MECHANISM FOR FIRE SAFETY MANAGEMENT IN HOTEL FACILITY IN ABUJA.

BY

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MTECH/SET/2017/7491

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ABSTRACT

Fire has often been described as the greatest servant but the worst master that is difficult to curb or control when it becomes out of control destroying everything in its path. Hotel facilities along with people's lives need protection against fire outbreak. There is barely a day without an occurrence of one incidence of fire outbreak worldwide leaving in its wake, destruction of properties worth millions of naira with devastating impacts on human lives/livelihood and infrastructural development. Fire occurring in hotels can cause devastating effects if appropriate fire safety management mechanism is not put in place. The aim of this study is to propose a mechanism for fire safety management in hotel in Abuja. The specific objectives were to: assess the potential fire related risks in hotel facilities in Abuja, examine existing fire safety measures in hotel facilities in Abuja and to assess the fire safety measures incorporated in the design of the hotel facilities in Abuja. The study was restricted to 5, 4, and 3 star hotels in Abuja. Data were sought using instrument such as structured questionnaire and interviewer guide. Stratified random sampling technique was used for the selection of two hundred and twenty one (221) hotels while simple random technique was employed for the selection of respondents for questionnaire administration of one hundred and forty two (142) copies. The outcome of the study showed that the major causes of fire outbreaks in Hotel facilities in Abuja are kitchen fire from unattended cooking grease, electrical system that are overloaded, poorly maintained or defective, combustible storage area with insufficient protection, candles and other open flames, smoking (cigarettes, pipes and lighters). From the multi criteria analysis conducted, although there were some forms of existing fire safety measures in hotel facilities in Abuja Metropolis, the findings indicate that at least 0.83 (83%) improvement is required for structural fire protection, 0.79 (79%) is required for firefighting equipment and 0.78 (78%) status for fire detection and warning is required for adequate fire safety provision. FurthermoreStaff Training and Customers education on fire safety management is imperative so as to curb the devastating impacts on human lives/livelihood and infrastructural development from fire outbreaks especially in hotel facilities.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Fire is perhaps one of mankind's greatest discoveries but can be a source of danger in mishaps. It is known to be a good friend but a better enemy. Hassanain (2009) depicts fire as compound response of three components; Oxygen, Heat, and fuel bring about the creation of warmth and light. Structures remarkably address a significant part of where fire has deadly results. A significant precondition is that fire safety facilities enable free and satisfactory fire reaction performances by the building tenant. In practice, apparently the measures at present legally necessary do not generally offer the help individuals need in burning buildings, seeing how people act in an event of fire (Akhieme and Isiwele, 2017).

The impacts of a fire to hotel can be decimating, not exclusively to the hotel affected by fire and water harm, yet in addition to the community served by the hotel. The enduring impacts can stretch out beyond the mere fire related harm that can affect the local economy and visual appearance of the area (Sypen and Esq, 2010). Depending upon the degree of damage, numerous businesses essentially cannot proceed with business tasks. This, obviously, can have a negative rippling impact on tax revenues generated for the local government, just as the effect on encompassing property value. The expanding effect of a fire, like a pebble cast into a pond, can even affect outside organizations that once provided the business with products and enterprises. Unwarranted flames fiscally affect networks since fire remove businesses from the tax while the harmed building is modified

and reproduced. Statistics affirm that more than 40% of the businesses that experience a fire never return since they lose their client base (Fontana, *et al*. 2011).

The facts confirm that each building contains something which will effectively burst into flames and it is basically difficult to dispose of totally the chances of a fire happening in a structure. Event of fire outbreak in the US of America (USA) is assessed to happen as much of the time as at regular intervals every day, a country completely advanced in innovation of building development (Balamurugan and Senthamilkumar, 2014). The facts demonstrate that no structure material is completely fire resistant; therefore, the International Fire Protection Congress (IFPC) passed a goal in 1903 suggesting the utilization of the term fire-opposing instead of flame resistant as applied to the building materials and developments. Accordingly, a completely fireproof building is completely protected against any fire which may happen in its substance (Balamurugan and Senthamilkumar, 2014).

In Nigeria, reports that about ₦900 billion lose to fire incidence were recorded in the country as at 2005 with scores of live lost in different occurrences. This impact of fire makes it important to think on the best way to dodge the issue as opposed to adapting to it. The fundamental motivation behind making a building fireproof is the safety of life, merchandise andoccupation inside the building. It is estimated that almost 15,000 individuals are killed by fire each year in our country and immediate roundabout misfortunes are assessed at more than 1000 but, there is no comprehensive guideline to safeguard fire avoidance (Balamurugan and Senthamilkumar, 2014).

To ensure satisfactory fire safety norms, public and local mandates ought to be set up in a vast majority of countries. Individual safety is by and large managed by laws andofficial necessities, while the assurance of material resources is for the most part controlled by theguidelines and orders drawn up by insurance agencies. The hotel business is a force to reckon with within the European labour market and administration area. In 2006, roughly 265,000 hotelsoffered 13.9million bed placesacross the European Union1.75billion short-term stayswere recorded inEuropean hotelsand practically 1.8 million individuals were employedin the business, of which 1.4million on a full-time premise. 60% surprisingly utilized were ladies (Ortmeier, 2005).

The hotel owners/managers of hotel have a lawful duty to take sensible measures to forestall the event of fire and to secure the lives andsafety of guests/patrons and staff in case of fire happening in their premises. A fire safety management will be viable just in the event that it is actualized altogether;also it is checked on as everyday activity (Ortmeier, *et al*, 2005). Once the tourist has decided to travel to a destination, which is afterwards affected by a crisis, they might cancel their holiday or choose among alternative destination that offers the same features. Realize that guests' safetyand security is central for the hotel industry regarding inhabitance, and monetary achievement (Pizam, 2010).

For the most part, the fire safety objectives may include life safety, assurance of property and structure, coherence of business activity, legacy and ecological insurance. Nonetheless, the fire safety goals of a building may fluctuate with the inhabitance, structureand stature of the building. The seriousness of fire is the primary factor that decides the safety of a buildingand its tenants. It is subsequently essential to comprehend

the component which controls the potential fire hazard and to contemplate the manners by which building can be intended to limit fire harms, conceivable fire safety issues that could emerge in the push toward energy effectiveness, ecological insurance and maintainable plan and development are uncovered when considers show this move may impact (Krause, *et al*. 2012).

1.2 Statement of the Research Problem

The ruinous extend of fire in hotel building is incredible because of absence of sufficientand pertinent consideration for safety (precautionary and control measures) measures which ought to be pre-emptive in nature.Many major markets and commercial buildings have been gutted by fire, destroying lives and properties worth several billions of naira (National Emergency Management Agency, NEMA, 2006).The continuous event of real fire outbreaks in hotel buildings, shopping centers, and markets in Nigeria has turned into a genuine danger to the country's delicate economy. Numerous significant hotel fires and business structures have been gutted by these "business sector fires" pulverizing lives and properties worth a few billions of Naira. The basic issue is that of preparation, planning, and development of building without making sufficient and suitable fire safety arrangements all through these cycles (Karter and Molis, 2010).

Hotel fires pose a significant danger to individuals' safety, the hotel facilitiesand business coherence. Insights from the U.S. show that a structural fire is accounted for by one of twelve hotelsor lodges consistently. Somewhere in the range of 2006 and 2010the local groups of fire-fighters reacted to an estimateaverage of 3,700 design fires for every yearat lodging andhotel properties, causing yearly averagelosses of 12civilian deaths, 143 non military personnel injuriesalso $127 millionin direct property harm. In 2007-2011, U.S.

local groups of fire-fighters reacted to a normal of 15,400structure flames in high-risebuildings. These flames caused yearly normal of public fire insurance affiliation (Public Fire Safety Affiliation, 2013). 46 civilian fire deaths, 530civilian fire wounds, also $ 219 millionin direct property damage (Pardo and Siemens, 2014).

Notwithstanding, in Nigeria, the Public Fire Insights Information was dispatched in 2014 in organization with Government Fire Services however it is yet to be fully functional. However, the nation can be said to have lost an expected N6 trillion to various fire occurrences across the country in the last five years while on yearly basis, Nigeria is said to be losing around 50 billion also 1,000,000 lives to fire, for example in 2017 alone, the Lagos state Fire Services said it recorded at least 1,273 fire calls. Similarly, total numbers of 660 fire outbreaks were recorded in Kano state in 2017 according to Kano state Fire Services with around 123 lives lost. In 2018, there have been a few announced instances of fire outbreaks across the nation, with most prominent being the Otedola bridge tanker fire in Lagos. This has been described as one of the greatest tragedies in Nigeria. Nigeria Fire Services stressed that the incessant fire outbreak in Nigeria, most likely, presents poses danger to the public economy as it leaves enormous facilities damaged, injury to people and disturbance of monetary and business activities of individuals influenced (Ezenyilimba, *et al*.2018).

The havoc wreck by fire is regularly blamed on the failure of the government or state fire administration; absence of types of gear, inadequate correspondence, absence of water supply and skillful fire fighter was embarked as the conceivable issue of fire occurrence of domestic wing of the Muritala Mohammed Air terminal Lagos in 2000 and furthermore

attribute the same cause to the razed down Clean John House on same year (Adedeji, *et al*. 2015).

Saratale, *et al*. (2018) posited that fire in structures can have a serious effect regarding both human safetyand potential economic losses. This is particularly obvious if there should arise an occurrence of fire of such seriousness that the structure is harmed. Solid building is traditionally viewed as protected in fire circumstance as concrete is non-combustible and displays profoundly protecting material properties. Fire safety management of hotel building is an intriguing and testing work.In 2005 somewhere in the range of 4 and 6 fires happened daily in hotels, in kitchens, parlors and rooms, with yearly misfortunes of millions of Euros (Sarasola, 2006).

In a study led by Boyd, *et al*. (2003) found that most of structural fires happen in the private occupancy, while just a little level of flames happen in business ormercantile occupancy. Moreover, the sheer number of assessments needed on request to perform yearly fire study for all occupancygroupings is a long ways past the accessible staffing of most local groups of fire-fighters.

Also in a study conducted by Cain, *et al.* (2008) found that establishing direct casualty between inspections and a reduction in fire incidents is not necessary; one only needs to establish a plausible connection for that outcome. Cain, *et al.* (2008) goes on to explain that, appropriate method for assessing the effectiveness of fire prevention inspection whereby determining the viability of an inspection program's viability.

In the design of any facilities (buildings) expected to house many users within a specific period, there is a clear need for the safety of such users from fire. Many firemen died due to

inefficient fire-fighting equipment in the Cocoa House fire in Ibadan, Also the three separate infernos which engulfed the Ministry of Education building, the Nigeria National Petroleum Corporation and the Nigerian External Telecommunications Building indicate the inadequacy of our existing Building Codes and fire-fighting equipment (Ogunsote, 2002).

The risk of fire and other catastrophic events in hotels can occur if the necessary mechanism is not put in place to forestall its effects on the performance of the hotel industry. The main question thereforeis what mechanism can be developed for the management of fire safety in hotel facilities. The research is thus aimed at providing answers to the following research questions:

i. What are the potential fire related risks in Hotel facilities in Abuja?
ii. What are the existing fire safety risk measures in Hotel?
iii. How were fire safety measures incorporated into the Hotel facility at the design stage?
iv. How available are the existing fire safety measures in Hotel facilities in Abuja?
v. What mechanism can be adopted to achieve an efficient fire safety risk measures in Hotel Facilities in Abuja?

1.3 Aim and Objectives of the study

The aim of the study is to develop a mechanism for fire safety management in hotel facilities in Abuja, in order to attain an efficient fire safety measures in the facilities.

