

ADDRESSING THE FIRE SAFETY PROBLEMS IN SHOPPING CENTRES OF DHAKA CITY: A CASE STUDY ON SOME SELECTED SHOPPING CENTRES IN MIRPUR AREA

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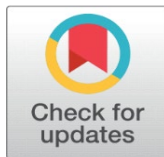
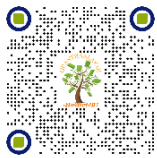
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ABSTRACT

The city of dhaka has been seeing a significant number of fire incidents. The exacerbation of the crisis is mostly attributed to a combination of institutional incompetence, insufficient equipment support, poor preventative measures, and a lack of awareness among people. The occurrence of fires in various shopping malls has become more prevalent in contemporary times. In the event of fire incidents inside shopping malls, there is a potential for both human casualties and property damage to occur. Contemporary shopping practices include the use of ornamental materials that possess a heightened susceptibility to combustion, hence amplifying the risk of fire incidents. The objective of this research is to assess the state of fire safety management in retail complexes. This research focuses on conducting a survey to assess fire safety in four high rise retail complexes located in the Mirpur region of Dhaka city. This study aimed to design a checklist methodology for assessing the fire safety standards of retail complexes. The assessment of fire safety levels in shopping malls by the Bangladesh Fire Service and Civil Defense directorate involves assigning varying weights to several parameters related to fire safety management. A study has shown that the majority of shopping malls exhibit characteristics of being high rise and mixed use, hence exacerbating their susceptibility to fires and subsequently increasing the associated fire risk. The majority of the shopping centers that were assessed are situated next to important roads, which are often broad enough to accommodate fire engines. However, a recurring issue arises as these roadways often experience congestion or occupation. Out of the shopping centers surveyed, only Mirpur Shopping Center possesses an emergency exit and some essential fire signs and symbols. Conversely, the remaining three shopping centers, namely Shah Ali Plaza, Muktabangla Shopping Complex, and Shah Ali Shopping Complex, do not have designated emergency exits, signs, and symbols altogether. This deficiency causes these shopping centers to be more vulnerable to fire hazards and reduces their overall level of safety. These shopping malls are extensively encompassed by various electric poles and transformers. The fire safety score of Mirpur Shopping Center is 56.57 (excellent), Shah Ali Plaza is 33.55 (average) and Shah Ali Complex and Muktabangla is 25.44 and 26.75 (poor) respectively. The Fire hazard vulnerability score of Mirpur Shopping Center is 11 (less vulnerable), Shah Ali Plaza is 26 (moderate vulnerable), Muktabangla Shopping Complex is 31 (highly vulnerable) and Shah Ali Shopping Complex is 35 (highly vulnerable). A lot of people are talking about how the fire brigade in our country doesn't have the right tools or the most up-to-date training, and they aren't keeping an eye on safety measures closely enough.

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1. INTRODUCTION

At present, the problem of fire hazards has emerged as a significant concern in Bangladesh, especially within metropolitan regions. Dhaka has been significantly affected by this particular phenomenon. According to Syeda Rizwana Haque, a Supreme Court lawyer and the chief executive of the Bangladesh Environment Lawyers Association (BELA), there have been a minimum of 16,000 fire hazard occurrences throughout the nation in the last decade, resulting in the unfortunate loss of 1,590 lives [Opu \(2019\)](#). The incidence of fire accidents in Bangladesh has had a significant rise of over three times since 1997. In the year 2018, the country experienced an average of 53 fire incidents per day [Tribune \(2019\)](#). According to a report by the Fire Service and Civil Defense, a total of about 250,000 fire incidents were recorded across the nation over the period spanning from January 1, 1997, to December 31, 2018, [Hossain \(2019\)](#). According to the Bangladesh Fire Service and Civil Defense Department [BFSCDD \(2019\)](#), the year 2015 proved to be particularly detrimental in terms of financial losses, as the nation experienced an estimated loss of Tk 850 crore due to a total of 17,488 fire incidents.

