become more popular in the modern shopping centers, which increase fire vulnerability. On the other hand, shopping centers of Bangladesh have failed to incorporate the factor of fire safety in overall design process of the shopping centers (Tabassum, et al, 2014). Shopping centers have large number of people passing through, especially at weekends and other times such as festive seasons. It is evident from different newspaper reports and research that maximum shopping centers have no proper fire safety management tools. So, if any fire incidents occur, it may cause human life losses and damage of properties. Different shopping centers of Dhaka City are also very much vulnerable for occurring fire accident. In the recent few years, different shopping centers of Dhaka City like Bashundhara City, Eastern Plaza, Motaleb Plaza, Multiplan Center, Sezan Point, Mazar Cooperative Market, Muktijoddha Super Market etc. faced problem of fire hazard (Islam, 2017). From various relevant research it is observed that till now much research have been conducted on the issue of fire hazard including fire risk assessment, hazard analysis and fire prevention measure for residential and industrial areas. But no mentionable in-depth study on fire hazard problem of shopping centers in Dhaka City has been carried out. In these circumstances, the present research attempts to assess the fire hazard vulnerability level of shopping centers of Dhaka City and finally recommends some guidelines to improve the present condition.

Objectives and Methodology of the Research

The present study aims to assess the fire hazard vulnerability level of the selected shopping centers by check list method. And finally it tries to come up with some guidelines from planning perspective to reduce fire hazard vulnerability of the shopping centers of Dhaka City.

For the purpose of this study, four shopping centers of Dhaka City, namely Bashundhara City Shopping Mall, Eastern Plaza, Motaleb Plaza and Muktijoddha Super Market were selected as case study. These shopping centers have already experience of fire hazard occurrence. Simple lottery method was adopted here as sampling technique to select the case study shopping centers.

For this research, information and data were collected both from "Primary" and "Secondary" sources. "Primary data" were collected through "Field Survey", "Office Interview" and "Key Informant Interview". To be familiar with the shopping centers, at first a "Reconnaissance Survey" was conducted. General information and firefighting equipment related information of these shopping centers were collected by empirical field level observation and "Office Interview" of the shop owners association of these shopping centers. "Key Informant Interview" was conducted to determine weight of different attributes to assess fire hazard vulnerability of shopping centers. The fire hazard vulnerability category of shopping centers was also developed by "Key Informant Interview". "Secondary data" were collected by reviewing relevant literatures, i.e. statistical reports, newspapers, journal articles, seminar papers, published and unpublished thesis, books etc.

A Short Description of the Case Study Shopping Centers

Bashundhara City Shopping Mall: Bashundhara City is a shopping mall in Dhaka, It is the second largest shopping mall in Bangladesh opened for public on 6 August 2004. The mall is located in Panthapath, near Kawran Bazar. Bashundhara City is a 20 floor building complex covering an area of 191200 sqft comprising an 8 floor podium containing retail spaces, theme park, cinemas, fitness club, swimming pool and food court with a 20 storey Corporate Office of Bashundhara Group. The mall has space for 2,325 retail stores and cafeterias and has a large underground gymnasium, a multiplex cinema, a top-floor food court, an ice skating rink, and a theme park. The fully air-conditioned shopping mall with rooftop gardens is considered a modern symbol of the emerging city of Dhaka (https://en.wikipedia.org/wiki/Bashundhara_City).

Eastern Plaza: Eastern plaza is one of the most significant shopping centre in Dhaka City, which was started in 1992. It is one of the most beautiful mall in Dhaka. Eastern plaza is located at Hatirpool, near Bangla motor, panthapath, shahbag. This 10 storied shopping mall contains around 400 shops ensuring customers satisfaction (Islam, 2017).

Motalib Plaza: Motalib Plaza is a very significant shopping centre in Dhaka City, which is located in Hatirpool. This 17 storied shopping mall contains different types of shops. This is not a shopping centre, it also serves as residential and other commercial purposes. A huge number of populations travel these shopping centers for various purposes (Islam, 2017).