In order to achieve the above stated aim the following objectives are set:

i. To assess the potential fire related risks in Hotel facilities in Abuja.

ii. To examine existing fire safety measures in Hotel facilities in Abuja.

iii. To assess the fire safety measures incorporated in the Hotel facilities design.

iv. To examine availability of existing fire safety measures in Hotel facility in Abuja.

v. To propose a mechanism for effective fire safety management in Hotel Facilities in Abuja.

1.4 Justification for the study

The purpose of this research study is to develop mechanism for fire safety management in hotel facilities in Abuja against fire outbreaks. The most crucial aspect of a building's safety in the face of fireis the possibility of safe escape. In a study conducted by Wu (2007) in Hong Kong on fire safety for big hotels, it was discovered that the proper fire safety management scheme, is often regarded as more important in international chain hotels. Consequently, understanding how individualsbehave in the case of fire and fire evacuation is essential to bring fire safety measures into line with occupants needs during an incident(Buchanan, 2001).

In addition fire safety is always a major concern in hotel operations and guest services. In a study conducted by Gairson (2013) examining the value of fire prevention inspections in commercial occupancies. The finding shows that introduction of more comprehensive codesand standards, the enforcement of fire regulations becomes paramount in maintaining a fire safe community.

The study will assess potential fire related riskin hotel facilities and thereby lessening the cost on how to address them. Indices of existing fire measures will be examine and applied

in solving the problems. The study will educate the hotel buildings, /hotel owners on how best to stem the incidence of fire that may result from negligence. It will enlighten them on the fire safety measures and various effects of fire outbreak and preparedness plans/measures necessarily needed to avoid fire outbreak in hotel buildings.

The study enables firms in the hotel industry in Abuja to improve their fire safety management process and to adopt efficient mechanism to improve hotel performance through the fire safety management processes. The mechanism developed in the study enable the hotel industry to perform better, to grow their businesses, maintain a competitive advantage and make Abuja the most preferred tourist destination.

1.5 Scope of the Study

The study was restricted to 5, 4, and 3 stars hotels in Abuja considering the fact that Abuja is one of the most fast growing cities in the country today. Both a 4-star and 5 star hotels can be considered luxurious, however, they differ in regards to service. While a 5-star hotel offers amenities like 24-hour butler service, room service, and in-room bar at no extra cost, a 4-star hotel is much more comfortable and larger, and provides excellent cuisine, room service, and other amenities and will place a charge on top of your room stay for such service. However a 3-star hotel has more spacious rooms and adds high-class decorations and furnishings and color television. It also offers one or more bars or lounges.

Hence the study will cover the fire safety risk sources as it pertains to hotel facilities within the framework of the study area. A careful research was conducted on how the involvement of the fire safety risk performance evaluations mechanism affects the hotels. The study examines the method of how the facility is managed and emphasis wasplaced on the physical soundness and working conditions of the hotels, so that it serves its main purpose.

The research therefore covers the entire fire safety management process of the hotel within the confines of the study environment. The management practices would also be identified.

1.6 De-limitation of the study

It is recognized that, in some ways, any research work would have limitations.This study is confined to the Hotel buildings in Abuja and concerned mainly with safety measures from fire and to promote the awareness on how tomanage at the time of fire outbreaks. This study was carried out using questionnaires, observation and interviews method.

1.7 Definition of terms

Fire:

Is the fast oxidation of a material in the exothermic synthetic interaction of ignition, delivering in the warmth, light, and different response items. Fire start when a combustible or potentially a flammable material, in blend with an adequate nature of an oxidizer, for example, oxygen gas or another oxygen rich accumulate is presented to a wellspring of warmth or surrounding temperature over the glimmer point for the fuel and can support a pace of fast oxidation that delivers a chain response (Olaghade, 2012).

Fire Safety:

Fire safety alludes to safety measures that are taken to forestall or decrease the probability of a fire that may bring about death, injury, or property harm, alert those in a construction to the presence of an uncontrolled fire in the occasion one happens, better empower those compromised by a fire to get by in and clear from influenced zones, or to lessen the harm brought about by a fire. Fire safety measures incorporate those that are arranged during the

development of a structure or actualized in structures that are as of now standing, and those that are instructed to inhabitants of the building (Jacob, 2014).

Fire safety management:

A fire safety management plan subtleties your courses of action to execute, control, screen and audit fire safety norms also to guarantee that those principles are maintain. The courses of action for viably overseeing fire safety in order to forestall fire happening and, in case of fire, to ensure individuals and property have a competency to forestall and to ensure fire hazard and have the mindfulness about it (Solomon, 2007).

Hotel:

Hotel accommodation is a place where travelers can sleep and find other services or a place where people can live, stay or work (Maxfield and Babbie, 2014).

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Fire Hazard

Fire is the fast oxidation of a material in the exothermic synthetic interaction of burning, delivering warmth, light and different response items (Charles, 2000). Fire begins when combustible as well as a flammable material, in blend of adequate amount of an oxidizer, for example, oxygen-rich build is presented to a source of warmth or surrounding temperature over the glimmer point for the fuel and can support a pace of fast oxidation that creates a chain response (Olagbade, 2012). This is ordinarily called the fire tetrahedron. Fire can't exist without these components set up and in the correct extents.

Instances of fire outbreak in Nigeria have become a lasting issue. By and large, fires are started with a solitary fire object. The smoke delivered from the consuming item is shipped by a smoke plumeand gathers the upper part of the space as a layer. The smoke plume likewise ships the warmth created by the fire into the smoke layer causing the smoke layer to increase top to bottom and furthermore temperature (Crook, 2000). This smoke layer transmits energy back to unburned fills in the space, making them increase in temperature. Fire spreads to different articles either by radiation from flares appended to the initially consuming things or from the smoke layer. As different objectignite, the temperature of the smoke layer increase further, transmitting more warmth to different items (Crook, 2000).

A fire requires a start source and a mix of oxygen also fuel to support the fire (Henderson and Mackay, 2009). The fuel for this situation is anything combustible or ignitable store or

kept in a structure or in an open space including furniture, blinds, apparel, sheets, paper and inflammable fluid. The more burnable these are and the greater amount of them you have in the room or in an open space, the more serious the subsequent fire (Ohemeng, 2010).

2.2 Fire safety in hotels

Fire safety is a relative term. In the event that you characterize "fire-protected" as a zero possibility of a fire, one can never say that any hotel is fire-safe. In any case, we can portray hotels as generally more secure than others dependent on the fire insurance gear that is introduced and the safety rehearses that they follow. The sum and sort of fire safety equipment in ahotel varies by the size of the building, its stature and age. Some skyscraper hotel are ensured with fire sprinklers, however one out of four actually need them. For all hotelandhotels paying little heed to tallness, just 50 percenthave fire sprinklers. Some hotel proprietors have corporate approaches to retrofit more established properties with fire sprinklers, however this is not the standard. What is more, a few hotels introduce best in class, all around kept up alarm system that render bogus caution issues nil, yet different proprietors keep on enduring the issue. Accordingly, numerous hotel visitors overlook alarms. The nature of fire insurance additionally changes by locale. In certain regions, building also fireauthorities keep their safety codes current and persistently implement them. However, code headway alsorequirements are not uniform around the U.S. On the off chance that these codes are not stayed up with the latest and implemented by skillful faculty, the nature of fire comfort can endure an extraordinary arrangement (Chow and Kot, 2012).

2.3 Fire Safety Needs

Is the provision of training expected to diminish the obliteration brought about by fire. Fire safety measures incorporate in building are proposed to forestall the outbreak of an uncontrolled fire, and those that are utilized to restrict the turn of events and impacts of a fire after it begins. Fire safety measures incorporated and those that are provided during the development of a building or execution of buildings are now standardizedand those that are trained to inhabitants of the building. Dangers of fire safety are generally alluded to as risks. A fire hazard may include a circumstance that increase the probability of a fire or may obstruct escape in the event a fire happens. Fire safety is regularly a part of building safety (Chow and kot, 2012).

2.4 Elements of a Fire Safety Policy in Hotel

Fire safety strategies apply at the development of a buildingand all through its working life. Building regulations are enacted by local, sub-national or public governments to guarantee such features as adequate fire exists, signage, dividers, windows, and fire appraised entryways. Preventing overheating of wiring or hardware is part of the goals of electrical codes to ensure fire safety (Chow and kot, 2012).

There are important prerequisites for fire code management in places like theaters or café. Fire codes would need convenient fire extinguisher inside a building, for example, a fire sprinkler systemand also fire alarm system. Strict adherence to the guidelines of fire safety would enable proper fire assessment to be done, so that mishaps could be easily noted.This can bring about shutting down of a building until it has met the necessary requirements of fire code (Chow and kot, 2012).

The management of fire safety provision for instance, an industrial site may assign and prepare specific workers who primary responsibility is to put out fires during fire outbreaks. Managers should guarantee building conform to fire clearing protocol. Enlightenment of clients and inhabitants of buildings about fire safety needs to be done periodically. Fire safety measures such as how to open up fire entryways and fire drills should be part of the strategy programs (Chow and kot, 2012).

2.5 Common Fire Hazards in Hotels

The hotel business faces difficulties with regards to fire insurance, anticipation, andvisitors' safety. A portion of the fundamental driver of fire in hotel incorporate; Kitchen fire from unattended cooking oil fires/chip dish fires, Electrical system that are over-burden, ineffectively maintain or flawed, Burnable capacity regions with deficient safety, Combustibles close to hardware that creates warmth, fire, or starts Candles and other open blazes, Smoking (cigarettes, stogies, pipes, lighters), equipment that produces heat andutilizes ignitable materials, Combustible fluids and pressurized canned products, Chimney stacks not appropriately or routinely spotless, Cooking apparatuses ovens, stoves, Electrical wiring in helpless condition, Individual start sources-matches lighters and Outside cooking gear grill (Chow and kot, 2012).

2.6 Fire Safety Code

In the U.S., the fire code (additionally fire counteraction code or fire security code) is a model code received by the state or neighborhood locale and upheld by fire anticipation officials inside city local groups of fire-fighters. It is a bunch of rules endorsing least prerequisites to forestall fire and blast perils emerging from capacity, taking care of, or utilization of risky materials, or from other explicit unsafe conditions. It supplements the

construction law. The fire code is pointed basically at forestalling fires guaranteeing that vital preparing also hardware will be close by, and that the first plan premise of the structure, including the fundamental arrangement set out by planner is not undermined. The fire code likewise addresses examination and upkeep prerequisites of different fire security hardware to keep up ideal dynamic fire insurance and detached fire assurance instrument (Karter and Molis, 2010).

2.7 Fire safety plan

A fire security plan is needed by all public, state also common fire codes dependent on building utilize or inhabitance types. For the most part, the proprietor of the hotel building is liable for the readiness of a fire safety plan. Hotels with elaborate crisis system may need the support of a fire insurance expert. After the arrangement has been prepared, it should be submitted to the main fire official or authority having locale for endorsement. When affirmed, the proprietor is liable for actualizing the fire safety plan and preparing all staff in their obligations. It is additionally the proprietor's duty to guarantee that all guests or visitor and staff are educated regarding what to do in the event of fire (Karter and Molis, 2010).

2.8 Fire safety plan structure

Fire safety plan is planned by the building proprietor to distinguish the moves that ought to be made by the tenants and building management in case of fire. A fire safety plan incorporates; Key contact data, Utility services (counting shut-off valves for water, gas and electric), Access issues, Hazardous put away materials, Area of individuals with uncommon requirements, Associations with sprinkler system, Design, drawing, and site plan of building, Upkeep plans for life safety, Make amass point/safe zone and Individual preparing and fire drill method (Amernic, *et al.* 2008).