According to [Islam & Hossain \(2018\)](#) the incidence of fire accidents in Dhaka city over the years 2014, 2015, and 2016 amounted to 2397, 1977, and 2953, respectively. The magnitude of economic losses resulting from fire hazard casualties in Dhaka is much higher in comparison to other cities within Bangladesh. According to [Islam & Hossain \(2018\)](#), the estimated average yearly economic loss or property damage above Tk. 400 core. According to [Islam \(2019\)](#), a study conducted by the Fire Service and Civil Defense headquarters in 2017 revealed that out of the 3,786 enterprises in Dhaka city, a mere 129 were categorized as neither "Risky" nor "Extremely Risky". Furthermore, the current state of affairs has been exacerbated by the substantial increase in population in Dhaka. According to estimations, the population of Dhaka in 2019 reached 20.628 million, resulting in a population density of 46,997 individuals per square kilometer inside the city. According to the Bangladesh Fire Service and Civil Defense [BFSCD \(2019\)](#), there has been a noticeable rise in the occurrence of fire events in the city of Dhaka, as seen in [Table 1](#).

Table 1

Table 1 Year-Wise Number of Fire Incidents and Economic Loss

Year	Number of Incident	Economic Loss (BDT) (Approximately)
2015	17,488	BDT 850,00,00,000
2016	17,173	BDT 240,43,00,000
2017	18,105	BDT 257,24,84,486
2018	19,642	BDT 385,77,35,895

Source [BFSCD \(2020\)](#), 2021

On February 20, 2019, Dhaka city was split apart by a fire in the storehouse district of Chawk bazar that claimed 70 lives [Hossain \(2019\)](#). Before the city could recover from the Chawk bazar inferno, a devastating fire broke out at FR Tower in Banani on March 28, 2019, claiming 25 lives [The Daily Star \(2019\)](#). We wait with mounting dread, for that toll to climb higher. A devastating fire occurrence broke out in third June 2010 at Nimtoli in the most densely populated part of Old Dhaka [Molla \(2019\)](#). On February 26, 2007, a demolishing fire broke out at the Bangladesh Steel and Engineering Corporation (BSEC) Bhaban in the Dhaka [Haq \(2009\)](#). In Basundhara City Complex at Panthapath, Dhaka a devastating fire gulp the upper levels of twenty story shopping center with killing 7 people and injured 20 people

on 13 March 2009, Friday at about 1:45 pm [Tabassum et al. \(2014\)](#). [Rahman & Islam \(2019\)](#)

Dhaka city the heart of Bangladesh mostly observed fire hazards causes to cities high-density population, combustible building equipment's, parochial roads [Rahman et al. \(2020\)](#), improper water supply and day by day reduced water sources [Rahman \(2021\)](#), [Rahman & Cornia \(2020\)](#), [Mahmud et al. \(2020\)](#), [Rahman et al. \(2019\)](#), hanging electric cable and wire, chemical factories within residential areas alongside inadequate skills response and emergency preparedness [Rahman \(2021\)](#), [Rahman et al. \(2020\)](#), [Chakrabarty et al. \(2020\)](#) among local pupil and the concerned authority [Maniruzzaman & Haque \(2007\)](#). Commercial and mixed land use areas are comparatively more vulnerable in Dhaka to a fire Hazard [Rahman & Islam \(2019\)](#). Narrow road [Khan & Rahman \(2019\)](#) and other settings like hospital access [Rahman \(2021\)](#), the transportation modes [Rahman et al. \(2021\)](#), the vulnerable buildings [Shawon et al. \(2021\)](#) and urban heat island [Rahman & Hosen \(2018\)](#) make it more vulnerable to fire hazard. According to the current law, the roads need to be at least nine meters wide for fire engines to pass through but 71 percent of the streets in Dhaka are too narrow for fire engines to pass through [Islam \(2019\)](#). In Dhaka the average yearly monetary loss caused by fire hazards is comparatively very high in Dhaka city compared with several cities in Bangladesh as Dhaka city is more involved in the concentration of economic and financial activities [Islam & Adri \(2008\)](#). Again, most of the area of Dhaka is haphazardly built and most of the buildings are mixed in nature which makes it more vulnerable to fire hazards. Thus, it is high time to control this threatening problem immediately.

Under these conditions, the current study aims to determine the primary reasons of the fire hazard vulnerability as well as the shopping malls' fire safety level and fire hazard vulnerability. Lastly, this research contributes to reducing the study area's shopping centers' vulnerability to fire hazards.

2. OBJECTIVES OF THE RESEARCH

The evaluation of fire hazard vulnerability and fire safety levels within specific shopping centers located in the defined study region is one of the study's main goals. Additionally, a thorough investigation will be performed to identify the underlying causes leading to these shopping centers' sensitivity to fire hazards. This investigation will help us better understand the hazards that fire accidents may present and develop solutions that will improve the overall fire safety measures in these commercial buildings.

