Didactic Analysis Of Active-Passive Fire Safety Measures In Tejuosho Ultra Modern Market Complex, Yaba, Lagos

Didactic Analysis Of Active-Passive Fire Safety Measures In Tejuosho Ultra Modern Market Complex, Yaba, Lagos.

P. A. Aderonmu [1] and O. V. Eghobamien [2]
[1]Department of Architecture, Covenant University, Ota, Ogun State, Nigeria
[2] Department of Architecture, Covenant University, Ota, Ogun State, Nigeria
Corresponding Author; eghobamien.omarosa@gmail.com, +2349097576659

Abstract-
Fire outbreaks are a leading cause of loss of property and lives in the Nigerian market scene and its neighbouring areas. Although this menace of market fire outbreak has been a recurring index since the early 2000s up till now, a lot of marketplaces still do not have standard fire protection measures in place to prevent fire spread. Neither are they adequately equipped for efficient fire outbreak control. This study investigated the existing active and passive fire safety measures adopted in Tejuosho ultramodern market to create policy guidelines for effective fire safety management practices. This study was carried out in Tejuosho market, Yaba, Lagos because it is one of the most recent market developments where effective fire protection strategies were put in place. Primary data for this research was obtained employing observation and questionnaires. The study revealed that all the active fire protection measures put in place have been well maintained, regularly serviced, highly effective and supported by the passive measures. This study recommended didactic procedures and strategies accessible to the market users and traders whenever an emergency fire outbreak occurs.
Key words: fire safety, active fire safety measures, passive fire safety measures

1. Introduction

Market places started as open-air spaces with traders displaying their wares and buyers moving around to buy what they wanted. These markets had no structure built up for protection against weather elements except in some cases where small wooden stands were built to display wares. Although there are still quite a lot of major markets in Nigeria which are the same, the infrastructure has evolved to accommodate more modern facilities. Markets are very important to people in Nigeria as they serve as a way for individuals to earn a living as well as a social hub for interaction and commerce [1]. It is due to the social factors of interaction and entertainment that it is important for active and passive fire safety measures to be put in place for the protection of the lives and property of the users. While a market complex comprises of a group of commercial establishments located in a building or group of buildings in the same area owned and managed as a single property. With the high economic values of these properties, fire outbreaks have been a leading cause of loss of property and lives in the Nigerian market scene and its neighbourhood. Generally, most recently was the reported fire outbreak incidents at Water board IDP Camp on 12th March 2020, and fire outbreak recorded on 22nd March 2020 at about 12:10 P.M in Monguno Local Government Area, Borno State which left 248 individuals without shelters and properties at Water board IDP Camp [2]. Although the menace of fire outbreak in market places has been a recurring index since the early 2000s.

The frequency of market fire outbreaks is at an all-time high. In past times, numerous markets within and outside Nigeria have had instances of fire outbreak which have all resulted in significant losses [3]. But in terms of fire outbreak market places within the last four months of 2019, there were no less than ten major incidences that caused significant damage to lives and property. These fire outbreaks resulting from human activity include failure to put out lit cigarettes before disposal, gas leaks from gas cylinders, overloading of electrical sockets, improper fuel storage and lack of fire safety awareness.

Active fire safety measures refer to those put in place within the building to put out fires after an outbreak has already occurred. They can also be called firefighting equipment and are important when it comes to handling fire emergencies [1]. These safety measures are mechanical and include fire extinguishers, sprinklers, total flooding protection, and hose reels. Passive fire safety measures, on the other hand, include those that are implemented in the design of a facility to prevent fire outbreak occurrences, fire spread and enable effective access to a fire by fire fighting personnel after a fire occurs. Some passive safety measures include compartmentalization, the use of adequate corridor widths and lengths, the use of non-combustible building materials and provision of easy accessibility for firefighting personnel among others. Good fire safety is achieved when both the active and passive fire measures put in place work together to create a comprehensive fire safety system.