2.9 Use of fire safety plans

Fire safety plans are a valuable instrument for firefighters to have information that permit them to know basic data about a structure that they may need to go into. Utilizing this, firemen can find and evade potential threats like dangerous material (hazardous materials) stockpiling regions and combustible synthetic substances. Likewise, fire comfort plans can likewise give particular data that, on account of a clinic fire, can give data about the area of things like the atomic medication ward (Amernic, *et al*. 2008). Furthermore, fire safety designs likewise extraordinarily improve the comfort of firemen. As indicated by Fire Emergency Management Agency, 16% of all firemen deaths in 2002 happened because of an underlying breakdown or in light of the fact that the firemen got lost. Fire security plans can layout any conceivable primary danger, just as to give the firemen information on where he is building (Amernic, *et al*. 2008).

2.10 Fire safety plans in the fire code

In North America alone, there are around 8million structures that legitimately require a fire comfort plan, be it because of local or state law (Solomon, 2007). Not having a fire, and they are needed for all buildings, like business, mechanical and gathering.

2.11 Advances in fire safety planning

Fire safety plans are made to be used during emergency situations. In the past, there were made on paper which was stored away by the fire fighters at specific areas. This made it difficult for individuals to be able to assess it at the time of need. More also, only 50% of those plans met some of the average requirements of standard plan, while only 10% were of standard print. However in recent times, there has been a significant improvement in these

fire safety plans as they have been made into digital/electronic forms so that they can be easily accessed by individuals at any location (Solomon, 2007).

2.3 Types of hotels

The hotel gives home away from home to a huge number of voyagers and sightseers. The reason for their visit is unique, so is their need and assumption for administrations delivered by the hotels. Hotels can be grouped dependent on the room charges, facilities accessible, loaned of stays of visitors, area of the hotels, possession and the executives also some more. Probably the most celebrated groupings will be clarified underneath.

2.3.1 Residential hotels

The private hotels are flats which are typically situated in huge urban areas and give hotel services to visitors who stay on a long term basis. It is additionally workable for visitors to remain at private hotel for a more limited timeframe (Raju, 2009).

2.3.2 Transit hotels

Transit hotel are located close to airports and motorways, they cater for guests who are on transit and need a temporary place to stay for a shorter period of time which may vary from one hour to few days. A distinctive characteristic of transit hotels is their design which mainly focuses on providing comfort also convenience (Raju, 2009).

2.3.3 Resort hotels

The retreat hotels are situated in uncommon places near beautiful excellence like lakes, mountains, oceans and sea shores. Since the accentuation of a retreat hotel is typically on unwinding, it is not un-basic to discover sporting conveniences, for example, green, pool, skiing, tennis courts also some other indoor game offices in the hotel. The primary objective gatherings for this sort of hotels are individuals with pay that is better than expected who are searching for a spot to unwind also avoid their every day schedule.

Resort hotel are generally occasional foundations. In any case, in the as of late, the patterns have changed a little and some retreat hotels are working consistently. Resort hotels can likewise be sub-separated into summer resorts, winter resorts, comfort resorts, the entire season resorts, and slope resorts (Raju, 2009).

2.3.4 Heritage hotels

Heritage hotels are old properties of refined and regal families which are remodeled to give extraordinary experience to sightseers. These sorts of hotels give visitors extraordinary treatment like aristocrats. Heritagehotels are not as normal as the business or private hotels.

2.3.5 Commercial hotels

Business hotels as the name proposes are generally situated in downtown area and draw their visitors from all over the place. The hotels fundamental spotlight is typically on the bustling business community and they offer types of assistance, for example, business focus offices and parking spot. The possibility of the hotels being in the downtown areas may make somebody feel that the hotels' clients are just business voyagers. In any case, the quantities of relaxation voyagers dwelling in the hotel are expanding yearly Moreover; the business hotels even have visitors who hold up in the hotel on a lasting base (Kumar, *et al*. 2008).

2.4 Classification of Hotels

According to (Kumar, *et al*. 2008) hotel order is "the task of hotels to an all out rating as indicated by the sort of property, offices, and conveniences advertised". The order framework was brought into the lodge business when it was a couple of foundations that strived to give protected and dependable housing also food to voyagers. The framework was at first evolved as an administrative system which guaranteed clients assurance. In the

new years, the focal point of the characterization system has changed a smidgen from ensuring to in-shaping the clients (Kumar, *et al*, 2008).

2.4.1 Diamond rating system

TheAmerican Automobile Association (AAA) was among the principal specialists to favor assignments for lodgings and cafés. The models for its rating depend on a blend of the general quality, the scope of offices accessible just as the degree of administrations offered by the hotels. Furthermore, the rating additionally addresses the sort of involvement which the explorers ought to anticipate from the hotel unit. American Car Affiliation evaluations range from 1 to 5 diamond of which every one of the precious stones has its remarkable or unmistakable qualities; hotels with one jewel rating are the ones that gives fundamental convenience administration no nonsense, they typically get together with essential solace, neatness also cordiality also they generally appeal to financial plan disapproved of explorers. In a two precious stone hotel, the clients can anticipate moderate rooms where actual credits, plan also conveniences have been improved when contrasted with one diamondhotel. Then, a three precious stone hotel is somewhere close to giving essential conveniences to giving extravagance. It ordinarily has multifaceted facilities with recognized style, actual ascribes, conveniences and visitor safety. In a four diamondhotel, the client can hope to see refined also a la mode lives with upscale actual ascribes that reflect upgraded quality all through. One of the unmistakable qualities between a four diamond hoteland the other lower precious stones is that properties assigned with the four diamonds frequently have broad conveniences with a serious level of accommodation and administrations. The five diamondhotels have the most significant level of extravagance with exceptional actual ascribes, careful customized administration, broad conveniences and faultless guidelines of greatness (Muller, 2015).

2.4.2 Star rating system

The star rating framework is everywhere across the globe. Most voyagers andhotel visitors favor making requests about lodgings comparable to their stars regardless of the way that the measures for the star rating of hotels shifts starting with one country then onto the next. Star rating is valuable in hotel industry for some reasons; at the public level it gives the clients the chance of finding ahotel that truly adjusts to their ideal norm. Moreover, hotel management likewise benefit from the rating since it assists with improving the nature of the item being offered to the visitors (Kurma, *et al*, 2008).

2.5 Common Causes of Fire in Hotels

Up to ongoing occasions, the reasons for hotel fires were for the most part because of the thoughtless removal of cigarettes, issues in electrical apparatus utilizes, and inconsiderateness by laborers utilizing exposed flares which touched off oil and oil stores in kitchen territories, and some dubious reasons. The majority of the flames were begun in visitor rooms, kitchen regions and shopping arcades (Chow and Kot, 2012).

During 2006-2010, an expected normal of 3,700 design fires in hotelandlodges were accounted for to U.S. local groups of fire-fighters each year, with related yearly misfortunes of 12 non military personnel deaths, 143 regular citizen wounds and $127 million in property harm. Almost 3/4 (73%) of flames in hotelsandhotel did not spread past the object of origin (Chow and kot, 2012).

According to the South Australian Country Fire Services department most common fire cause in hotel are categorized to nine main categories. In addition, they also provided some tips on how to prevent fire occurrences in hotels. The most common fire causes are: Kitchen Naked Stoves, Electric Blankets, Faulty Wiring, Smoking in Bed, Lighting, Flammable Liquids, Arson, Candles fire, and Heating (Chow and Kot, 2012).

2.5.1 Kitchen naked stoves

Hotel flames can be totally wrecking, especially in the event that they are not contained or managed quickly. Obviously, quite possibly the most widely recognized spots for a burst to start are in the kitchen. With bare blazes from gas hobs and 200 degrees heat being delivered by the stove, there is gigantic potential for fire mishaps to occur. With regards to stove fires, there are various key contributing components that could go about as a trigger which are specialized breakdowns, tidiness, and carelessness (Pauchuari, *et al*. 2014).

2.5.2 Electric blankets

There is nothing very like the solace of an electric blanket on a bone chilling winter night. On the off chance that you disdain the sensation of sliding into frigid sheets around evening time, you likely know the joy of flipping a switch and permitting your electric cover to set up a comfortable spot for a decent night rest. In any case, each year, in excess of a couple of sound sleeping and clueless families utilizing electric covers, the inquiry is replied by shouts of fire when they conscious in a bed of flares. There is a high danger of fire flare-up when utilizing an electric cover. Indeed, most electric covers contain a security circuit at the sole, a selective motivation behind which is to attempt to forestall fire. Overheating of the warming component to the mark of start, presence of burnable materials close by also overheating of an electrical segment of the item, other than the warming component are systems by which these flames happen. Because of various zones in hotels the most well-known territories in hotel where fire happens are kitchen, visitor rooms, and capacity region (Pauchuari, *et al*. 2014).

2.5.3 Arson

Illegal conflagration is the wrongdoing of determinedly and vindictively burning down or roasting property. In spite of the fact that the demonstration normally includes structures,

the term arson can likewise allude to the deliberate consuming of different things, for example, engine vehicles watercraft, or timberlands. The wrongdoing is normally delegated a crime, with examples including a more prominent level of danger to human existence or property also thus conveying a stricter punishment. A typical intention in illegal conflagration is to submit protection extortion. In such cases, an individual obliterates their own property by consuming it also afterward lies about the reason to gather protection (Zalma, 2014).

2.5.4 Smoking in bed

Fire also consumes are among the main sources of accidental demise in the U.S. The greater part of these deaths happens in homes, and cigarettes are an essential driver. Smoking in bed can be lethal - small ashes can see the unnoticed and burst into fire a lot later. In the primary occurrence, consuming of materials contaminates the air space also furthermore, a critical degree of carelessness also wildness of individuals is knowledgeable about this respect. As less individuals smoke, there are less freedoms for fire; nonetheless, the extent of any decrease is being referred to as individuals who quit may not really light fires. Anyway laws directing indoor smoking are related with diminishes in flames (Sara, *et al*. 2014).

2.5.5 Flammable liquids

A Combustible fluid is a flammable fluid which can be handily touched off in air at surrounding temperatures, that is, it has a blaze point at or underneath ostensible edge temperatures characterized by various public and global guidelines associations. The Word related Security alsoComfort (OSHA) of the US Branch of work characterizes a fluid as combustible on the off chance that it has a blaze point at or beneath 199.4 of (93 ^{o}C). Before aligning guidelines with the Unified Countries Universally Blended Arrangement of

Characterization and Marking of Synthetic compounds (GHS) in 2012, OSHA believed combustible fluids to be those with a blaze point under 100 of(37.8 ºC). Those with streak focuses over 100 ofalsounder 200 of (93.3 ºC) were delegated ignitable fluids. Studies show that the real proportion of fluids combustibility, it is streak point, is subject to height (Xu, *et al*. 2014).

2.5.6 Heating

Fire is the fast oxidation of a material in the exothermic compound cycle of ignition, delivering warmth, light, also different response items (Schmidt-Rohr, 2015). More slow oxidative cycles like rusting or absorption. Fire in its most normal structure can bring about blaze, which can possibly cause actual harm through consuming. The negative impacts of fire incorporate danger to life and property, air contamination, and water con end (Hanna, *et al*. 2016).

2.5.7 Faulty wiring

Over-burdening is a striking actual instrument of electrical fire. The fundamental purpose behind over-burdening is that streaming current surpasses the greatest current conveying limit of the wire or link (He, *et al*. 2011). Temperature will rise and cause overheating. When over-burdening happens, the encompassing materials may liquefy because of exorbitant warm protection, or even launch of hot particles if heat radiated from the wire is a lot higher than the softening place of the material, these can bring about fire flare-ups. Wrong determination of wire cross-sectional zone also ill-advised defensive gadgets estimating would prompt start because of these systems (Lee, *et al*. 2012).