3. STUDY AREA

Mirpur is the haphazardly built and heavily crowded mixed-use area of the Dhaka North City Corporation (DNCC). In Mirpur area under the Dhaka North City Corporation (DNCC), the following four markets are selected as study areas. The shopping centers are:

- Shah Ali Plaza (Mirpur-10),
- Mirpur Shopping Center (Mirpur-2),
- Mukto Bangla Shopping Complex (Mirpur-1),
- Shah Ali Complex (Mirpur-1)

The shopping centers were selected on the basis of some criteria like huge public gathering, location at crossing of major roads and mixed-use character of the buildings of the shopping centers.

Table 2

Table 2 Variable Matrix of the Study			
Objectives	Variable	Data type	Source of data
To evaluate the degree of fire safety and the vulnerability of the chosen shopping centers to fire in the study area.	Fire safety tools such as, <ul style="list-style-type: none"> • Emergency Exit and General Stairwell • No. of Fire Extinguishers • No. of Fire Alarms • No. of Hose Pipes • Lift with Fire Switch • Smoke and Heat Detector System • Water Reservoir • Access way • Electrical system. • Fire drill • Fire sprinkler 	Primary data	<ul style="list-style-type: none"> • Questionnaire survey • Checklist
To identify the existing fire safety management options of the government.	<ul style="list-style-type: none"> • Rules & regulations • Existing fire safety management tools 	Primary data and secondary data	<ul style="list-style-type: none"> • Dhaka North City Corporation • Fire Service and Civil Defense Department

4. EXISTING CONDITION OF THE SELECTED SHOPPING CENTERS

1) Access Way and Stories of Buildings: Firefighting equipment can reach any building according to the provided entry access. A road width of at least 9 feet is required to accommodate these appliances, and in certain cases, as much as 30 feet may be required. Since all four shopping centers are situated next to major roads, the entry ways are generally wide enough, although cars tend to crowd them. [Table 3](#) displays the height in storeys of each shopping centers.

Table 3

Table 3 No. of Stories of the Shopping Centers		
Shopping Center	No. of story	Shopping centers
Shah Ali Plaza (Mirpur-10)	14	6
Mirpur Shopping Center (Mirpur-2)	9	8
Muktobangla shopping complex (Mirpur-1)	11	8
Shah Ali Complex (Mirpur-1)	6	5

Source Field Survey, 2021

2) Emergency Exit and General Stairwell: Emergency exit is a way of escape in the event of a fire or any emergency which makes the stairwells inaccessible inside the building. A field survey was conducted at study areas shopping centers to gather data about emergency exits. The number of emergency exits in the Mirpur shopping centers was obtained as 2. The other

three malls do not have any clearly marked emergency exits. Only the Mirpur shopping center on Mirpur-2 has an emergency staircase; the other three malls only have regular staircases, which may be somewhat overcrowded. As a result, during the fire hazard accident time, the people cannot move easily.

- 3) **Fire Extinguisher:** In maximum shopping centers fire extinguishers are available, but the amounts are not sufficient in some shopping centers. In Shah Ali shopping complex of Mirpur-1, the amount of fire extinguishers is very insufficient and in the case of Muktabangla market both the quantity and quality of the fire extinguishers are low. The numbers of fire extinguishers in the surveyed shopping centers are given below:

Table 4

Table 4 No. of Fire Extinguishers in Buildings	
Shopping centers	No. Fire Extinguishers
Shah Ali Plaza (Mirpur-10)	47
Mirpur Shopping Center(Mirpur-2)	102
Muktabangla shopping complex(Mirpur-1)	23
Shah Ali Complex (Mirpur-1)	5

Source Field Survey, 2021

- 4) **Hose Reel:** Hose reel is a flexible pipe for carrying water and an important factor to assess fire safety of the apartment. Among the surveyed shopping centers, maximum shopping centers provide this fire equipment's, but maximum are very poor quality.