The Study Area is Tejuosho Ultra-modern Market in Yaba, Lagos. The scope of this study covers the main Tejuosho ultramodern market complex building. This market was chosen because in a state such as Lagos where a high level of commercial activities take place, Tejuosho market is one of the most modern and well maintained market places with functional facilities. It was rebuilt after a fire outbreak which occurred in December 2007 destroyed the previously existing structure. Yaba is a Local Government Area in Lagos state which is located in the South-Western part of Nigeria. The aim of the study carried out is to identify the existing active and passive fire safety measures adopted in Tejuosho ultramodern market to create a didactic guideline for markets' stakeholders to follow for effective fire safety management practices. This will be achieved through the following objectives: identifying the existing active and passive fire protection measures and assessing the effectiveness of the fire protection measures put in place in Tejuosho ultramodern market.

Fire in the context of this study is described as a fast, self-sustaining process of oxidation which is accompanied by the production of heat and light in varying degrees of intensities [4]. It is created as a result of four elements; a fuel, a source of ignition, an oxidizing agent which is usually atmospheric oxygen and a mechanism of the reaction [4]. This means that these four elements have to be present before a fire can be created. Although another study carried out by [5], states that fire comes about as a result of three elements which are fuel, heat and an oxidizer.

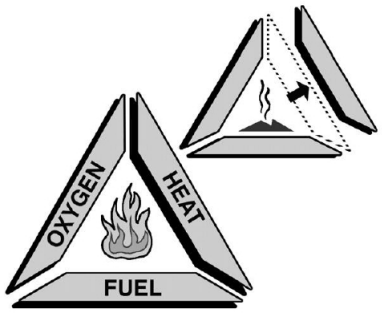

Fig 1: The fire triangle showing the components of Fire

Source: Donald et al (1999), Time saver standards for architectural design data

A study carried out by [3] has shown that fire is the leading cause of loss of lives and property in commercial and industrial facilities worldwide. The records of losses from fire incidences in Nigeria are so many, this indicates that more work needs to be done by researchers to find more techniques that can be implemented to prevent fires. Past studies have attributed all causes of fire to be human factors which can be avoided with enough care [3]. [4] also found that the major causes of fires in market places in Ghana has been electrical problems arising from faulty wiring and also the misuse of electrical gadgets.

Active fire safety measures according to [6], comprises of either manual or automatic fire protection systems put in place which include but are not limited to fire extinguishers, fire hydrants, sprinkler systems, fire alarm systems and smoke detectors. While passive fire protection includes systems that are built into the physical fabric of the building such as fire doors, emergency exits, stairs and muster points [6].

2. Methodology

The study population includes all the active and passive data measures put in place in Tejuosho ultramodern market building. Data for this study was collected through the use of an observation schedule as well as questionnaires. The questionnaires were administered to users of the market complex who include traders, salespersons and administrative officials. The data which was collected via observation in the Tejuosho ultramodern market building consisted of information regarding the existing passive and active fire protection measures including the availability and effectiveness of fire extinguishers, fire hose reels, fire hydrants, sprinklers, fire alarms, emergency exits, emergency stairs and muster points.

The first objective was achieved through the use of an observation schedule. The availability of active and passive fire protection measures was documented on the schedule. The second objective was achieved by analyzing data gotten with the use of questionnaires administered to salespeople, administrative officials and security personnel. A limitation faced in this study was that salespeople were mostly unable to fill in questionnaires adequately as they were busy

managing sales in their shops which led to less amount of information than expected being generated.

3. Results and discussion

There were adequate fire protection services available in Tejuosho ultramodern market such as ample exit points as well as exit stairs. There was an exit point and two exit stairways in every wing of the market building. Also frequently serviced and up to date fire extinguishers and fire hose reels were available on each floor of each wing of the market. Functioning and well-equipped smoke detector and a sprinkler system have been put in place as an emergency measure as well to put out fires in case they occur.