2.5.8 Candle fire

Light utilize in the US has soar in the course of the most recent 20 years and candle producing is currently a ₴2 billion industry. The utilized of candles in hotel building can be

a genuine fire danger as per Public Fire Security Affiliation. "Candle flames is on the ascent", hotel fires brought about by candles have more than double during the previous decade. As well as being risk, inappropriately utilized candles can produce a lot of residue. This sediment can harm the dividers, floor and roofs of hotels just as close to home assets (Michael, 2014).

2.6 Fire Safety Measures in Hotels

To give safety against the fire, adequate insurance must be given. The plan in present day lodgings are; Primary fire assurance, arrangement of break courses, Smoke control, Ventilating framework, Establishment of programmed sprinkler system, Fire discovery framework, Establishment of fire hydrant also hose reel frameworks, Stockpiling of perilous merchandise and ignitable materials (Chow and Kot, 2012).

Structures should be intended to offer a satisfactory degree of fire safetyand limit the danger from warmth and smoke. The essential target is to decrease to inside satisfactory limits the potential for death or injury to the tenants of a buildingand other people who may get included, for example, the fire and salvage administration. Additionally crucial are securing substance and guaranteeing that however much as could reasonably be expected of a building can keep on working after a fire and that it tends to be fixed (Andrew and Anthony, 2017).

There are two types of fuel that are under the influence of designers, the building texture and its substance. The fire comfort of the texture materials is frequently communicated as far as it ignitability or instability, with specific respect to the primary components which should stay set up for dependability (Andrew and Anthony, 2017). The interior completions may offer a fuel source and should be deliberately determined, while the materials of the

structures substance additionally give shifting fire hazards, like materials, furniture and plastics (Andrew and Anthony, 2017).

2.6.1 Structural fire protection

All the constructions are intended to work sufficiently if there should be an occurrence of fire. The Building Construction Guidelines Hong Kong Building Guidelines, set out the base imperviousness to fire periods (FRP) for the development components. The worth relies upon the volume or floor region in any one story. For compartments, it is prescribed to introduce fire-opposing entryways and select non-flammable materials for pipe or line works. Likewise, it should be guaranteed that the visitor floors are very much isolated from different regions of generally higher fire hazards.

2.6.2 Provision of escape routes

The structure (Planning) guideline determines the arrangement of ways to get out for crisis National Occupational Health and Safety Commission. (NOHSC, 1986). A second stair case should be given if the floor of the highest story is in excess of 17 m or 6 stories over the ground level. The code of practice on provision of means of escape in case of fire and the allied requirementsNational Occupational Health and Safety Commission. (1986) prescribethe number and width of the required exits and staircases, the maximum travel distance, the fireresistance periods etc. It also specifies the requirements for basements, garages, car parks, refugefloors and others in order to comply with the above regulation. Hotel staff should be trained toensure that problems such as the wedge-opening or locking of fire doors, the blockage of the means of escape etc. do not arise (Siemens, 2014).

2.6.3 Smoke control

Smoke control can be isolated into the measure of smoke included and development of smoke. The measure of smoke created can presumably be decreased by restricting the fire

size (for example by sprinklers) and the fire heap of the hotel. Smoke development can be constrained by giving either actual boundaries to keep it or by regular or mechanical ventilation to separate it. The departure courses ought to be ensured by compression frameworks (Hobson, *et, al*. 1994) in controlling smoke development as indicated in the new Code of Training on Least Fire Services Establishments and Gear (Pardo and Siemens, 2014).

2.6.4 Ventilating system

Warmth and smoke may spread starting with one compartment then onto the next through the ventilating pipes. In this way, securing by fire dampers or utilizing fire opposing conduits is fundamental. Under the (Building Ventilating Frameworks Guideline, 1974), it is recommended that the air admission for the ventilation frameworks should be sited in a spot which won't establish a fire risk. Each pipe ought to be developed of non-burnable materials with strength and solidness at least that of either aroused iron or steel. It should be fitted with a damper worked by fusible connections at a temperature of 69°C. Also, yearly investigation by an enrolled ventilating worker for hire is required (Pardo and Siemens, 2014).

2.6.5 Installation of automatic sprinkler system

The Fifth prerequisite is to introduce programmed sprinkler frameworks (Nash, *et al*. 1981).Hotels are needed to give sprinkler frameworks covering all open zones including basic passageways under the new guidelines. In any case, visitor rooms may be absolved if other putting out fires establishments like hydrants, hose reels also convenient quenchers are available. The Fire Services Department upholds the Fire Workplaces Board rules for programmed sprinkler establishments with specific alterations to suit nearby conditions.

Under the current version of FOC rules, hotels are named Additional Light Risk (ALR) inhabitance where the sum and instability of the substance are low. So the sprinkler frameworks are needed to release water at 2.25 mm/min with four sprinklers in activity also covering a complete least region of 84 m2. Better expectations will be needed for different regions like storm cellars, engine compartments, kitchens, laundries, stockpiling zones, workrooms, and so forth Temperature rating of sprinkler heads is chosen by the idea of danger and reaches from 57 to 260°C (Siemens, 2014).

2.6.6 Fire detection system

Detectors can be classified according to their mode of detection and recommended to beinstalled in accordance with Fire Office Committee rules or other suitable standards. Theproblems associated with the detection systems are mainly due to failure to operate or falsealarms. Up to five false alarms per day can be observed! Maintenance and sensitivity tests by the hotel management are therefore essential. Some systems claim to be able to detect a real fire and accommodate false alarm problems. However, microprocessor-controlled smoke detector systems should not only include these but should be able to help occupants todecide what they should do. Human behavior under fire should therefore be included (Siemens, 2014).

2.6.7 Installation of fire hydrant and hose reel systems

All aspects of the floor should be reached by the hose reel or the hose associated with the hydrant. The rising primary might be wet or dry, contingent upon the stature of the hotel. For a hotel not surpassing 60m in stature, a dry riser establishment is worthy since the firefighting gear can convey water to a tallness of 60m. Over that, Fire Service gulf should be accommodated both wet and dry rising mains (Siemens, 2014).

2.6.8 Storage of dangerous goods and combustible materials

Under the Dangerous Goods Ordinance the Fire Services Departmenthas jurisdiction on the control of perilous products. Building materials should adjust to the prerequisites of Building(Construction) Guidelines. Nonetheless, building substance are out of extent of the current enactment. Be that as it may, furniture contained in a room may give a fire heap of 65% of the all out fire heap of the actual room. Hence, specific consideration should be paid on the furniture utilized (Siemens, 2014).

2.7 Evacuation Challenges in Hotel Fires

Genuine flames including fatalities just as wounds habitually emerge in structures where numerous individuals are accumulated, and at whatever point they have happened, they have happened in hotelsand other neighborliness conditions (Graham and Roberts, 2000).Hotels are portrayed by the immense number of individuals at danger when flames break out. Generally critical; they are not utilized to with the environmental factors and think that it is tricky to recognize the break courses and flights of stairs. It has been assessed that somewhere in the range of 4000 also 8000hotel flames will happen every year on an overall premise, where somewhere in the range of 5000 and 10,000 individuals will pass on and a huge number of genuine wounds will result. These assessments verify that reviewing the fire risk of hotels to organize future plan information also fitting hotel the board methods are vital and essential. The clearing interaction can be separated in two stages, to be specific the pre-development stage also the development stage. The cycles in the pre-development stage are accepted to be more unequivocal on endurance than the genuine development speed. The pre-development stage comprises of the alert time also the response time (Hassanain, 2009).

2.8 The Effects of Fire on the Building

Aside from restorative and stylish harm, which are themselves significant misfortunes for any hotel, the chief harm from fire to such a structure is primary. This is because of the warmth which causes extension, disfigurement, liquefying, and breakingalso primary disappointment delivering the structure not, at this point ready to play out its capacity. The warm developments and subsequent strains in the structure design will change the burdens at all joints and corners also, since regular structure materials are not typically versatile at the temperatures came to in flames, they may turn out to be forever distorted thus debilitated, that destruction also recreation is vital (Anaglatey, 2013).

Structures should be intended to offer a worthy degree of fire security and limit the dangers from warmth and smoke. The essential goal is to diminish to within acceptable limits the potential for death or injury to the inhabitants of a buildingand others, who may get included, for example, the fire and rescue service, just as to secure substance and guarantee that much as possible be expected of a structure can be fixed. The danger to abutting properties also should be thought of, as well as possible ecological contamination. Fire happens because of a progression of exceptionally fast substance responses between a fuel and oxygen that deliveries warmth and light. For burning to happen this is the fire'.Fire triangle'.

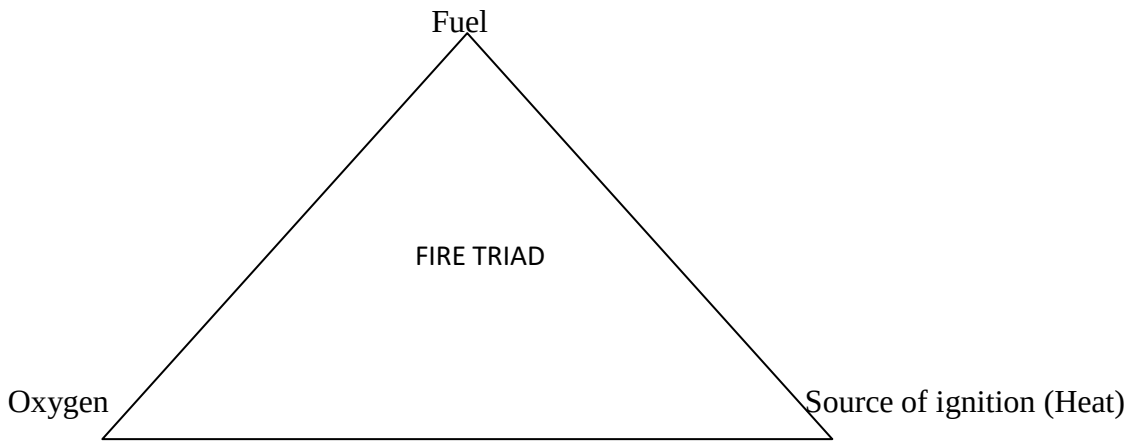

Figure 1.0: Fire Triangle

Source: Hoover, 2017.

Flames are the noticeable sign of burning. It is notable in fire engineering that a little, low-intensity fire can become a highintensity inferno in minutes, if not seconds. In one of the most famous such fires, at the CocoanutGrove Dance Hall in 1942, the fire spread throughout the building in less than 5 min resultingin 490 fatalities, 259 injuries and only ¼ of those inside the hotel club escaped unhurt.The design and decoration affected the fire in such a way as to cause what is known as aflashover, a phenomenon which has been at the heart of numerous high-publicity fire disasters (Rasbash, 1991).

2.9 Effect of Fire on People

The physiological effects of fire on people can be distinguished as those due to heat and those due to smoke (Graham and Roberts, 2000). Heat effects on human beings operate within a few degrees of 37℃ (98°F). Highertemperatures bring the possibilities of heat depletion (loss of water and salt through sweat) and warmth stroke where the body can't sufficiently control its temperature. Profound serious consumes impact nerves framework,

lungs and skin. Furthermore, more so Smoke impacts has two normal methods of influencing individuals that is it will influence the faculties and (synthetically) the physiology. Artificially, smoke contains aggravations, poisons, cancer-causing agents also little oxygen. Absence of O2causes asphyxia alsoquick obviousness/demise. CO is a poison which replaces O2 in the blood and hence causes loss of awareness and asphyxia. Likewise gathering of smoke in a structure decreases perceive ability and can deliver impediments along a departure course, or even the actual fire, undetectable. Also, hot smoke can quickly spread upwards, decreasing deceivability significantly further, and given the stature of hoteland the utilization of atria in numerous cutting edge premises (Graham and Roberts, 2000).