Table 5

Table 5 No. of Hose Reel in Buildings	
Shopping Centers	No. of Hose reel
Shah Ali Plaza (Mirpur-10)	0
Mirpur Shopping Center(Mirpur-2)	10
Muktabangla shopping complex (Mirpur-1)	0
Shah Ali Complex (Mirpur-1)	0

Source Field Survey, 2021

- 5) **Fire Safety Sign and Symbol:** Necessary fire safety sign and symbols such as "Emergency Exit Sign, no smoking area, Electrical F.D.B awareness sign etc." are not present in the most of the surveyed shopping centers. Only Mirpur Shopping Center has some of the fire signs and symbols present in adequate quantity, but the other's condition is very low.
- 6) **Standpipe:** It contributes a lot for supplying water during fire hazard. In Mirpur shopping center the hose reel box is connected with the standpipe. Standpipe was mainly kept inside the wall of the buildings. In other three shopping centers, standpipes are not available at all.
- 7) **Transformers and Risky Electric Poles:** An electric pole is a column that is used to help upper electricity lines and some different utilities for example, cable, fiber optic cable and associated material like streetlights and transformers. Location of electric poles and transformers have high impact on fire vulnerability of an area. Electric poles located within 10 feet distance of a building, increase the building's vulnerability. However, there are

numerous different kinds of electric poles and transformers all around the shopping malls.

- 8) **Smoke and Heat Detector System:** Smoke detector and heat detector are devices that detects smoke and heat respectively. In the study area we have collected this information by survey of the shopping centers. For using smoke detector, it is required to ensure the environment is free from any smoke. In the four-shopping center, no smoke detector was found.
- 9) **Lift with Fire Switch:** Fireman switch, fire switch, lift fireman switch whatever it is, is a very important device in lift which is used to escape from fire. It is used in emergency situations. When fire catches, this button is pushed to get the lift landed into the first floor in order that the fireman can control the fire. Lift lobby is attached with main lobby. Fire switch is only available in the Mirpur shopping center and in the case of the other three it has not been identified.
- 10) **Nearby Water Sources:** There are no water sources in all the side of the shopping centers. For any kind of firefighting, water is very much essential for firefighting because the existing water reservoir is not sufficient to cover the whole firefighting process. Fetching water from any lake is very helpful for firefighting. Not only these areas but also the whole Dhaka has no street fire hydrants arrangement along with just one natural water sources which can be of no help, the fire fighters naturally will have to turn the deficiency of water during the firefighting in this area. So, government need to provide adequate water sources like street water pumps or ensure that every building preserves water for emergency purposes like fire outbreaks through provision in related acts and laws.

5. ASSESSMENT OF FIRE HAZARD VULNERABILITY

By giving values to a few pre-selected fire safety or fire risk-related factors (or attributes), this method combines them mathematically to produce a single vulnerability index that quantifies the fire vulnerability of the particular building.

- 1) **Score for shopping center vulnerability** = Weight for accessibility(10) × (1 for No access or 0 for Access) + Weight for open space in between two apartments(5) × (0 for Not vulnerable or 1 for vulnerable for narrow space) + Weight for transformer and power line(4) × (0 for Not vulnerable or 1 for Vulnerable considering power line or transformer)+ Weight for emergency exit(10)× (0 for Having emergency exit or 1 for Without emergency exit) + Weight for fire alarm(7) × (0 for Having fire alarm or 1 for Without fire alarm). (Source: Expert opinion survey,202)

Vulnerability Score for Shah Ali Plaza

$$=10 \times 0 + 5 \times 1 + 4 \times 1 + 10 \times 1 + 7 \times 1 = 0 + 5 + 4 + 10 + 7 = 26 \text{ (Moderate Vulnerability)}$$

Vulnerability Score for Mirpur Shopping Center

$$=10 \times 0 + 5 \times 0 + 4 \times 1 + 10 \times 0 + 7 \times 1 = 0 + 0 + 4 + 0 + 7 = 11 \text{ (Moderately Low Vulnerable)}$$

Vulnerability Score for Muktobangla Shopping Complex

$$=10 \times 1 + 5 \times 0 + 4 \times 1 + 10 \times 1 + 7 \times 1 = 10 + 0 + 4 + 10 + 7 = 31 \text{ (High Vulnerability)}$$

Vulnerability Score for Shah Ali Complex, Mirpur-1
 $=10 \times 1 + 5 \times 1 + 4 \times 1 + 10 \times 1 + 7 \times 1 = 10 + 5 + 4 + 10 + 7 = 35$ (High vulnerability)

2) Calculating Fire Safety Rating (FSR) Value: After completing the survey, obtained grade points are given on the basis of different legislation's standards. Then FSR is found by following procedure. After the summation of all Weights and Achieved Values of all parameters. Then the total of achieved values is divided by the total weights and finally multiplying with 100, the Fire Safety Rating (FSR) is calculated.