Table 1: Observation schedule showing the availability and effectiveness [FG6] of active and passive fire protection measures in Tejuosho Ultramodern market

S/N	Fire feature	Absent	Low	Moderate	High	Very High
1.	Corridors and exits are kept free of obstructions and hazardous materials				*	
2.	All electrical panels have a panel cover/door placed on them					*
3.	Fire extinguishers are available					*
4	Fire extinguishers are up to date					*
5.	Fire extinguishers are unobstructed				*	
6.	Fire extinguishers are accessible					*
7.	Fire extinguishers are placed in locations where they can reach every part of the market effectively					*
8.	Fire alarm stations are clearly labeled, unobstructed, and accessible	*				
9.	Adequate exit points from the building				*	
10.	Fire resistant building materials and finishes				*	
11.	Fire doors (Compartmentalization)		*			
12.	Adequate corridor sizes				*	
13.	Effective placement of electrical control points					*
14.	Adequate stairs/ramps					*

The figures below show some of the active and passive fire protection measures available:

1. Active Fire Protection Measures

Fig. 2. Hose reels
Source: Author's fieldwork (2019)

Fig. 3. Sprinkler systems
Source: Author's fieldwork (2019)

Fig. 4. Fire extinguisher
Source: Author's fieldwork (2019)

2. Passive Fire Protection Measures

Fig. 5. Sign indicating staircase
Source: Author's fieldwork (2019)

Fig. 6. Sign showing fire emergency procedures
Source: Author's fieldwork (2019)

Fig. 7. Adequately wide corridor
Source: Author's fieldwork (2019)

Fig. 8. Atrium
Source: Author's fieldwork (2019)

With regards to examining the effectiveness of the existing passive and active fire protection measures in place in the facility, the questionnaires distributed to users gathered the following data:

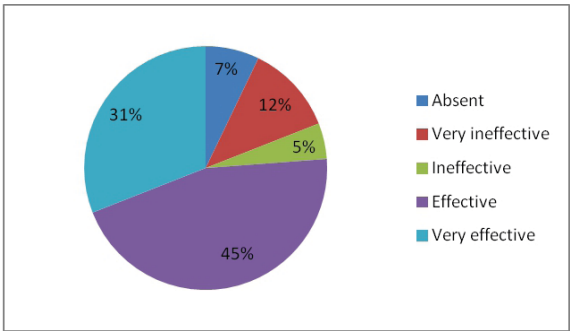

Fig. 9. Chart showing the effectiveness of fire extinguishers available in Tejuosho market

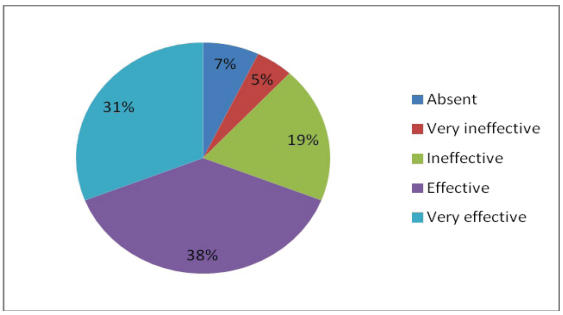

Fig. 10. Chart showing the effectiveness of hose reels available in Tejuosho market.

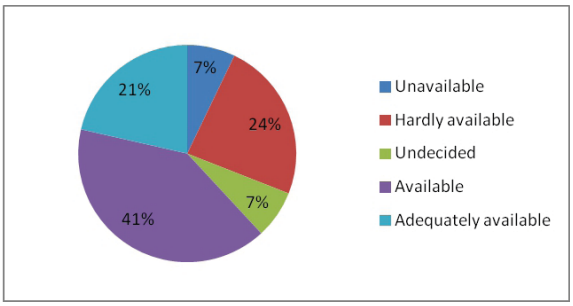

Fig. 11. Chart showing the availability of sprinklers in Tejuosho market.