2.10 Framework for Fire Safety Management

The System for Fire Safety in casual Settlements gives a stage to considering fire safetyand fire hazard decrease through the four phases of the fiasco cycle (moderation, readiness, reaction, recuperation), at various scales (family unit, local area, city). Fire in a casual settlement can spread quickly also influence a great many individuals. Coordination between the local areas, crisis administrations also different partners can altogether improve fire reaction. The vital activities during a fire are Correspondences, Departure, andfirefighting. A viable reaction can diminish the death toll, property harm, the effect on occupations and the exertion, time also speculation needed to restore the influenced territories (Barbara, 2018). The system is coordinated around the four phases of the fiasco cycle and recognizes twelve key parts of fire security. The rings address the various scales at which activity to improve fire comfort ought to be considered in families, local area, and city (Barbara, 2018).

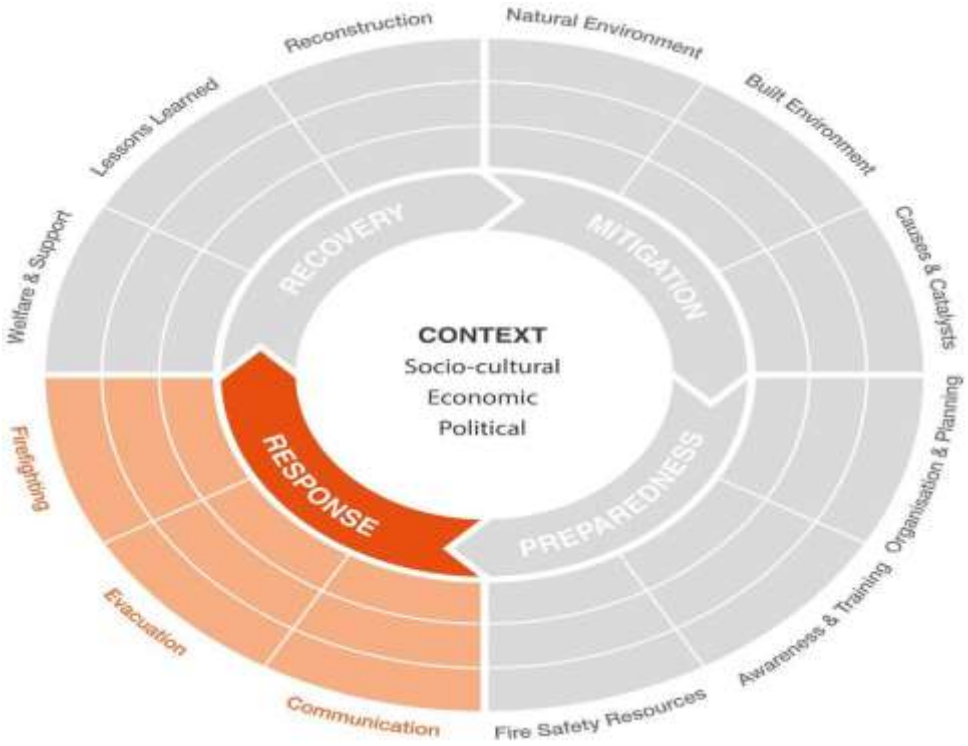

Figure 2.0: A Framework for Fire Safety in Informal Settlements.

Source: Barbara, 2018.

2.11 Fire Safety Strategies

The main design options to ensure fire safety are:

2.11.1 Prevention strategy

The three parts that are needed for a fire to begin are a ignition source, fuel and an inventory of oxygen. Since it is hard to avoid oxygen from a building, fire prevention tends to concentrate on the other two components which a designers can reduce the risk of ignition, is to design out ignition sources, and enable buildings to be managed in such a way that the risk of ignition is eliminated (Andrew and Anthony, 2017).

2.11.2 Communication strategy

When a fire is recognized either by occupants orautomatic means, it is important to convey the area of fire to different tenants and to a control and reaction focus, for example, the fire and salvage administrations (Andrew and Anthony, 2017). This will permit an appraisal of the right reaction to be attempted, and if vital, incorporate cautions to be sounded, a controlled clearing, setting off of smoke control system or sprinklers (Andrew and Anthony, 2017).

2.11.3 Escape strategy

Building should be planned with the goal that occupants can get away from safety if a fire breaks out. They should have the option to arrive at a position of safety without being overwhelmed by warmth or smoke, thus the time taken to get away from should be more limited than the probably time it will take for fire or smoke to spread (Andrew and Anthony, 2017).

This can be accomplished by controlling fire spread and by guaranteeing that departure courses are effectively available and neither too long or too complex individuals with versatility issues who may require help should likewise be thought of (Andrew and Anthony, 2017).

2.11.4 Containment strategy

The capacity of a structure's plan to contain a fire once began is basic to the assurance of the property, the existences of the tenants and furthermore encompassing individuals and structures. It is the strategy most unmistakably covered by enactment and furthermore one which insurance agencies are generally worried about regulation should address both

warmth and smoke hazard. It is conceivable to plan latent also dynamic fire regulation measures (Andrew and Anthony, 2017).

Detached estimates concerned the idea of the structure, sub-division and wrap. They are the properties of a structure's development which serve to restrict the spread of fire and smoke if there should arise an occurrence of a fire, for example, a half-hour fire entryway. Dynamic measures are those which must be enacted either naturally or physically. This incorporates sprinklers, fire hydrants, dousers and smoke alarms. In case of a fire, they will be enacted by some specialist of type of correspondence, advising individuals or hardware regarding the presence of fire and educating them to take measures to contain it spread (Andrew and Anthony, 2017).

2.11.5 Extinguishment strategy

The quenching specialists can be applied either by the actual inhabitants, through auto-concealment frameworks, or by the fire and salvage administration. Sprinkler is intended to douse. Little flames or contains developing flames until the fire and salvage administration shows up. Practically all structures over 30m high should be fitted with a sprinkler system introduced as per the proper English guidelines (Andrew and Anthony, 2017).

2.12 National Fire Safety Code

In 2013 when the federal government affirmed the Public Fire Security Code, which was accepted to be long late, many heaved a sigh of relief, accepting that the country would now be able to take a rest from incessant fire outbreak. The Public Fire Security Code contains what ought to be finished by land owners prior to, during and after development of property to rapidly capture the spread of fire during flare-ups. The code additionally

explains, among others, what ought to be viewed as when arranging business private or some other sort of building, so that fire episodes can rapidly be managed in the event that they occur (Omolabake, *et al.* 2019).

The assumption is for the code to be implemented altogether open structures as contained in theFederal Governments circular Ref no SGF 6/S. 18/VII/907,2112. Five years after the usage of the code, very little expected changes have occurred; rather, the circumstance has gone from fry skillet to fire, based on accessible insights. Specifically, specialists say while the fire security code exists, very few know about the arrangement of the code thus can't follow up on it also as result, the nation kept on floundering in colossal human and material avoidable misfortune. Government at different levels has not adequately worked the fire comfort code while implementation authorities for the most part spring to activity just when debacle ejected (Bukola, *et al.* 2018).

Along these lines, another master, Oserogho and Partners called attention to that the security of lives and properties particularly from avoidable fire mishaps should possess a higher spot in hazard the board needs of each business and country. It is subsequently vital for all entrepreneurs, administrators and troughs to guarantee that they are continually side by side with fire security laws, guidelines, codes also industry, all of which affect venture (Adedayo, 2018).

2.12 National Building Code

The Public Building regulation 2016 (Adedayo, 2018) about fire comfort procedures regarding structures. Fire comfort is the proactive technique for decreasing crises and the harm brought about by flames.The objective is to spread awareness about fire safety and the precautions to be taken to prevent potentially harmful fires and how to survive them.

Thus, provisions for fire protection of buildings are required. Building regulation is to ensure general comfort, safetyalso general government assistance as they identify with the development and inhabitance of buildingsand constructions. The construction standard becomes law of a specific purview when officially instituted by the proper legislative or private power (Ching, *et al.* 2018).

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

Creswell (2003) define research design as a set of strategies and systems utilized in gathering and breaking down proportions of the factors determined in the research problem. Quantitative research is the systematic empirical examination of recognizable phenomena by means of measurable, numerical, or computational strategies (Given, 2008). Quantitative research chooses what to consider, asks explicit, restricted inquiries; gathers quantifiable information from members, dissects these numbers using statistics; and conducts the request in an impartial, target way (Fischler, 2010).

Qualitative research is a logical strategy for perception to accumulate non-mathematical information (Maxfield and Babbie, 2014). Qualitativeresearchalludes to implications, ideas definitions, attributes, analogies, images, and depiction of things.Qualitativeresearch answers why and how a specific phenomenon may happen as opposed to how regularly (Van De Berg and Struwig, 2017).

This research adopted mixed method research design through investigation. Creswell (2003) believes that mixed method research techniques is compared to pragmatismand it is focused on that mixed strategy look to numerous ways to deal with gathering and examining information instead of buying in to just one way utilizing both quantitative and qualitative information to give the best comprehension of a research problem. The research goals were accomplished using questionnaire survey, interviewand observation. These were directed to those associated with the Hotel Management in Federal Capital Territory Abuja.

3.2 Targeted Population

Target population is characterized as a total arrangement of cases or components for certain basic recognizable attributes of a specific nature distinct from other population. Mugenda and Mugenda (2003) notes that a population is a well-defined set of individuals, services, components, occasions, group of things or families that are being examined. The target population is 3, 4 and 5 star hotels in Abuja. Middleand top managers were the respondents in the study since they are associated with decision makingand day to day organization tasks. According to Hotel Owners Forum Abuja, total of two hundred and twenty one (221) hotels were disclosed to be registered 3, 4 and 5 star hotels in Abuja (Hotel Owners Forum Abuja, 2019). Table 3.1 presented the distribution of target population by categories of hotel.

Table 3.1: Target Population

Category (Star)	Number of Hotels
5 Star	30
4 Star	76
3 Star	115
Total	221

Sources: Hotel Owners Forum,2019

3.3 Sampling Method

Gray, *et al*. (2009) characterizes a sample technique as a section or part of a population to be studied. The study fundamentally deals with the managements; the study was only focusing on all levels of the management. Stratified random sampling was used to arrive at a sample of hotels.

The research adopted Stratified random sampling (Dougherty, *et al.* 2018). It is where the researcher ensures that subgroups (strata) of a given population are each adequately represented within the whole sample population of a research study (Dougherty, *et al.* 2018). The Taro Yamane method for sample size calculation which was formulated by the statistician Taro Yamane in 1967 was used to determine the sample size:

$$n = \frac{N}{1+N(e)^2}$$

Where:

n = Sample Size (unknown)

N = Population (221)

e = error limit given as 5% (0.05)

1 = Constant (1)

$$n = \frac{221}{1+221(0.05)^2}$$

$$n = \frac{221}{1.55}$$

n= 142

Table 3.2 shows the distribution of sampled hotels in Abuja.

Table 3.2: Sample Size

Category (Star)	**Number of hotels**	**Number of sampled hotels**
5 star	30	13
4 star	76	51
3 star	115	78
Total	221	142

3.4 Data Collection Procedures

3.4.1 Questionnaires Survey:

The questionnaires survey method was created by Sir Francis Galton. Creswell, (2003) characterized questionnaire survey as information collection instrument that comprise of a progression of inquiries and other brief to assemble data from respondents. A set of inquiry on a topic or gathering of subject intended to be replied by the respondent. It is the vehicle utilized to suggest the conversation starter that the scientist needs respondents to answer (Ahmed, 2012).

