

Examine the Practice of Fire Safety Management in Building

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ABSTRACT

Proper fire safety management practice is critical for effective control of fire at both construction and post-construction stage of the building. Therefore, effective fire safety management practice plays an essential role in enhancing the safety of the occupants, building, and its contents against fire disaster. The purpose of this paper is to examine the practice of fire safety management in Nigeria at post-construction stage of buildings. The components of fire safety management in buildings are discussed, the impacts of these components were considered with respect to their level of their implementation of fire safety management in building. A structure questionnaire was prepared and administered in order to determine the level of fire safety performance in building, relative importance index was calculated to rank the components. It was found that fire safety training factor of fire safety management rank first and it has higher influence in the fire safety awareness of the building's occupants and public. The finding revealed that the standard level of fire safety awareness among the public is very poor, which normally led to the primary causes of fire injury, death, and destruction of property. Adequate fire safety training is thereby proposed in order to enhance fire safety knowledge of the building occupants and general public for the achievement of fire safety objectives.

Keywords:

Debris flows; disaster risk reduction;
agencies; social-based study

1. Introduction

Effective fire safety management is very critical in the concept of ensuring absolute safety of buildings. Fire safety management is an application of policy, tools, standard, information, and practice of the task of analysing, evaluating, and controlling fire safety by the managers of buildings [1]. In addition, fire safety management is a system that involve the mixture of coordination of some activities or program in preventing the destruction of property from fire [2-3]. Fire safety in a building is the acts of minimizing the level of fire risk exposed to by the buildings and its occupants and any attempt to increase the level of fire risk, and there will an increase on the level of risk expose by the building occupants, building and its contents [4], fire disaster occurrence, and emergence in Nigeria have significantly increases in the last decade, particularly in the recent times. Recent studies have shown that increase in the population and social-political problems has led to scarce resources and inadequate budgetary provision to tackle the issues of fire safety in Nigeria [5].

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Fire disaster can be caused by several factors of which some are attributed to the fault of the occupants, management, and non-compliance to the relevant legislation and standard. The recent fire outbreak in Nigeria is worrisome; therefore, all stakeholders in the building industry most work together to develop a strategy to tackle this ugly incident [6]. The likelihood of fire outbreak is usually depending on the standard of fire safety management practices and its appropriateness of its implementation [7]. The complexity of the current building's construction approaches leads to the concerned about development and implementation of the standard fire safety management in order to achieve the desire fire safety objectives. Proper fire safety management practice prevents the fire disaster occurrences by controlling the level of fire risk the buildings occupant exposes and ensuring that the installed fire safety system is functional, hence establishing robust maintenance procedures, making provision for an organized approach to safe the occupants, and arranged evacuation of the building in the event of a fire.

Therefore, the modern building is more of the complex in nature. Hence, a more practical technique to tackle the complex nature of the current buildings in terms of fire safety is required [8-9]. The results from the recent fire statistics in Nigeria revealed the annual rate of likelihood of fire disaster occurrences in buildings than any other facilities. Therefore, buildings are regarded as a call point for all sundry for the purpose of business, shelter, and serve as an interactive point. Furthermore, it is an important part of the economy and often refer to as a driver of economic growth especially in the developing countries. Therefore, this critical aspect of economic driver should not leave without proper attention as the record has shown that several fire outbreaks across the Nigeria has led to the loss of lives and property worth billions of naira across the country. Hence, this ugly situation mostly continuous as a results of ineffective fire safety management. Thus, this study focused on examining the practice of fire safety management in Nigeria.

1.1 Fire Safety Management Program in Building

Presently, ineffective fire safety management implementation has become more recognized as a problem in the building industry for various reasons. One of the primary purposes is the high-risk of fire expose to by the building occupants and its contents in the work environment, which could have a significant influence on the achievement of fire safety objectives. Building and its environment are required to offer a comfortable, conducive working atmosphere, provide opportunities for the occupants to interacts, participate in the combined activities, and take shelter; as such, there are needs for high safety measure against fire disaster to safeguard the property and the life of the occupants. Hence, proper fire safety management program is critical to achieve optimum safety in building.

Previous studies have proven that proper fire safety management implementation in the building can help in achieving an acceptable fire safety objective [3]. Wardani [10] suggested that the implementation of proper fire safety management could be a help in tackling other activities. Chow and Gigi [11] revealed that the uses of proper fire safety management to educate the building occupants and public in the United Kingdom caused the numbers of death, injuries, and property destruction experience 0.99% reduction in the numbers of causality [10]. Chow and Gigi [11] stated that fire safety standard could be achieve through an effective fire safety management implementation. In addition, studies have been carried out to identify several factors, which are influencing the fire safety management, and the managers of buildings usually encounter challenges. The study by Umar *et al.*, [9], revealed that regulatory compliance is significant in minimizing incident of the fire disaster, nonetheless, without the proper fire safety management program; compliance with the fire safety legislation alone cannot guarantee the achievement of fire safety objectives. On

the other hand, Howarth [1], suggest that fire safety should not only be viewed as compliance with the regulation but should also become a value and culture with the clear commitment from all levels of management.