Muktijoddha Super Market: Muktijoddha Super Market is located at Mirpur section 1. It is the second oldest shopping center of Mirpur area. It was established in 1983. It is a 6 storied building. Ground to 3rd floor are using as shopping center and rest 2 floors are using as small scale sewing industries, good downs, commercial offices, a residential hotel etc. It is an air conditioned shopping centre of 44,000 sq. ft. (11,000 sq. ft. in each floor) having 600 shops. There is no garage or car parking facilities in this market (Hossain. 2019).

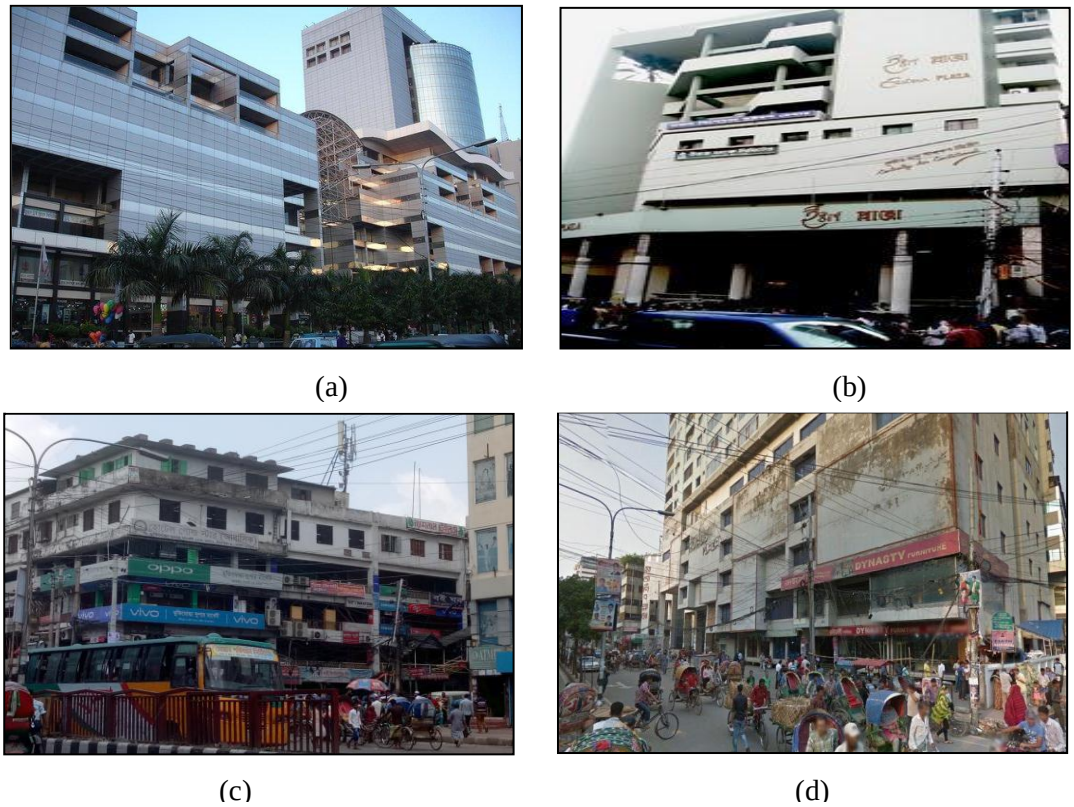


Fig. 1: Photograpgh of (a) Bashundhara City Shopping Mall, (b) Eastern Plaza, (c) Muktijoddha Super Market, (d) Motalib Plaza

Source: Field Survey, 2019

Conceptual Issues regarding Fire Hazard Vulnerability Assessment of Shopping Centers

Fire: Martin and Kanury (1982) define that, fire is defined as a chemical process involving rapid oxidation of a combustible material producing heat and flame. Fire thus involves a chemical union between oxygen and fuel (or combustible material) that has a temperature raised to its ignition point by addition of heat. According to BFSCDD (2006), the main contributing factors of fires are –

- Natural factors: Fire caused by a disaster or a natural factor,
- Accidental factors: Fire caused by negligence, carelessness of human error.
- Incendiary factor: Fire caused by a deliberate of treacherous human act.