This mechanism of information collection was initiated to be suitable for this study given the idea of the study area. At the end of the day, significant data need for this study was gotten through the administration of questionnaires. Questionnaires were structure to accomplish the objectives of the research work. The Questionnaire was administered to safetyand maintenance official of the hotel, which lasted for a period of 6 months.

3.4.2 Interview Survey:

Interviews can be characterized as a qualitative research procedure which includes"conducting intensive individual interview with few respondents to explore their point of view on a specific thought, program or circumstance (Al-Yami and Price, 2006). There are three unique arrangements of interview: organized, semi-organized also unstructured. Organized interviewwas utilized for the research which comprises of a progression of pre-decided inquiries that all interviewees replied in a similar request. To assemble required data, the researcher guarantees one on one conversation with the focused on respondents. Each inquiryquestion was guided to be an open end inquiries for respondent to completely free communicate their assessment.

The researcher interviewed 5 safety officials from various hotels appraised 3 stars, 4 stars and 5 stars, to make up a sum of 15 interviewees. The interview was conductedwith each participant three times in their respective offices. Each of the interviews took approximately 40 minutes.In order to obtain pertinent information of the study the researcher ensures top official of the hotel are interviewed, most especially the safety officers. The interview was conducted for three (3) weeks to guarantee satisfactory data is being collected/gathered from the respondent.All the interviews were recorded and transcribed.After transcription, the resultant information was qualitatively analyzed.

3.5 Research Instrument: Suitability and Reliability Test

3.5.1 Suitability test

The suitability of the use of Factor Analysis techniques was tested using Kaiser-Meye-Oklin test and Barlett's Test of Sphericity. The suitability of the data as tested using KMO is hereby presented in Table 3.3

Table 3.3: Suitability of the Sets and Variables

Test	Variables	Value
Kaiser Meyer-Olkin	Measure of Sampling Adequacy	0.832
	Approx.. Chi-Square	34049.3
Barlett's Test of Sphericity	Df	56
	Sig.	0.000

Table 3.3 shows the result of the Kaiser Meyer-Olkin proportion of examining sufficiency and Bartlett's Trial of Sphericity. A KMO value greaterthat 0.5 shows that the testing in mediocre, while a KMO under 0.5 considered hopeless. Subsequently, the Kaiser Meyer-Olkin measure of sampling adequacy for the factors is 0.832, this demonstrates that the

sampling is acceptable and the framework of the variable can be examined. The Bartlett's Trial of Sphericity p-esteem is under 0.5. Subsequently, this demonstrate that the factor examination meet criteria necessary to continue.

3.5.2 Reliability test

The reliability of the data as tested using the Cronbach's Alpha is also presented in Table 3.4 below.

Table 3.4: Suitability of the Sets and Variables

Variable	No. of Variables	Cronbach's αValue
Items	58	0.811

3.6 Data Analysis

Gathered information was altered for precision, consistency and culmination. Raw information was entered on a worksheet in Microsoft Exceland computer programming known as Statistical Package for Social Sciences (SPSS) version 23.0 and R programmingwhich were the instruments of analysis. Raw information was broke down quantitatively and statistically. Information was analyzed using descriptive statistics like Collected data was edited for accuracy, consistency and completeness. Raw data was keyed on a worksheet in Microsoft Excel and computer software known as Statistical Package for Social Sciences (SPSS) version 23.0 and R programming which were the tools of analysis. Raw data was analyzed quantitatively and statistically. Data was analyzed using descriptive statistics like Frequency distribution and percentage (%). Multi Criteria Decision Analysis

was used to establish a mechanism (Behzadian, *et al.* 2012). Findings were interpreted and inferences made and presented using pie charts, tables and percentages.

3.7 Procedure for Factor Analysis usingMulti-Criteria Decision Analysis (MCDA)

The choice for multi criteria decision analysis is as a result of the need for management of hotel facilities to make proper use of the mechanism to be proposed in their decision making as regards to how to manage fire risk in hotels, with consideration of the following explanatory variables:

M1 = Structural fire protection

M2= Fire detection and warning

M3= Firefighting Equipment

M4 = Provision of Escape Route

M5= Staff Training and Customers education

And Moderating Variables known as criteria

C1= Reduction of fire incidence,

C2= Reduction in fire casualty

C3= Hope of safety as the criteria basis (C3). Table 3.5 also 3.6 gives the skeletal representation of the MCDA.

Table 3.5: Multi-Criteria Decision Analysis (MCDA)

Measures	C_1	C_2	C_3
Weight	W_1	W_2	W_3
M_1	p_{11}	p_{12}	p_{13}
M_2	p_{21}	p_{22}	p_{23}
M_3	p_{31}	p_{32}	p_{33}
M_4	p_{41}	p_{42}	p_{43}
M_5	p_{51}	p_{52}	p_{53}

where;

W_j= weight of each criteria (j = 1,2,3).

p_{ij} = performance of each measures per criteria (i = 1,2,3,...,5; j= 1,2,3)

The following steps are then followed to output in Table 3.4

i. calculating the normalized matrix

$$\bar{p}_{7y} = \frac{p_{ij}}{\sqrt{\sum_j^n p^2_{ij}}} \quad (3.1)$$

ii. Calculating the weight normalized matrix

$$V_{Ij} = p_{ij} \, XW_j \quad (3.2)$$

iii. ideal best also ideal worst value

ideal best = V^+= maximum value

Ideal worst = V^-= minimum value

iv. Calculating the Euclidean distance from the ideal best and ideal

$$S^+ = [\sum_{j=1}^{m} (V_{ij} - V_j^+)^2]^{0.5} \quad (3.3)$$

$$S^- = [\sum_{j=1}^{m} (V_{ij} - V_j^-)^2]^{0.5} \quad (3.4)$$

v. calculating the Performance score

$$P_i = \frac{S_i^-}{S_i + S_i^+} \quad (3.5)$$

Hence, for the purpose of the study, the value of criteria weight (W_j) was obtained from the relative importance Index (RII) calculated from information gathered from participants of the study.

Table 3.6: Final Stage Multi-Criteria Decision Analysis (MCDA)

Measures	C_1	C_2	C_3	S^+	S^-	P_i	Rank (R_i)
M_1	p_{11}	p_{12}	p_{13}	S^+_1	S^-_1	P_1	R_1
M_2	p_{21}	p_{22}	p_{23}	S^+_2	S^-_2	P_2	R_2
M_3	p_{31}	p_{32}	p_{33}	S^+_3	S^-_3	P_3	R_3
M_4	p_{41}	p_{42}	p_{43}	S^+_4	S^-_4	P_4	R_4
M_5	p_{51}	p_{52}	p_{53}	S^+_5	S^-_5	P_5	R_5

3.8 Analysis of Interview (Qualitative Data)

Narrative analysis approach is becoming increasingly popular, especially in social sciences (Al-Yami and Price, 2006). As the name suggests, it is about making sense of information obtained. For the purpose of this study: interview response is gathered, analyze each information and look for insights and meanings. Compare and contrast of each response was addressed and look for interpretations that best disclosed the opinion of the response.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Data Presentation

The organization of data was done with the administration of questionnaire to officials/managers of the examined hotels in Abuja City. Out of which one hundred and 42 (142) questionnaire administered, ninety five were returned and found legitimate for the study.Table 4.1 reveals the distribution of respondent by category (stars).

Table 4.1: Distribution of Hotels by Level of Stars

S/N	Category	Administered Questionnaire (%)	Returned Questionnaire (%)
1	**5 Star**	13(9.2)	7(4.9)
2	**4 Star**	51(35.9)	33(23.2)
3	**3 Star**	78(54.9)	55(38.7)
Total	**(%)**	142(100.0)	95(66.9)

Table 4.1 shows that 55(38.7%) of reactions are gotten from 3stars hotels, trailed by 33(23.2%) from 4 star hotelsand finally 7(4.9%) reactions are from 5 star hotel. The implication of this is that 95(66.9%) of the overall questionnaire were administered and also more responses are gotten from both 3 and 4 star hotels.

Table 4.2 also discloses the demographic information of the respondents

Table 4.2: Demographics Characteristics of the Respondents

Items	Description	Frequency	Percentage (%)
Gender	Male	79	83.2
	Female	16	16.8
	Total	95	100
Age	<25 years	7	7.4
	26-35 years	53	55.8
	36-45 years	35	36.8
	46-55 years	68	17.6
	>55 years	0	0.0
	Total	95	100.0
Cadre	Maintenance	49	48.4
	Safety	46	51.6
	Total	95	100.0
Job Tenure	Permanent	54	56.9
	Contract	22	23.2
	Casual workers	19	20.0
	Total	95	100.0
Working Experience	1 – 23 month	27	28.4
	2-5 years	37	38.9
	6-10 years	29	30.5
	11- 15 years	2	2.1
	> 15 years	0	0.0
	Total	95	100.0

Table 4.2 uncovered the demographic data of the respondent. The outcome reveals that 79(83.2%) male while 16(16.8%) are female. The result of the age scope of respondent portray that 7(7.4%) are< 25, 53(55.8) are 26 – 35, 35(36.8%) also falls inside the age scope of 36 – 45, lastly none are above 46years age.

The outcome likewise uncover that all the respondents are staff, the result of the

investigation also, show that 49(48.4%) are maintenance staff, 46(51.6%) safety staff, the outcome likewise portray that 54(56.8%) are permanent staff, 22(23.2%) are contract staff and keeping in mind that 19 (20.0%) are casual staff. The result uncovered that 27(28.4%) just spent 1 – 2 years in their individual hotel, 37(38.9%) had 2 – 5 years of stay with the hotel, 29(30/.) spent 6 – 10 years lastly 2(2.1%) spent 11 – 15 years.

4.2 Assess the Potential Fire Risks in Hotel Facility in Abuja

The need to assess the potential fire risks in hotels facility makes it possible to know sections that need prompt attentions on fire safety. Table 4.3 shows the potential risks in hotel facilities in Abuja.

Table 4.3: Potential Fire Related Risks in Hotel Facility in Abuja

Fire Risk	SA	A	DA	SD	NS	*RII*	Rank
Electrical system that are overloaded, poorly maintained or defective	57	38	0	0	0	0.87	1st
cooking appliances, stoves and ovens	55	33	5	0	2	0.85	2nd
Kitchen fire from unattended cooking grease	53	32	7	3	0	0.83	3rd
Flammable liquids and aerosole	50	34	10	0	0	0.84	4th
Candles and other open flames	48	37	7	4	0	0,86	5th
Equipment that generate heat and utilizes combustible materials	42	39	14	0	0	0.78	6th
Combustible storage area with insufficient protection	41	37	13	4	0	0.76	7th
Electrical wiring in poor condition	48	32	8	0	7	0.75	8th
Smoking (cigarettes, pipes and lighters)	28	55	8	4	0	0.74	9th
Fire place chimneys not properly or regularly clean	34	33	14	7	7	0.68	10th
Arson	38	20	25	8	4	0.68	10th
Electrical blankets	28	55	8	4	0	0.74	9th

Table 4.3disclosed that kitchen fire from unattended cooking grease, electrical system that are overloaded, poorly maintained or defective, combustible storage area with insufficient protection, candles and other open flames, smoking (cigarettes, pipes and lighters),

equipment that generate heat and utilizes combustible materials, flammable liquids and

aerosols, cooking appliances, stoves and ovens, electrical wiring in poor condition, fire place chimneys not properly or regularly clean, arson and electrical blankets are fire risk in hotel facilities.Electrical system that are overloaded, poorly maintained or defective is ranked 1st with Relative Importance Index (RII) of 0.87 while Fire place chimneys not properly or regularly clean and Arson is ranked 10thwithRelative Importance Index (RII) of 0.68.

4.3 Examination of Existing Fire Safety Strategies/Measures in Hotel facility in Abuja

Table 4.4 and 4.5 revealed existing fire safety strategies/measures in Hotel facility in Abuja.