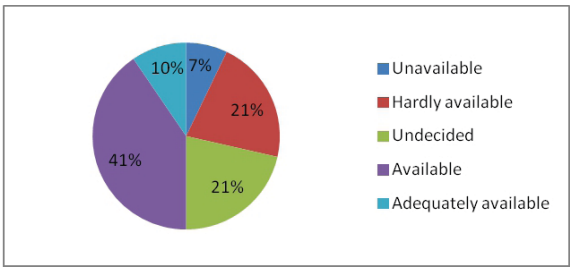

Fig. 12. Chart showing the availability of adequate space between shop blocks.

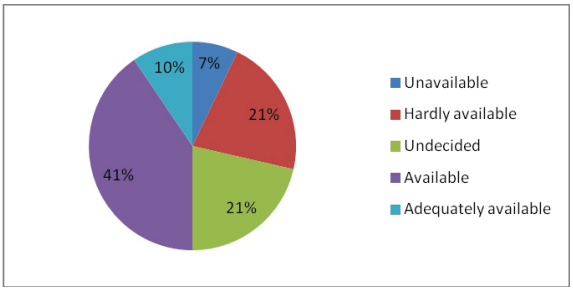

Fig. 13. Chart showing the availability of adequate space for fire services to access the buildings in case of a fire emergency.

As seen in the charts from fig 8 to 12, majority of the questionnaire respondents confirmed that all the existing active fire safety features in place in Tejuosho market are effective and passive features allowing for accessibility and easy circulation have also been made available.

4. Conclusions

From the study carried out, it is evident that active and passive fire protection services are adequate in Tejuosho ultramodern market. From the observation carried out by this investigation, it was observed that there were different active fire protection measures in place at suitable distances from each other. The fire extinguishers and hose reels are located at each corridor on each floor level with adequate distance between them. This equipment was provided and serviced regularly for effective use when required. All of the existing fire protection equipment have also been properly maintained and replaced when due. Although, the market structure is not well compartmentalized which would have caused the spread of fire rapidly in the event of a fire outbreak.

The recommendations from this study are stated below.

The following Didactic guidelines were made as recommendations for stakeholders like government agents, investors, architect-designers, engineers, planners and allied professionals:

1. Marketplaces need to be designed following the operational fire standards for commercial facilities; with the placement of symbols, signs and writings on the walls of the markets and billboards around market areas.

2. Regular seminars and outdoor lectures should be organized for markets. The major market users should be enlightened on the ways to operate fire emergency equipment as well as the proper procedures to follow in the event of a fire outbreak.

3. Designing markets in separate blocks with adequate distance from each other is a form of compartmentalization which would prevent a wide spread of fire as well as allow for easier access to the fire by fire service personnel.

The study did not check that the market facility conforms to the existing standards of its location. This is a gap in the study on which further research can be carried out.

Acknowledgements
The authors wish to acknowledge the financial support offered by Covenant University in actualization of this research work for publication.

Reference

[1] Odaudu, U. S., Zubairu, S. N., & Isah, A. D. (2019). Analysis of Active Fire Protection Measures in Garki Model Market of the Federal Capital Territory of Nigeria. *British Journal of Earth Sciences Research*, 1-8.

[2] International Organization for Migration (2019). World Migration Report 2020. Geneva: International Organization for Migration.

[3] Ilodiuba, N., Nwaogazie, I. L., & Ugbebor, J. (2017). Awareness Assessment of Hazardous Activities and Effects on Market Fire in Nigeria. *International Journal of Health, Safety and ENvironments*, 48-58.

[4] Addai, E. K., Tulashie, S. K., Annan, J.-S., & Yeboah, I. (2016). Trend of Fire Outbreaks in Ghana andWays to Prevent These Incidents. *Safety and Health at Work*, 1-9.

[5] Popoola, A. (2016). Analysis of Causes and Characteristics of Market Fires in Lagos State Nigeria. *International Journal of Agriculture and Rural Development , 19* (1), 2407-2421.

[6] Suryoputro, R., Fajar, B., Amarria, S., & Rahmillah, F. (2018). Active and passive fire protection system in academic building KH. Mas Mansur, Islamic University of Indonesia. *Matecs Web of Conferences*, (p. 154).