FSR= (Total achieved values/ Total weights) *100

The FSR Value ranges from 0 to 100. The FSR value illustrates the entire safety of that category. The higher value represents the higher safety. By aggregating all the factors, the fire safety level was calculated. Here high score indicates higher safety level and low score indicate low safety level. High safety level decreases the vulnerability of the buildings.

Table 6

Table 6 Obtained Values of Different Shopping Center According to Fire Experts					
Factors	Importance Value	Marks/values Obtained			
		Shah Ali Plaza	Mirpur S.C	Muktobangla S.C	Shah Ali Complex
Accessibility	10	8	9	5	6
Fire station	6	4.25	5	3	3
Power lines	7	6	4	6	6
Transformer	4	3	1	4	4
Open space in between two apartments	5	3	4	3	3
Nearest water sources	8	2	2.5	3	3
Fireextinguisher	10	4	8	3	1
Hose reel	8	0	6	0	0
Fire alarm	7	0	0	0	0
Smoke detector	7	0	0	0	0
Heat detector	7	0	0	0	0
Water reservoir	8	4	4	3.5	3
Standpipe	6	0	4	0	0
Emergency exit	10	0	10	0	0
Exit sign	8	3	5	0	0
Lift with fire switch	3	1	2	0	0
Total	114	38.25	64.5	30	29

Source Field Survey, 2021

3) Fire Safety Level Score of Shah Ali Plaza: By aggregating all the obtained safety marks from the checklist, the fire safety level is calculated as following:

Table 7

Table 7 Fire Safety Level of Shah Ali Plaza				
Factors	Importance Value	Obtained Marks	Shopping center's Safety Score in Percent	Safety Level
Accessibility	10	8		Average safety
Fire station	6	4.25	33.55	
Power lines	7	6		
Transformer	4	3		
Open space in between two apartments	5	3		
Nearest water sources	8	2		
Fire extinguisher	10	4		
Hose reel	8	0		
Fire alarm	7	0		
Smoke detector	7	0		
Heat detector	7	0		
Water reservoir	8	4		
Standpipe	6	0		
Emergency exit	10	0		
Exit sign	8	3		
Lift with fire switch	3	1		
Total	114	38.25		

Source Field Survey, 2021

- 4) **Fire Safety Level of Mirpur Shopping Center:** The fire safety level of Mirpur Shopping Center was calculated by aggregating all factors. Here high score indicates higher safety level and low score indicate low safety level.

Table 8

Table 8 Fire Safety Level of Mirpur Shopping Center				
Factors	Importance Value	Obtained Marks	Shopping center's Safety Score in Percent	Safety Level
Accessibility	10	9	56.57	Excellent safety
Fire station	6	5		
Power lines	7	4		
Transformer	4	1		
Open space in between two apartments	5	4		
Nearest water sources	8	2.5		
Fire extinguisher	10	8		
Hose reel	8	6		
Fire alarm	7	0		
Smoke detector	7	0		
Heat detector	7	0		
Water reservoir	8	4		
Standpipe	6	4		
Emergency exit	10	10		
Exit sign	8	5		
Lift with fire switch	3	2		
Total	114	64.5		

Source Field Survey, 2021

5) Fire Safety Level of Mukto Bangla Shopping Complex: The fire safety level of Mukto Bangla Shopping Complex was calculated by aggregating all factors.

Table 9

Table 9 Fire Safety Level of Mukto Bangla Shopping Complex				
Factors	Importance Value	Obtained Marks	Shopping center's Safety Score in Percent	Safety Level
Accessibility	10	5	26.75	Poor Safety
Fire station	6	3		
Power lines	7	6		
Transformer	4	4		
Open space in between two apartments	5	3		
Nearest water sources	8	3		
Fire extinguisher	10	3		
Hose reel	8	0		
Fire alarm	7	0		
Smoke detector	7	0		
Heat detector	7	0		
Water reservoir	8	3.5		
Standpipe	6	0		
Emergency exit	10	0		
Exit sign	8	0		
Lift with fire switch	3	0		
Total	114	30		

Source Field Survey, 2021

6) Fire Safety Level of Shah Ali Complex, Mirpur-1: The fire safety level of Shah Ali Complex, Mirpur-1 was calculated by aggregating all factors.