Table 4.4: Fire Safety Strategies/Measures in Hotel facility in Abuja

Strategy	SA	A	DA	SD	NS	*RII*	Rank
Conduct Inspection of Electrical Installation	64	21	1	14	4	0.82	1st
Fire suppression system should be present and function automatically	51	44	0	0	0	0.79	2nd
Provide clear signage indicating	54	36	5	0	0	0.77	3rd
Means of evacuation should be well developed	56	31	8	0	0	0.74	4th 5th
Design effort must minimize damage to property in event of fire	64	21	6	0	4	0.71	6th
Provision of fir safety plan	51	39	5	0	0	0.68	7th 8th
Design and construction of hotel should minimize occurrence of fire	54	31	1	0	0	0.68	
Conduct inspection and Maintenance of Fire Safety Measures	49	40	6	0	0	0.66	
Design must ensure that adjacent property are protected in event of fire	58	24	9	4	0	0.65	9th 10th
Implementation fire evacuation drill procedures	47	39	9	0	0	0.62	11th
Conduct Fire Drill	56	25	7	3	4	0.61	

Undertake Fire Safety Training	54	30	3	0	8	0.60	12th
Adhering to Standard Codes	51	19	7	0	0	0.50	13th

Table 4.4 shows the various fire safety strategies employed by hotel in Abuja. The results depict that inspection of Electrical Installation, inspection and Maintenance of Fire Safety Measures, conducting of fire drill, undertake Fire Safety Training, Adhering to Standard Codes, Provision of Fire Safety Plan, Implementing Fire Evacuation Drill Procedures, Provide Clear Signage Indicating Exit Routes and Location of Fire Safety Equipment, Means of evacuation should be well developed, Fire suppression system should be present and unction automatically, Design and construction of hotel should minimize occurrence of fireDesign effort must minimize damage to property in event of fire and Design must ensure that adjacent property are protected in event of fire are fire safety risk strategies in Hotel facility in Abuja. Conduct inspection of electrical installation was ranked 1st with Relative Importance Index (RII) of 0.82 while adhering to standard codes was ranked 13th with Relative Importance Index (RII) of 0.50.

4.4 Assessment of Fire Safety Equipments Incorporated in Hotel Facility in Abuja.

Table 4.5: Fire Safety Equipments Incorporated in Hotel facility in Abuja

Equipments	Existing		Not Existing		Not Sure		RII	Rank
	Freq.	%	Freq.	%	Freq.	%		
Fire exits	87	91.6	5	5.3	3	3.2	0.78	1st
Fire Extinguisher	81	85.3	10	10.5	4	4.2	0.76	2nd
Fire safety sign	79	83.2	13	13.7	3	3.2	0.74	3rd
Fire alarm	76	80.0	16	16.8	3	3.2	0.73	4th
Fire hose reel	67	70.5	25	26.3	3	3.2	0.72	5th
Fame detector	70	73.7	12	12.6	13	13.7	0.70	6th
Fire link door	68	71.6	13	13.7	14	14.7	0.67	7th
Sprinkler system	61	64.2	26	27.4	8	8.4	0.66	8th
Fire bucket	59	62.1	27	28.4	9	9.5	0.65	9th
Heat Detector	62	65.3	20	21.1	13	13.7	0.57	10th
Smoke detector	60	63.2	20	21.1	15	15.8	0.53	11th
Wet riser	59	62.3	20	66.3	16	16.8	0.50	12th
Emergency lighting system	49	51.6	37	38.9	9	9.5	0.49	13th
Fire Hydrant	43	45.3	48	50.5	4	4.2	0.49	14th
Dry Riser	42	44.2	40	21.1	13	13.7	0.47	15th
Halon gas system	30	31.6	63	66.3	2	2.1	0.41	16th

Table 4.5reveals that smoke alarm, fire detector, heat detector, fire alarm, and sprinkler System, fire extinguishers among others is fire safety measures incorporated in hotel. The outcome further shows that 'fire exit's was positioned 1st with RelativeImportance Index (RII) of 0.78, while Halon gas system is positioned 16th with RII value 0.41.

Althoughall the measure reaction values are over the 2.0 criteria point for 3 liker scale, thus all measures exist in the hotels.

4.5 Examine the Availability of Existing Fire Safety Measures in Hotel Facility in Abuja.

Table 4.6: Availability of Existing Fire Safety Measures in Hotel Facility in Abuja

Measures	HA	A	MA	FA	NA	RII	Rank
Smoke Control	66	26	3	0	0	0.86	1st
Installation of Fire Hydrant and Hose Real System	57	31	5	2	0	0.81	2nd
Ventilating System	55	31	9	0	0	0.78	3rd
Installation of automatic sprinkler system	51	37	7	0	0	0.75	4th
Provision of Escape Route	49	40	6	0	8	0.73	5th 6th 7th 8th 9th
Fire Detection System	63	14	14	0	4	0.71	10th
Extinguishment	43	42	10	0	0	0.70	
Communication	48	28	17	0	2	0.69	
Containment	36	46	11	0	11	0.68	
Structural Fire Protection	42	45	0	0	8	0.66	
Storage of Dangerous goods and Combustible Materials	44	32	10	5	4	0.65	11th
light Scattering	38	32	17	0	8	0.63	12th
Ionization Detectors	26	27	28	2	12	0.59	13th
A lesser Beam	26	21	18	7	23	0.53	15th
Bimetallic Strip Detectors	30	25	11	3	26	0.57	14th
Average						0.69	

Table 4.6 reveals the respondent responses on the level of availability of existing fire safety measures in Hotel facility in Abuja. The provision of escape routes, smoke control, ventilating system, installation of automatic sprinkler system, fire detection system, installation of fire hydrant and hose reel system among others of existing fire safety

measures. The result depict smoke control is ranked 1st with highest available of RII 0.86, while lesser beam ranked 15thwith RII of 0.53.

Although the average total of RII of 0.69 shows the availability of fire safety measures in Hotel facility in Abuja are above average.

From field observation fire safety status of the hotel in Abuja metropolis are observed to be at moderate level as unveiled in Table 4.7.

4.6 Fire Safety Status of the Hotel in Abuja Metropolis

4.7Analysis of Physical/Observational Checklist

Physical/Observation Checklist

Item	Action	AV	NAV
Fire detection and warning system			
1	Automatic smoke detector/sensors with alarm available in the rooms and corridors	79	16
2	Heat/smoke detectors in the rooms are in working condition	67	28
3	Fire alarm bells available in the hotels	81	14
4	If the fire – detection and warning system is electrically powered, does it have a backup power supply?	45	50
5	Are the smoke/fire alarms connected to fire emergency response team's e.g fire brigades?	-	-
Fire Fighting equipments available			
		AV	NAV
6	Fire Extinguishers	95	_
7	Color code	95	_
	Blue	95	_
	Black	95	_
	Cream	69	26
8	Fire extinguisher are inspected and tagged annually by a licensed fire protection services company	87	8
9	Fire extinguisher are in working condition	89	6
10	Sand bucket	79	16
11	Fire blankets	85	10
12	Automatic sprinklers	65	30
13	Hose reels with water	43	52
Means of escape		AV	NAV
14	Exit door/exit corridor present	95	0
15	Labeled exit door	95	0
16	Emergency escape route with labeled signs/illustration on the walls	89	6
17	Exit routes are free from obstruction	93	2

18	Exit doors readily open from inside without the use of a key	84	11
19	Lighting provided on the exit route	92	3
20	Exit route lighting in working condition	87	8
21	Staircases and exit routes have balustrades and handrails	95	0
Documentary items available in the Hotel		AV	NAV
22	Annual fire audits report	34	61
23	Evacuation plan posted in each hotel room/corridors	91	4
24	Fire drill reports	45	50
25	Fire safety policy document	92	3

Table 4.7 unveiled the fire safety status of the hotel in regards to fire detection and warning system, firefighting equipment available, means of escape, documentary items available in the Hotel. The result shows that fire detection and warning system are moderately maintained in the hotel, likewise, the fire fighting equipments available, while the means of escape is fair and finally documentary items available in the Hotels are poor.

4.7 The Proposed Mechanism for Effective Fire Safety Management in Hotel Facility in Abuja.

In order to develop a mechanism for an effective fire safety management in Hotel Facility in Abuja, a Multi Criteria Decision Analysis was used to give a clear description of preferences inexisting fire safety measures**.** The study considers five indicators of fire safety (strategies/measures) these are:- Structural Fire Protection, Fire Detection and Warning, Firefighting Equipment, Provision of Escape Route, Staff Training and Customers Education on fire safety management. Likewise, three different roles are expected to be examined in each of this construct which are; Reduce Incidence of Fire, Reduce Casualty of Fire and hope of safety. Each of these construct is measured based on response of the respondent to assess significance roles on Reduction on Incidence of Fire outbreak, Reduction on Casualty of Fire and hope of safety with RII of 0.45, 0.57 and 0.53 respectively.

The performances of each candidate against the four criteria are shown in Table 4.8

Table 4.8Multi Criteria Decision on Each Indicators and Performance Ranking

	Normalised Ideal best	Normalised Ideal Worst	Normalised Performance	Rank
Structural fire protection	0.089	0.072	0.83	1st
Firefighting Equipment	0.06	0.11	0.79	2nd
Fire detection and warning	0.110	0.037	0.78	3rd
Provision of Escape Route	0.041	0.078	0.72	4th
Staff Training and Customers education on fire safety management	0.074	0.045	0.71	5th

Table 4.8 shows the normalised Ideal best alternative, normalised Ideal Worst alternative, normalised performance of each alternatives as well as their ranking.

The result depict that at least 0.83 (83%) improvement is required for Structural Fire protection, and 0.79 (79%) is required for Firefighting Equipments, followed by 0.78 (78%) status for Fire Detection and Warning is required for adequate Fire safety. Provision of Escape Route takes the 4th ranking with 0.72 (72.0%) performance requirement, and lastly Staff Training and Customers Education on Fire Safety Management ranked 5th with 0.71(71%).

4.8 Interview Results

From the Interview with Maintenance/Safety Officers of the Hotels the Following are Deduce:

The 5 stars' hotels are known to adopt designs standard, and also carry out staff training/seminar at least four times in a year, the hotel management ensure fire safety

policies are being conformed to adequate inspection, operationand maintenance of fire safety equipment. The participant of the study experienced fire incidence in the hotel at least once over the yearsof their stay with the hotel although not critical, all the staff are exposed touse a fire extinguisher in case of a fire outbreak, the mechanism forfire safety management.Hence, the hotels are rated to be fully equipped and safe from any fire outbreak incidence (Maintenance/Safety Staff: 5 Star).

From the statement above it obvious that there is high adequacy of fire safety measure adopted in all the 5 stars' hotels in Abuja. Hence, the hotels fully adopted fire safety standard.

The management of most 4 stars' hotels was revealed to moderately adopted designs standard and code.Thestaffs undergone training at least twice in a year, the hotel management ensure fire safety policies are being adhered to, most of the hotels facilities are revealed to be moderately sufficient in case ofany fire outbreak. The management of the hotels also ensures adequateinspection, operationand maintenance of fire safety equipment. There is experience of fire outbreak at least twice but without any serious damage. The staffs are exposed to use of a fire extinguisherin case of a fire outbreak, the mechanism for fire safety management. Hence, the hotels are rated to be highly equipped and safe from any fire outbreak incidence (Maintenance/Safety Staff: 4 Star).

From the statement above it obvious that there is high adequacy of fire safety management adopted in virtual all the 4 stars' hotels in Abuja. Hence, there is highly level of fire safety among 4 stars' hotel in Abuja.