According to Nagar (2011), based on the various types of combustible materials, fire can be classified into four classes.

Table 1: Classification of Fire Hazard

Class A	Solid fire
Class B	Liquid fire
Class C	Gas fire
Class D	Metal fire

Source: Nagar, 2011

Vulnerability: According to Nagar (2011), vulnerability is a concept which describes factors or constraints of an economic, social, physical or geographic nature, which reduce the ability to prepare for and cope with the impact of hazard.

Fire Hazard Vulnerability Assessment of Shopping Center by Checklist Method: According to Islam, et al. (2008), to assess fire hazard vulnerability level of a shopping center following five attributes are considered -

- Accessibility
- Transformer and Power Line
- Open Space between Two Buildings
- Emergency Exits
- Fire Alarm

The score calculation equation for assessment of fire hazard vulnerability level of a shopping center by Checklist Method is given below (Islam, et al., 2008):

Score for fire hazard vulnerability level of shopping centre = Weight for accessibility × (1 for no access or 0 for access) + Weight for open space between two buildings × (0 for not vulnerable or 1 for vulnerable for narrow space) + Weight for transformer and power line × (0 for not vulnerable or 1 for vulnerable considering power line or transformer) + Weight for emergency exit × (0 for having emergency exit or 1 for without emergency exit) + Weight for fire alarm × (0 for having fire alarm or 1 for without fire alarm).

The data of these attribute are collected through the field survey. By analyzing collected data, the value for non-vulnerability and vulnerability for each attribute is then determined. Weights for each attribute are determined with the expert opinion. More priority attribute gains more weight. The total score is then calculated for each shopping center using this weight and obtained value of different attributes through field survey. With help of the expert opinion, the vulnerability level of shopping centers can be classified into different categories based on the calculated score. Table 2 and 3 presents weight of different attributes and fire hazard vulnerability categories of shopping centers for this study based on the expert opinion respectively.

Table 2: Weight of Different Attributes for Fire Hazard Vulnerability Assessment of Shopping Centers

Attribute	Weight (in a scale of 10)
Accessibility	10
Open space in between two buildings	5
Transformer and power line	6
Emergency exit	10
Fire alarm	5

Source: Developed by the author with help of expert opinion, 2019

Table 3: Fire Hazard Vulnerability Category of Shopping Centers

Vulnerability Category	Score
Low Vulnerability	0 - 12
Moderate Vulnerability	13 - 24
High Vulnerability	25 - 36

Source: Developed by the author with help of expert opinion, 2019

Standard to Assign Value to Different Attributes for Assessing Fire Hazard Vulnerability of Shopping Centers: There is some legislation of different organizations, such as Bangladesh Fire Service and Civil Defense (BFSCD), RAJUK, National Building Authority etc. These legislations set following standard for different factors to assess fire hazard vulnerability of shopping centers in Bangladesh (Islam, 2017).

- **Accessibility:** Adjacent road width of the shopping center will be minimum 30 feet. If the adjacent road width of the shopping center is less than 30 feet, then it will gain less value.
- **Open space between two buildings:** 15 feet or above space is required between two buildings. To give the value for open space factor, distance between two apartments is to be judged. Considering this, if space between two buildings is little, the obtained value will be less for this factor.
- **Power lines and transformers:** High voltage electric line and transformer is to be laid at minimum 10 feet distance from the shopping center.
- **Emergency exit:** It should be 25 meters from any places of the shopping center. Minimum width of the fire stair (emergency stair) will be 1.5 meter. It should be connected with the ground floor and its lobby should be separated from the lobby of the lift.
- **Fire alarm:** Fire alarm is a device making a loud noise that gives warning of a fire. Sufficient number of alarm bell must be arranged in every floor.