Table 10

Table 10 Fire Safety Level of Shah Ali Complex, Mirpur-1				
Factors	Importance Value	Obtained Marks	Shopping center's Safety Score in Percent	Safety Level
Accessibility	10	6	25.44	Poor Safety
Fire station	6	3		
Power lines	7	6		
Transformer	4	4		
Open space in between two apartments	5	3		
Nearest water sources	8	3		
Fire extinguisher	10	1		
Hose reel	8	0		
Fire alarm	7	0		
Smoke detector	7	0		
Heat detector	7	0		
Water reservoir	8	3		
Standpipe	6	0		

Emergency exit	10	0
Exit sign	8	0
Lift with fire switch	3	0
Total	114	29

Source Field Survey, 2021

The Principal Causes Which Contribute to Shopping Center Fire Hazards

- Congested access way.
- Inadequate fire equipment.
- No nearby water source is found in close proximity to extinguish fire.
- Making living arrangements in the basement.
- In most cases, staircases aren't effortlessly visible for fast escape.
- Lift lobby is attached with main lobby and enclosed by shops.
- Use of combustible gypsum boards as ceiling material.
- Shortage of disclosure protection.
- Insufficient public protection (i.e., inadequacies of fire department).
- Inadequate own fire protection (i.e., absence of fire experts and fire drill).

6. MAJOR FINDINGS

This study was conducted to identify existing fire safety management options of the government and assess the fire safety level of the selected shopping centers. An extensive observation survey was conducted in the study to carry out the research successfully. After collecting all the relevant information from the study area and other sources, the data was analyzed very carefully. By analyzing these data, the following findings are found.

1) Mixed Use: The majority of the surveyed shopping centres are high rise and mixed use, which exacerbates the fire vulnerability and increases the fire risk. Specifically, Shah Ali Plaza and Muktabangla S.C have high vulnerability due to mixed use. The following chart shows the mixed use of the shopping centres by the total stories and number of shopping stories.

Figure 1

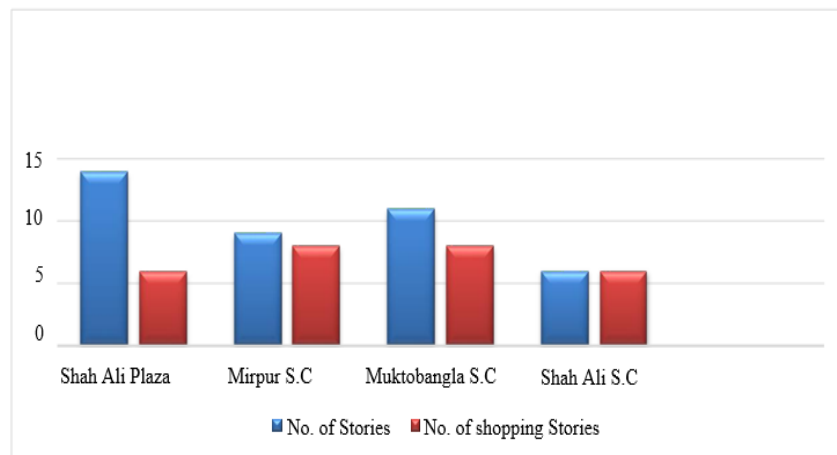


Figure 1 Shopping Centres in Terms of Shopping Stories

- 2) **Accessibility:** The majority of the studied shopping complexes are situated along major thoroughfares, so the roads are broad enough for fire trucks to travel on them, but the issue is that most of the time the roads are still utilized. The access way of Mirpur shopping center is sufficiently wide and accessible but for the case of other three accessibility is not that satisfactory.
- 3) **Emergency Exit:** Only the Mirpur shopping center has an emergency exit, while the other three have no designated emergency exits at all, making the shopping centres more flammable and lowering their degree of safety.