2. Factors Affecting Fire Safety Management Building

Building's occupants and its contents are subjected to several fire safety problems, though there are various regulations, standards, codes, and guidelines developed to provide an effective fire safety management of buildings. Ineffective fire safety management may cause unsafe to the life of occupants and destruction of property and non-functional installed fire safety system, which can significantly affect the functionality of a building. However, several kinds of studies have been conducted to identify the factors affecting fire safety management program in buildings [1-3-11]. The studies have been conducted in which ten common factors affecting the performance of fire safety management strategy in building were highlighted and briefly explained as follows.

2.1 Non-Compliance to the Fire Safety Rule and Regulations

Fire safety rule and regulation are enacted by law as a primary measure to achieve fire safety goal in building, non-compliance with this law will jeopardize the FSM program, which was developed to ensure that all fire safety measures are provided and functional at all time, to enhance quick evacuation of the occupants in building a fire [12].

2.2 Lack of Proper Fire Emergency Management in Building

Fire emergency management, comprises of fire emergency plan, fire procedure and fire routine notices, the management of building should provide evidence of distribution and explanation the emergency planning with responsibilities and goal defined. One of the articles [13], suggested that there should be sign of practical emergency planning for a wide range of anticipated events to includes the uses of the building, fire growth characteristics, the types of occupants, and fire safety systems in a building, etc.

2.3 Lack of Fire Safety Training and Education

According to Subramaniam [14], fire training and education was described as an act of instructions and learning between trainers and trainee for an effective application and management of evacuation procedure. Wardani [10] describes it as a process of given the occupants of buildings a good knowledge of fire protection, prevention, which includes awareness among the occupants on the needs to be careful of expose fire hazards in the workplace and home, given the information that could help on fire prevention detection and evacuation from fire. Thus, fire training and education often provide knowledge about safety in terms of fire, which could help occupants of building in averting fire disaster.

2.4 Lack of Fire Safety Organization, Policy, and Auditing

In line with several fire safety rules and regulations across the world. Such as NFPA, evidence of fire safety responsibility for fire safety at the upper level of organization with a line of responsibility throughout the organization and authorization at a suitable practical level, this, however, should be

achieved through clear fire safety policy developed to advance fire safety strategy and supported by effective FSM system.

Fire safety auditing should be applicable in all building; independent should conduct auditing fire editor, recorded, established its inspection of system management to know whether it takes account of any implication of the fire strategy such as changes to the occupancy and the fire growth characteristic, and the area where development can be made (UK legislation: the regulatory reform (fire safety) order 2005: Article 11).

2.5 Communication and Information, Reporting and Investigating Fire, and Fire Safety Budget

To achieve an acceptable fire safety in building, there should be evidence of writing and verbal communication to encourage cooperation and control, which include dialoguing between management, staff, occupants, and any other persons. Thus, a suitable relationship with fire and emergency service, which includes notice of materials, changes in the risk outline, and appropriate system/equipment are essential for warning in case of fire. The report, investigate and record all fire incidents, is an aspect of the FSM program that an organization or manager can learn a lesson of the previous fire event to enable take correction in order to avert the subsequent incident.

Fire safety budget is an aspect of FSM program postulated by various fire safety legislation, to ensure that the fire safety system is replaced and maintenance as at when due. In line with the general regulation world over, there should be evidence of adequate financial budgeting for safety, which includes a fund for fire safety arrangements in building improvement and repair, fire training, and replacement of bad fire equipment (UK Regulatory Reform (Fire Safety) Order 2005: Article 11).

3. Research Methodology

This study was carried out to examine the practice of fire safety management in building. Besides, it will serve as a benchmark to analyse the factors affecting the objective of fire safety management in building. Therefore, the study design used for this paper was survey research design, where questionnaires was used to determine the perception of the fire safety practitioners, and building managers on the factors affecting the practice of fire safety management program in buildings.

3.1 Method of Data Analysis

The factors affecting fire safety management program were highlighted, in which ten factors are identified from the literatures. The factors, which are all-influential in achievement of fire safety objectives. These identified factors were used in preparing questionnaires survey to seek the perception of the fire safety practitioners and building managers in Lagos State, Nigeria, with the purpose of determining the level of implementation of these factors in management of fire across the state. The questionnaires survey was developed and distributed to the participants. In addition, the participants were asked to provide answers to the questionnaire based on their knowledge and experience in the field of fire safety. The participants were asked to assess the level of implementation of these factors, on the fire safety management of five Likert's scale. The participants therefore, were asked to indicate their level of agreement by using an ordinal scale, such as 1-Strongly Disagree, 2-Disagree, 3-Moderately Agree, 4-Agree, and 5-Strongly Agree.