Existing Condition of the Selected Shopping Centers in Terms of Fire Hazard Attributes

This section of the paper presents information regarding fire hazard vulnerability issue of the selected shopping centers.

1. Accessibility (Adjacent Road Width): Access way shall be provided for accessibility of site to firefighting appliances. To allow access of those appliances 30 feet wide road is required. From field survey, it is observed that the front side road of the Bashundhara Shopping Mall is sufficiently widened. But the access way of Eastern Plaza and Motalib Plaza is comparatively narrow and maximum time of the day it is occupied with heavy traffic. On the other hand, the access way of Muktijoddha Super Market is widen enough as per standard level, but often it is occupied with heavy traffic.

(a) (b) (c)

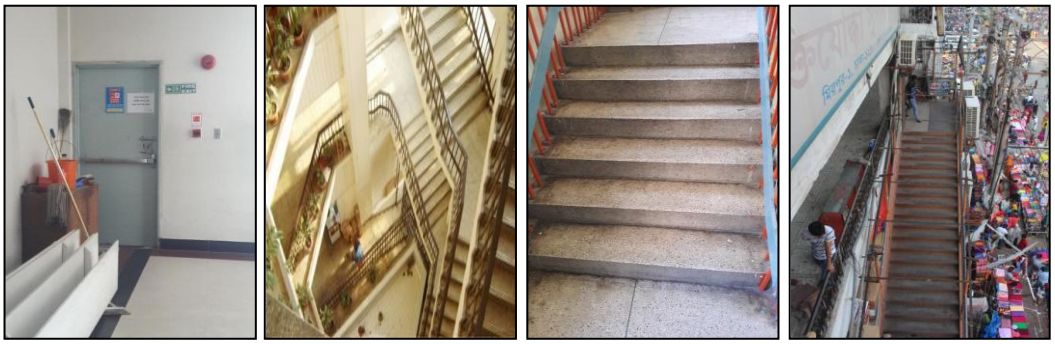
Fig. 2: Adjacent Road Width of (a) Bashundhara Shopping Mall, (b) Muktijoddha Super Market and (c) Motalib Plaza

Source: Field Survey, 2019

2. Open Space between Shopping Center and Adjacent Buildings: From field survey, it is observed that only Bashundhara City Shopping Mall has adequate space between adjacent buildings. Rest three shopping centers are very closely located with adjacent buildings.

3. Location of Transformer and Power Lines: From field survey it is observed that there are several numbers of transformers and electric poles around these shopping centers.

4. Emergency Exit: It provides a method of escape in the event of a fire or other emergency that makes the stairwells inside a building inaccessible. From field survey, it is observed that, in Bashundhara City Shopping Mall there are 3 emergency exits, in Eastern Plaza and Motalib Plaza there is one emergency exit, where as in Muktijoddha Super Market there are two emergency exits. The emergency gate of the Bashundhara City Shopping Mall is blockade by different materials and it is locked by the authority. In Motalib Plaza the emergency stairs is so narrow and sloppy. As a result during the fire hazard accident tine, the people cannot move easily. In Eastern plaza, different types of waste are thrown in emergency exits and here Open stair will be a carrier of fire and smoke in Eastern plaza. In Muktijoddha Super Market the emergency exits are made of steel frame and always use as general stairway and these are not wide and strong enough to support during fire accident.



(a) (b) (c) (d)

Fig. 3: (a) Locked emergency gate in Bashundhara City Shopping Mall, (b) Open stair will be a carrier of fire and smoke in Eastern Plaza, (c) Sloppy and narrow emergency stairs in Motalib Plaza and (d) Narrow and weak steel frame emergency stair in Muktijoddha Super Market

Source: Field Survey, 2019

5. Different Fire Fighting Tools, Signs and Symbols: Table 4 shows provision of different fire fighting tools of the case study shopping centers.