Figure 2

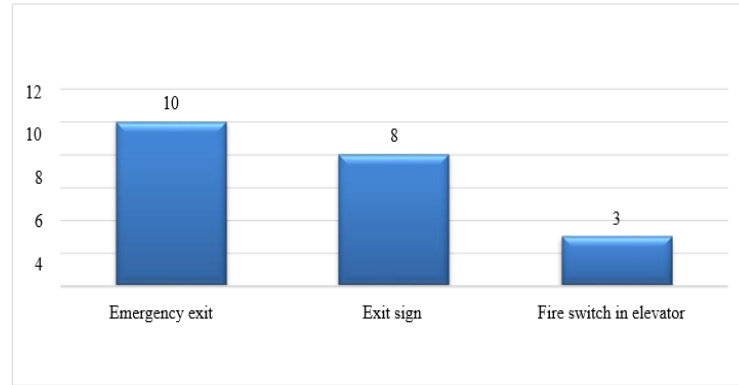


Figure 2 Shopping Centers in Terms of Importance Value

- 4) **Fire Sign and Symbols:** In Mirpur shopping center some of the necessary fire signs and symbols are present in though they are not adequate in quantity but in Shah Ali Plaza, Muktabangla S.C and Shah Ali S.C there is no sign and symbol for fire safety.
- 5) **Electric Poles and Transformers:** Various kinds of electric poles and transformers are densely positioned all around the shopping areas. Especially Shah Ali S.C is totally surrounded with electric poles and transformer. The three sides of these shopping centers have different cables lines which increases the fire hazard vulnerability of the shopping center.
- 6) **Fire Equipment:** Most of the surveyed shopping centers are ill-equipped with fire equipment. Except Mirpur shopping center, the other three shopping centers have the only fire equipment is fire extinguishers, and the amount is not noteworthy as well.

Figure 3

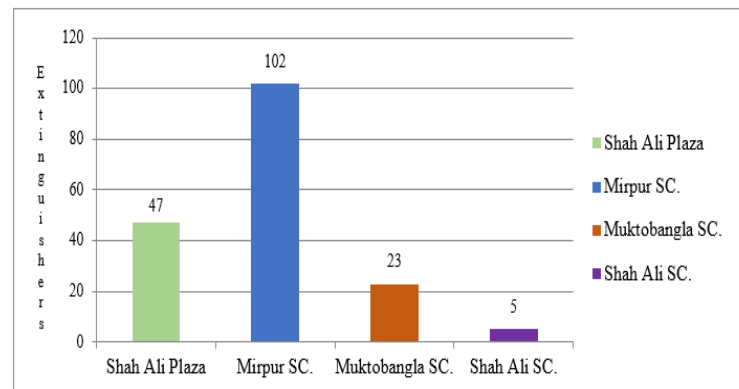


Figure 3 Shopping Centers in Terms of Extinguishers

- In Mirpur shopping center the number of fire extinguishers are 102, In Shah Ali Plaza, the number of fire extinguishers are 47 and in Muktoabangla plaza, the approximate number of fire extinguishers are 23. The worst condition is available in Shah Ali Complex with only 5 fire extinguishers.
- Old and expired fire extinguishers are found in Muktoabangla S.C. Here Fire extinguishers are not easily visible as well.
- In Mirpur shopping center the approximate number of Hose reels are 8 hose reels are also kept inside boxes and connected with standpipe as well. But in Shah Ali laza, Muktoabangla S.C and Shah Ali S.C there is no Hose reel at all.
- Some fire sprinklers are found in the basement of the Mirpur shopping center but in other shopping centers sprinklers are not present at all.
- No Shopping Centers provide fire alarm, smoke, and heat detectors etc. vital equipment for fire safety.
- Most of the modern fire equipment are absent in most of the shopping centers. Hence, their obtained grade in fire equipment is very low as well.

Figure 4

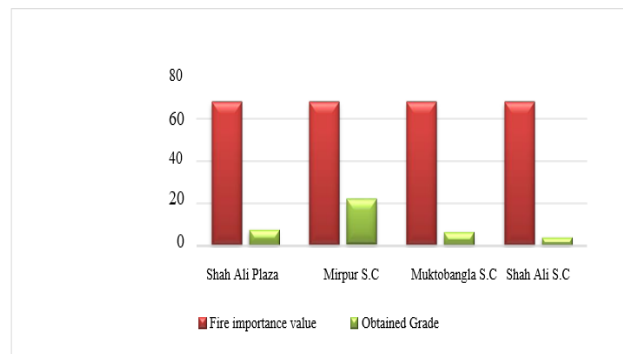


Figure 4 Fire Equipment Scenario Shopping Centers

7) Fire Safety Level

- The fire safety score of Shah Ali Plaza is 33.55 which is average in safety level.
- The fire safety score of Mirpur Shopping Center is 56.57 which is excellent in safety level.
- And the fire safety score of Shah Ali Complex and Muktoabangla is 25.44 and 26.75 respectively which is poor in safety level.