4. Data Presentation

This section presents the data analysis based on the research question developed, distributed, and retrieved. The impacts of each of the factors with respects to the fire safety management was examined and the ranking of the qualities in terms of it impacts as perceived by the participants was conducted by uses of relative importance index (RII), which was calculated using the following equation $RII = \frac{\text{Sum of } Y}{A * N}$, where Y is the values assigned to each factor by the participants and its ranges from 1-5, A is the highest weight, and N is the total numbers of respondents.

The relative importance index was computed for all the factor (components) and the ranking is given to all factors according to the relative importance index means score. The details of the ranking were shown in the Table 1 and Figure 1.

Table 1
 The results of means and ranking of components of fire safety management

S/No	Implementation Level FSM	Relative Important Index	Items Means	Ranking
1	Fire risk assessment	0.48	2.4	7th
2	Fire Safety organization	0.53	2.6	5th
3	Compliance with fire safety regulation	0.42	2.1	9th
4	Emergency plan/fire safety procedure	0.45	2.3	8th
5	Fire safety communication/information	0.49	2.5	6th
6	Reporting and investigating fire	0.57	2.8	3rd
7	Fire Safety Training	0.65	3.2	1st
8	Maintenance of fire equipment and standard	0.60	3.0	2nd
9	Fire safety Audit	0.57	2.8	4th
10	Fire Safety Budget	0.60	3.0	2nd

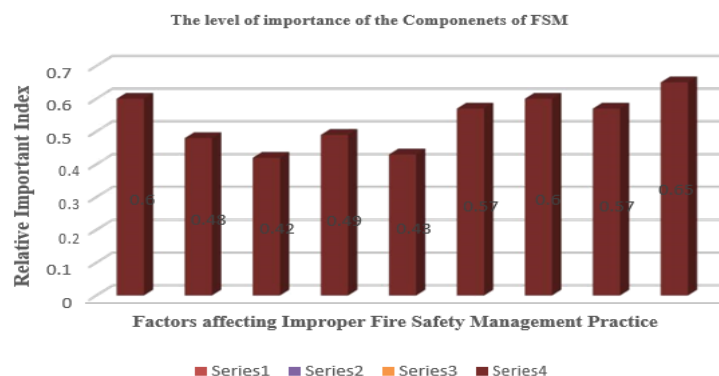


Fig. 1. The results of the most influential components of FSM

The finding from this study, revealed that fire safety training is the most influential components of fire safety management, which implied that educating, training, and creating awareness among the building occupants and general public has a greater influence in the achievement of fire safety objectives in building, maintained of fire safety equipment and fire safety budget are second most influential components respectively. While reporting/investigating fire, fire safety audit, fire safety

organization, fire safety communication, fire risk assessment, emergency plan/procedure, and compliance with the fire safety regulation are 3rd, 4th, 5th, 6th, 7th, 8th, and 9th respectively.

However, the finding from this study, vary from the result of Aminu *et al.*, [9] and Baker *et al.*, [15] with the most influential factors are emergency plan and fire safety procedure and fire risk assessment respectively, whereas fire safety training become the most influential components in this study as shown in Table 1 and Figure 1. This is because of the difference in the location of the fire safety practitioners that participated in the survey and the method adopted for the data collection, analysis, and the region in which the studies were carried out.

5. Conclusions

The study was carried out to examine the practice of fire safety management in building. This paper analysed all the ten components of fire safety management identified from the literature. The finding from this study found out that fire safety training factor was rank 1st, maintenance of fire safety equipment and standard and fire safety budget ranked 2nd, reporting and investigating fire rank 3rd, fire safety audit rank 4th, fire safety organisation rank 5th, fire safety communication/information rank 6th, fire risk assessment rank 7th, while compliance with fire safety regulation and emergency plan/fire safety procedure ranking 8th, and 9th, respectively. Thus this study is very essential in achievement of fire safety management standard in buildings because all the factors that guarantee the achievement of fire safety objectives through the perception of competent fire safety practitioners, analysed and the results revealed the most influential factors among the components in which, when all the components are integrated into the fire safety management strategy and properly implemented it will minimized the fire safety issues in buildings to an acceptable level.

The study thereby recommends adequate fire safety training in order to enhance fire safety knowledge of building occupants and the general public for the achievement of fire safety objectives.

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