Table 4: Provision of fire fighting tools in the case study shopping centers

Issues	Bashundhara City Shopping Mall	Eastern Plaza	Motalib Plaza	Muktijoddha Super Market
No. of Fire Alarm	6 in each floor	No	No	No
Smoke Detector	Yes	No	No	No
Heat Detector	Yes	No	No	No
No. of Fire Extinguisher	119	14	32	40
No. of Hose Reel	96	10	14	No
Stand Pipe	Yes	No	No	No
Provision of Fire Signs and Symbols	Yes	Yes	No	No

Source: Field Survey, 2019 and Office Interview of Shop Owners Association of the Shopping Centers, 2019

Fire Hazard Vulnerability Assessment of the Case Study Shopping Centers

To assess the fire hazard vulnerability level of a shopping center, five attributes are considered in check list method. The weights of these attributes have been determined with help of fire expert opinion (Table 2). The data on these attributes have been collected through the field survey. By analyzing the collected data and compare it with the standard for fire safety set by different organizations, the value for non-vulnerability and vulnerability for each attribute have been determined. Table 5 shows obtained value of different attributes of the four case study shopping centers.

Table 5: Obtained Value of Different Attributes for the Selected Shopping Centers

Attribute	Obtained Value			
	Bashundhara City Shopping Mall	Eastern Plaza	Motalib Plaza	Muktijoddha Super Market
Accessibility	0	1	1	0
Open space in between two buildings	0	1	1	1
Transformer and power line	1	1	1	1
Emergency exit	0	0	0	0
Fire alarm	0	1	1	1

Source: Developed by the author with help of field survey, 2019

Now the weight and obtained value of different attributes are incorporated into the following equation of fire hazard vulnerability assessment and final score for each market are determined. Compare the calculated value with the standard value set by expert opinion (Table 3), the fire hazard vulnerability category of each shopping center is then determined.

Score for fire hazard vulnerability level of shopping centre = Weight for accessibility × (1 for no access or 0 for access) + Weight for open space between two buildings × (0 for not vulnerable or 1 for vulnerable for narrow space) + Weight for transformer and power line × (0 for not vulnerable or 1 for vulnerable considering power line or transformer) + Weight for emergency exit × (0 for having emergency exit or 1 for without emergency exit) + Weight for fire alarm × (0 for having fire alarm or 1 for without fire alarm).

Table 6: Fire Hazard Vulnerability Level of the Case Study Shopping Centers

Shopping Center	Fire Hazard Vulnerability Assessment Score	Level of Fire Hazard Vulnerability
Bashundhara City Shopping Mall	10×0+5×0+6×1+10×0+5×0 = 6	Low
Eastern Plaza	10×1+5×1+6×1+10×0+5×1= 26	High
Motalib Plaza	10×1+5×1+6×1+10×0+5×1= 26	High
Muktijoddha Super Market	10×0+5×1+6×1+10×0+5×1= 16	Moderate

Source: Developed by the author, 2019

From Table 6, it is observed that fire hazard vulnerability score of Bashundhara City Shopping Mall is 6, whereas it is 26 for Eastern Plaza and Motalib Plaza. The value is 16 for Muktijoddha Super Market. That means Bashundhara City Shopping Mall is less vulnerable and Muktijoddha Super Market is moderately vulnerable for fire hazard. On the contrary, Eastern Plaza and Motalib Plaza are highly vulnerable for fire hazard.