Figure 5

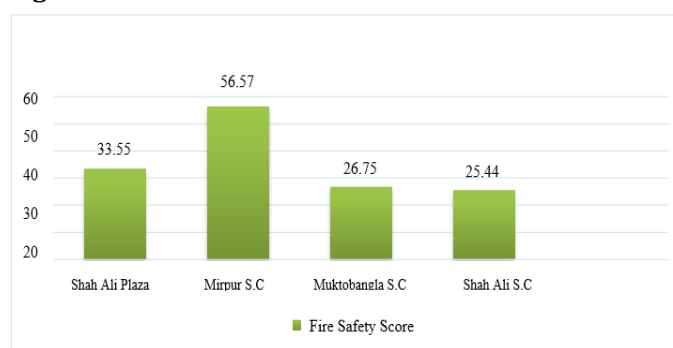


Figure 5 Fire Safety Score Shopping Centers

8) Fire Vulnerability Level

- The Fire hazard vulnerability score of Shah Ali Plaza is 26 which indicates moderate vulnerability.
- The Mirpur S.C is less vulnerable to fire hazard and its vulnerability score is 11.
- The Fire hazard vulnerability score of Muktabangla S.C is 31 which indicates High vulnerability.
- The Shah Ali S.C is also highly vulnerable to fire hazard and its vulnerability score is 35.

Figure 6

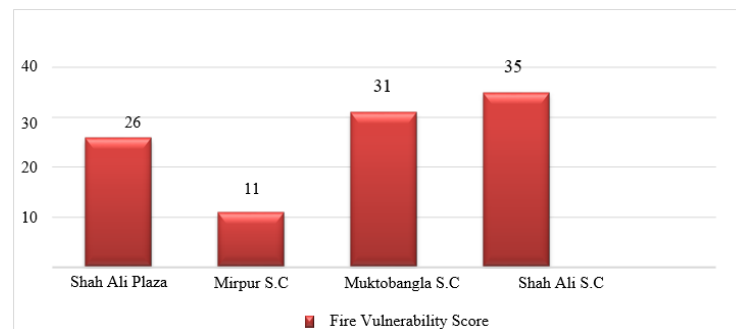


Figure 6 Fire Vulnerability Level of Shopping Centers

7. OTHER FINDINGS

- No nearby water source is found in close proximity to extinguish fire in case of emergency.
- Small garments in the basement of the Muktabangla S.C makes it more vulnerable to fire hazard and it will be hard to evacuate as well.
- Absence of daylight in the basement parking is very common in all the surveyed shopping centers which increases vulnerability to fire.
- In most cases, staircases aren't effortlessly visible for fast escape in case of difficulties and emergencies, especially in Shah Ali Plaza.
- Lift lobby is attached with main lobby and further enclosed through shops, their displays etc. especially in Shah Ali Complex.
- Combustible gypsum boards which are generally used as ceiling material that increase the fire incidence related risk.
- Based on the above analysis, it is clear that risk of fire incidence and firefighting process is not addressed properly in our country. In almost all cases, means of escape doesn't work properly. Firefighting equipment are not maintained properly. Inadequate oversight of safety procedures and a lack of sufficient equipment and modern training methods for the fire brigade in our nation are also current issues that are being debated widely.

8. CONCLUSION

In Bangladesh, shopping center has learned a remarkable growth during the last decade. An increasing number of shopping centers are currently air-conditioned

with elevator and escalator facilities. This research has focused on the assessment of the vulnerability and safety level of some selected shopping centers. The existing fire hazard management options and tools are not sufficient to lower the fire hazard vulnerability of these shopping centers. Moreover, the existing policies and directives are not followed anywhere, which increases the vulnerability to a great extent. Consequently, it is indispensable need to make our people more aware about fire related incidence. It is time to incorporate the government and non-government concerned authority to carry eligible attitudes to overcome the challenges and to assure sufficient public safety at high- rise shopping center. It is the responsibility of the market management to ensure safe and secure shopping malls for their market personnel as well as their valued customers. Employment of fire experts and taking fire drills on a regular basis is also highly recommended.

CONFLICT OF INTERESTS

None.

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