The management of most 3 stars' hotels was revealed to have fairly adopted designs standard and code.The staffs are made to undergone trainingat least once in two years. The 3 stars' hotel management ensures firesafety policiesare being adhered to. Most of the hotels facilities are revealedto be fairly sufficient in case of any fire outbreak. The management of the hotelsalso ensures fair inspection, operationand maintenance offire safety equipment. There was few experience of fire outbreak more than three times but without any serious damage. The staffs are exposed to use a fire extinguisherin case of a fire outbreak. There is no design mechanism for fire safety management. Hence, the hotels are rated to be highly equippedand safe from any fire outbreak incidence (Maintenance/Safety Staff: 3 Stars).

From the statement above it obvious that there is fair adequacy of fire safety management adopted in virtual all the 3 stars' hotels in Abuja. Hence, there is need to help to improve their standard from the outcome of the study so far the study there by posed the framework shown in Figure 4.1.

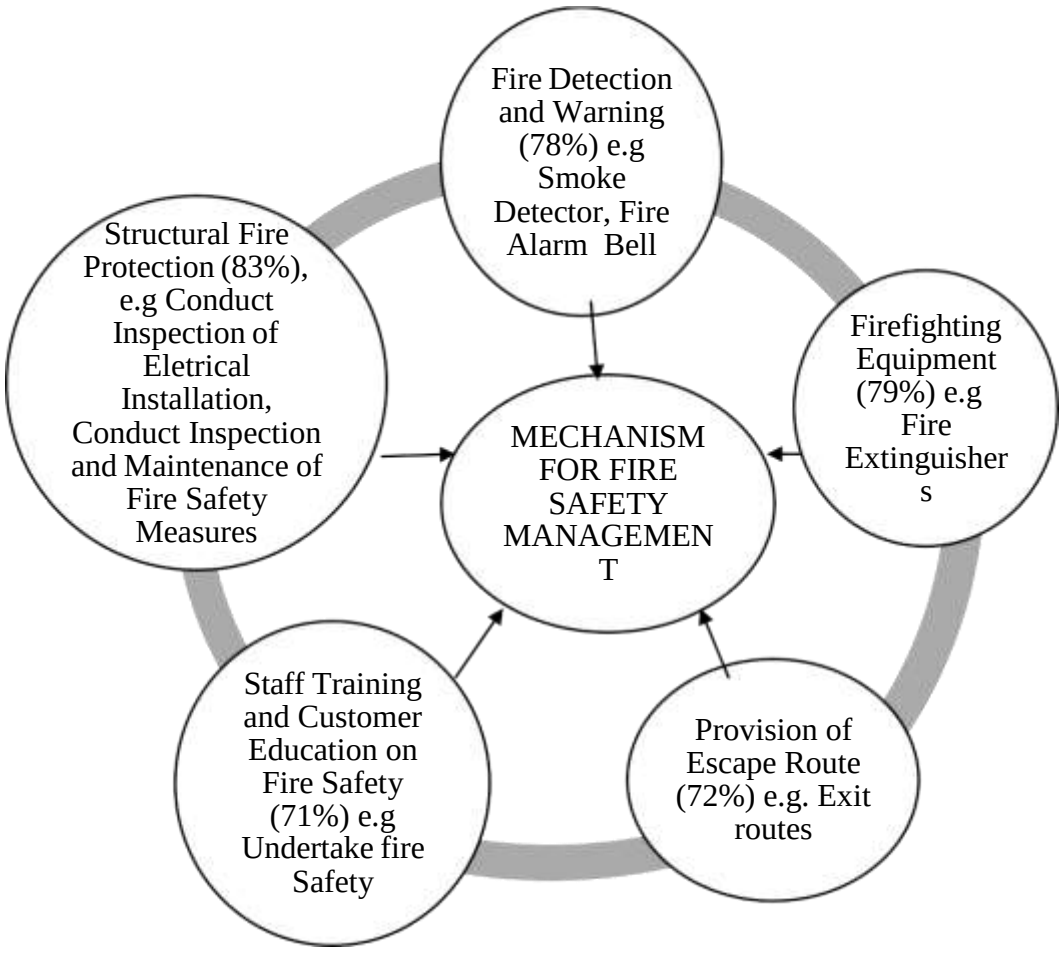

Figure 4.1: Proposed Mechanism for Fire Safety Management in Hotels

Figure 4.1 shows that at least 83% improvement is needed on Structural fire protection to be worked on by the hotel management for outbreak safety. Likewise 79% is needed for firefighting Equipment ought to be made accessible, followed by 78% status for fire detectionand warning is needed for sufficient fire safety. Provision of Escape Route to extent of 72.0%performance is required, and lastly Staff Training and Customers education on fire safety management should be upgrade to at least 71%.

4.9 Discussion of Results

In this study, Electrical system that are overloaded, poorly maintained or defective is ranked 1st with Relative Importance Index (RII) of 0.87 while Fire place chimneys not properly or regularly clean and Arson is ranked 10thwith Relative Importance Index (RII) of 0.68.

Conduct inspection of electrical installation was ranked 1st with Relative Importance Index (RII) of 0.82 while adhering to standard codes was ranked 13th with Relative Importance Index (RII) of 0.50.

The findings also shows that 'fire exits' was ranked 1st with Relative Importance Index (RII) of 0.78, while Halon gas system is ranked 16 with RII value 0.41.Although all the measure response values are above the 2.0 criteria point for 3 liker scale, hence all measures exist in the hotels. Smoke control is ranked 1st with highest available of RII 0.86, while lesser beam ranked 15thwith RII of 0.53. Although the average total of RII of 0.69 shows the availability of fire safety measures in Hotel facility in Abuja are above average.

The outcome of the result also unveiled kitchen fire from unattended cooking grease, electrical system that are overloaded, poorly maintained or defective, combustible storage area with insufficient protection, candles and other open flames, smoking (cigarettes, pipes and lighters), equipment that generate heat and utilizes combustible materials, flammable liquids and aerosols, and so on are hotel facilities at risk with relative importance index of (RII) 0.84, 0.87, 0.76, 0.80, 0.74, 0.78 and 0.84 respectively.

The findings of the study are vein with that of the (Siemens, 2014), which disclosed in the study that afire load, smoke movement, equipment that generate heat and utilizes combustible materials among others risk variables that lead to fire outbreak. The findings

also corroborate with that of (Lee, *et al.* 2012) who revealed that improper protective devices sizing would lead to ignition due to these mechanism.

More so, the study also unveiled that inspection of Electrical Installation, inspection and Maintenance of Fire Safety Measures, conducting of fire drill, undertake Fire Safety Training, Adhering to Standard Codes, Provision of Fire Safety Plan, Implementing Fire Evacuation Drill Procedures, Provide Clear Signage Indicating Exit Routes and Location of Fire Safety Equipment, Means of evacuation should be well developed, Fire suppression system should be present and unction automatically, and so on are fire safety risk strategies required in Hotel facility in Abuja with relative importance index (RII) of 0.50, 0.66, 0.61, 0.60, 0.82, 0.68, 0.62 and 0.77 respectively. This findings is also supported by that of (Michael, 2014), whose result revealed provision of fire safety plan, implementing fire evacuation drill procedures, provide clear signage indicating exit routes and location of fire safety equipment among the fire safety strategies need for hotels.

In addition the study also disclose that fire safety measures put in place by hotel management in the study area among these are; 'Fire exits' was ranked 1st with Relative Importance Index (RII) of 0.78, followed by Fire extinguishers ranked 2nd with RII of 0.76, Fire Safety sign rand 3rd with RII 0.74, and Fire Alarm ranked 4th with RII 0.73, and fire Hose Reel is ranked 5th with RII value 0.70 of and so on while Wet Riser is ranked 16 with RII value 0.41.

The findings of the study also unveiled the availability of the existing fire safety measures, from the responses of the respondent Smoke Control is ranked 1st with highest available of RII 0.86, followed by installation of fire Hydrant and Hose Reel System ranked 2nd with RII 0.81, the 3rd ranked is Ventilating System with RII of 0.78, and Installation of automatic Sprinkler System ranked 4th with RII of 0.75, the 5th ranked is Provision of

Escape Routes with RII 0.73, Fire Detection System was ranked 6th with RII of 0.71 this continues till the last ranked of 15th lesser Beam with RII of 0.53. The findings in contrast with that of (Siemens, 2014) whereby Fire Detection System was ranked 1st, followed by Hydrant and Hose Reel System, then others.

From the Multi Criteria Analysis conducted result depict that at least 0.83 (83%) improvement is required for Structural Fire protection, and 0.79 (79%) is required for Firefighting Equipments, followed by 0.78 (78%) status for Fire Detection and warning is required for adequate Fire Safety. Provision of Escape Route takes the 4th ranking with 0.72 (72.0%) performance requirement, and lastly Staff Training and Customers education on fire safety management ranked 5th with 0.71(71%). The findings is supported by the outcome of (Andrew and Anthony, 2017), whose outcome revealed structural fire protection, Firefighting Equipment and Provision of Escape Route to be an importance measure to control fire.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

From the outcome of the study it can be concluded that the kitchen fire from unattended cooking grease, electrical systems that are overloaded, poorly maintained or defective, combustible storage area with insufficient protection, candles and other open flames, smoking (cigarettes, pipes and lighters), equipment that generate heat and utilizes combustible materials, flammable liquids and aerosols, cooking appliances, stoves and ovens, electrical wiring in poor condition, fire place chimneys not properly or regularly cleaned, arson and electrical blankets are potential risks of fire outbreaks in hotel facilities in Abuja. This has given an insight on the potential risks of fire outbreaks in Hotel facilities in Abuja.

This implies that hotels in Abuja are still vulnerable to risks of fire despite the fairly adequate existing fire safety risk strategies/measures in Hotel facilities, the fire safety measures incorporated in Hotel facility design, the adequacy of the existing fire safety measures in Hotel facility in Abuja.

In addition it could also be asserted that inspection of electrical installation, inspection and maintenance of fire safety measures, conducting of fire drills, undertaking regular fire safety training, adhering to standard codes, provision of fire safety plans, implementing fire evacuation drill procedures, providing clear signage indicating exit routes and location of fire safety equipment are mitigation strategies mostly adopted by hotel management in hotels in Abuja metropolis.

Most of the Hotels assessed shows that fire exits, fire extinguishers, fire safety sign, fire alarm ranked amongst most common fire safety measures adopted by hotel managements in

Abuja. Moreover, smoke control, installation of fire hydrants and hose reel system, ventilating systems, installation of automatic sprinkler systems, provision of escape routes, fire detection systems are being taken into consideration in the fire safety measures in Hotel facilities in Abuja.

5.2 Recommendations

In view of the findings of the study the following recommendation are made:

1. The hotels management should ensure regular adequate assessment of potential risksof fire outbreak in Hotel facilities in Abuja.
2. Adequate fire safety measures should be made available by hotels management to ensure prompt response to any incidence of fire outbreak in the Hotels.
3. Hotels management should be enlightened on the importance of adoption of standard building procedures in building hotels to ensure safety of lives and properties from risk of fire.
4. Strict rules and regulation should be made, to ensure adequate implementation of this proposed mechanism for an effective fire safety management in Hotel Facilities in Nigeria.

5.3 Suggestion for Further Studies

The following are suggested for further studies:

1. Assessment of Fire Safety Measures in Hotel buildings in Abuja.
2. Fire safety Strategies for Hospitality Industry in Abuja.
3. Analysis of Buildings in Relation to Fire Safety Management in Hotel Facility

4. An investigative study on implementation and Effectiveness of Fire Safety Modelsincorporated among Hotels in Abuja.
5. Evaluation of influences of Hotel Management Policies on Effectiveness of Fire SafetyAwareness and Management among Hotels in Abuja.