Major Findings of the Study

From the empirical field level observation and analysis of the collected data, following major findings are observed:

- Though all the four shopping centers have previous experience of fire hazard, but till now 2 (Eastern Plaza and Motalib Plaza) are highly vulnerable and 1 (Muktijoddha Super Market) is moderately vulnerable to fire hazard. Bashundhara City Shopping Mall is less vulnerable in this regard.
- Except Bashundhara City Shopping Mall, none of other three shopping centers are equipped with fire fighting equipments for fire hazard mitigation. None of them have fire alarm, hose reel, heat and smoke detector, wet and dry riser, water sprinkler etc. Most of the shopping centers just have fire extinguishers. But the number of fire extinguisher is not sufficient enough according to stand level for fire safety of shopping centers. At the same time, 50% of these shopping centers have fire sign and symbol.
- Though all case study shopping centers have emergency exit, but either the emergency stairs are lock for all time or very narrow in width. That may hamper the proper function of emergency exits during emergency time.
- Except Bashundhara City Shopping Mall. Other three shopping centers are closely surrounded by other buildings. So, if any fire hazard occurs in any of these shopping centers, then there will be a good chance to spread the fire to the adjacent buildings.
- Electric transformers, electric poles and high voltage electric lines are located very close to all the shopping centers, which makes the shopping centers more vulnerable for fire hazard risk too. If any fire hazard occurs in any of these shopping centers, then transformers, high voltage lines and electric poles may be explored by fire due to close location to the shopping centers, which may cause disastrous situation not only to the shopping centers but also to the surrounding locality.
- The buildings of all the four selected shopping centers are of mixed use nature. Besides use as shopping centers, some floors of these buildings are also used as commercial spaces, good down, small scale sewing factories, garments industries etc. From many real experiences in Bangladesh it is evident that serious fire accident occurred in good downs, sewing factories, garments etc. due to several reasons. So, the mixed use nature of these buildings makes all four shopping centers more or less vulnerable to fire risk.
- Proper fire fighting drill can be helpful to safe life and resources during the time of fire hazard. But fire fighting drill is not properly practiced in these shopping centers.

The above scenario does not only belong to these four selected shopping centers; this scenario is common for most of the shopping centers of Dhaka City and other areas of the country as well.

Planning Perspective to Reduce Fire Hazard Vulnerability of the Selected Shopping Centers

From the findings of the study it can be easily stated that the fire safety management of the selected shopping centers is very poor. This scenario is common all over the country. From this study it becomes clear that there are some reasons for the high level of fire hazard vulnerability of shopping centers in the country. So it is the right time to take necessary initiatives to improve the present condition of fire hazard vulnerability of shopping centers. But no policy recommendation will be successful in this case until the concerned authority will not participate for the improvement of the situation. The study suggests following guidelines from planning perspective for reducing the problems of fire hazard vulnerability of the selected shopping centers, as well as other shopping centers of the country:

- **Enforcement of Building Code:** Excellent provisions have been made for fire protection and safer buildings under the National Building Code 2012. The code is a system of risk management designed to provide socially acceptable level of risk for the public. Since it is a system, it is possible to change components within the system and maintain the overall level of safety (Benjmin Clarke Associates, 1984). But the code is not being followed by the occupants of property and developers and also is not being enforced properly by the enforcing authority. The proper enforcement of this code may reduce the possible risk of fire hazard. So, enforcement of building code should be ensured.
- **Measures related to Open Space between Two Buildings:** From the field survey, it is evident that most of the case study shopping centers have sufficient space between adjacent buildings. This is because of violating building code and approved plan of RAJUK. No monitoring by RAJUK is also accountable in this regard. If possible RAJUK should have to take corrective measures (demolish the unauthorized portion of the buildings) as per the approved plan of the shopping centers to create open space between adjacent building in order to reduce the fire hazard risk.
- **Measures related to Emergency Exit:** According to BNBC 2012 and Dhaka Mohanagar Imarat Nirman Bidhimala 2008, each shopping center should have sufficient provision of emergency exits. But from the field survey, it is evident that the existing emergency exits of the selected shopping centers are not satisfactory at all. If possible, these shopping centers should have to develop more emergency exits to ensure safe escape routes during the time of fire hazard.
- **Measures related to Fire Fighting Equipments:** From field survey and office interview of shop owners association of the shopping centers, it is evident that none of these shopping centers are well equipped with fire fighting tools. To reduce fire hazard vulnerability level, first of all these shopping centers should have to install sufficient number of fire alarms. Though most of these shopping centers only have fire extinguishers as fire fighting tool, but these are not sufficient enough. So, arrangement of sufficient fire extinguishers should be ensured. At the same, arrangement of other fire fighting equipments like smoke and heat detectors, hose reels, water sprinklers, wet and dry risers etc. should be

ensured. Moreover, there should be sufficient provision of fire signs and symbols in the markets.

- **Measures related to Location of Transformers and Electric Poles:** The minimum distance between any electric pole or transformer and a building from any side should be 10 ft. But from field survey, it is observed that a lot of transformers and electric poles are located within in 10 ft. distance from the selected shopping centers. To reduce the fire vulnerability of these shopping centers, transformers and electric poles need to be relocated on an emergency basis. DESCO is the concern authority to supply electricity and maintain electricity lines, transformers, electric poles etc. in this locality. So, DESCO has to take immediate steps to relocate these transformers and electric poles.
- **Arrangement of Regular Fire Drill:** According to BNBC 2012, each shopping center should have to arrange at least two fire fighting drill annually. Regular arrangement of fire drill may help to reduce loss of life and property at the time of fire accident and any other accident, too. So, regular fire drill should have to be arranged in these shopping centers. The management authority of these shopping centers has to arrange at least two fire drills annually. Bangladesh Fire Service and Civil Defense authority should have to provide necessary support to the concerned authorities of the shopping centers in this regard.
- **Appointment of Fire Safety Manager and Other Fire Safety Personnel:** All the selected shopping centers need to appoint a Fire Safety Manager along with other Fire Safety Personnel. A competent person should be appointed as Fire Safety Manager. This person should be given sufficient stated authority, powers of sanction and resources to take responsibility for the day to day safety management of the shopping centre and to ensure that essential repairs or maintenance are carried out. The role of the Fire Safety Manager may be combined with other health and safety or security functions. The Fire Safety Manager should appoint a Duty Safety Officer, the key decision maker in responding to a fire incident. A Duty Safety Officer should be present at all times whenever the centre is occupied. In the case of a fire incident, the Duty Safety Officer should hand over control to the fire service on their arrival but should be available to provide advice and other assistance on request.
- **Regular Monitoring by BFSCD:** Bangladesh Fire Service and Civil Defense authority should ensure regular inspection of shopping centers of the city to understand their fire safety management capacity. BFSCD may provide necessary advices and guidelines to increase fire safety management capacity of the shopping centers. This may help to reduce fire hazard vulnerability level of the shopping centers as well.

Conclusion

Shopping centre is an important place for people. At present a lot of shopping centers are running all over the city. Among them a big numbers of shopping centers have a doubtful facility to fight with fire. Ignoring fire risk, most shopping malls and markets in the capital have been running without mandatory safety measures for years, posing a serious

threat, according to Fire Service and Civil Defense (https://www.thedailystar.net). Most of the shopping centers that are selected as sample shopping centers for this study are facing same problems like other shopping centers of the city. More or less these shopping centers are vulnerable to fire hazard. This study has addressed several reasons behind the vulnerability. Now it is very urgent to make our people aware about fire hazard. To meet the current challenge, it is the right time that government officials and all the concerned authorities take appropriate measures to ensure adequate safety for people at shopping centers. It is the responsibility of the market management authorities to ensure safe and secured shopping malls for their market personnel as well as their valued customers. The necessary actions as recommended in this study can be taken on an emergency basis to reduce the fire hazard vulnerability of the selected shopping centers. These recommendations can also be applied to other shopping centers of Dhaka City and all over the country. At the same time, the technical capacity and manpower of the Fire Service and Civil Defense should be improved that they may play effective role at the time of fire hazard to reduce the damage effects.

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