



Delft University of Technology

## Fire hazard management in dining properties

### A case study

Hassanain, Mohammad A.; Sawalha, Haitham; Hamida, Mohammad B.; Alshibani, Adel; Zami, Mohammad Sharif

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# Fire hazard management in dining properties: a case study

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Mohammad A. Hassanain

*Architectural Engineering and Construction Management Department,  
King Fahd University of Petroleum and Minerals,  
Dhahran, Saudi Arabia and*

*Interdisciplinary Research Center for Smart Mobility and Logistics,  
King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia*

Haitham Sawalha

*Architectural Engineering and Construction Management Department,  
King Fahd University of Petroleum and Minerals,  
Dhahran, Saudi Arabia*

Mohammad B. Hamida

*Department of Management in the Built Environment,  
Faculty of Architecture and the Built Environment, Delft University of Technology,  
Delft, The Netherlands*

Adel Alshibani

*Architectural Engineering and Construction Management Department,  
King Fahd University of Petroleum and Minerals,  
Dhahran, Saudi Arabia and*

*Interdisciplinary Research Center for Construction and Building Materials,  
King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia, and*

Mohammad Sharif Zami

*Architecture and City Design Department,  
King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia and  
Interdisciplinary Research Center for Construction and Building Materials,  
King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia*

## Abstract

**Purpose** – This paper explores the relevant fire code requirements and outlines the development of an evaluation tool based on these codes to evaluate fire safety measures in dining properties.

**Design/methodology/approach** – Existing literature was examined to identify the combustible materials, fire causes and factors making these properties prone to fire incidents. An evaluation method, based on code regulations, for ensuring fire safety in dining properties was then developed and tested on a specific dining facility to validate its practicality.

**Findings** – Forty requirements, grouped into seven categories, were identified for ensuring fire safety in dining properties. The case study exposed multiple violations of fire safety, leading to corrective measures for enhancing the fire safety status of the building.

**Practical implications** – This study introduced a methodical approach for raising awareness, among property managers of dining properties, about fire incidences and their consequences. It presents an evaluation tool for assessing the compliance level with fire codes and standards.

**Originality/value** – Dining properties are facilities that offer both dine-in and take-out food services. Given the increasing number of fire incidents in dining properties worldwide, there is a substantial demand for a



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process to audit the adherence to fire safety codes in these properties. This study presents a systematic approach to increase public knowledge of fire events and their effects in dining properties.

**Keywords** Dining properties, Fire safety, Audit, Evaluation, Case study

**Paper type** Case study

## 1. Introduction

Dining properties refer to facilities that offer both on-site dining and take-out food services, encompassing places like restaurants, cafeterias and food courts. The dining area is generally situated near the kitchen for the convenient serving of meals and beverages. These properties, where fire is a daily necessity in the kitchen, inherently pose fire risks due to the potential gathering of a large number of people for dining purposes. In fire emergencies, dining properties are considered high-risk premises due to three main criteria. Firstly, the presence of kitchens equipped with powerful cooking appliances using natural gas or electricity, along with a significant amount of combustibles like cooking oil and grease, increases the likelihood of ignition (Liu *et al.*, 2004; Griffin and Morgan, 2014). The second criterion is the architectural design of dining halls, featuring large undivided spaces (Lawson, 2018) that could rapidly become engulfed in flames and filled with toxic smoke (Chow *et al.*, 2002). The third criterion is the frequent overcrowding, with a substantial number of users regularly present in the food serving and consumption areas throughout the day (DSFRS, 2018). Fire safety engineering and design constitute a discipline dedicated to studying and developing policies, systems and structures within the built environment to prevent and protect against extreme events, such as fire incidents and their associated damages. This domain integrates technology and engineering to establish fundamental safety elements, facilitating occupant evacuation, providing fire and rescue services and safeguarding property and assets. Past research has identified two key operational challenges affecting the maintenance of adequate fire safety performance in dining properties: a lack of staff awareness and knowledge regarding fire safety measures (Dienstbühl *et al.*, 2008; Burton, 2019) and insufficient enforcement of required occupational health and safety measures in accordance with applicable fire safety codes (Özdemir and Özdemir, 2021). These challenges pose a threat to fire prevention in dining properties, prompting the need for a user-friendly fire safety evaluation method. Such a method would enable operators and administrators of dining properties to easily audit and enforce code requirements related to fire safety. Consequently, this research is driven by the imperative to address the following research questions:

- RQ1. In what manner has the literature discussed the implementation of fire safety measures in dining properties? Specifically, what are the various combustible materials and fire causes in such properties? Additionally, what criteria contribute to dining properties being classified as high-risk buildings during fire incidents?
- RQ2. What are the regulations and preventive measures outlined in codes for ensuring fire protection in dining properties?
- RQ3. How can the evaluation of fire safety in dining properties be conducted?

Hence, the primary aim of this study is to develop an evaluative tool based on codes for assessing fire safety measures in dining properties. The paper proceeds to demonstrate the application of this evaluation tool through a case study to verify its effectiveness and practical applicability. Theoretical and practical insights are offered, contributing to various facets of fire safety in dining properties. These contributions are expected to offer tangible advantages to property managers responsible for ensuring the secure operation of such facilities.

2. Methodology

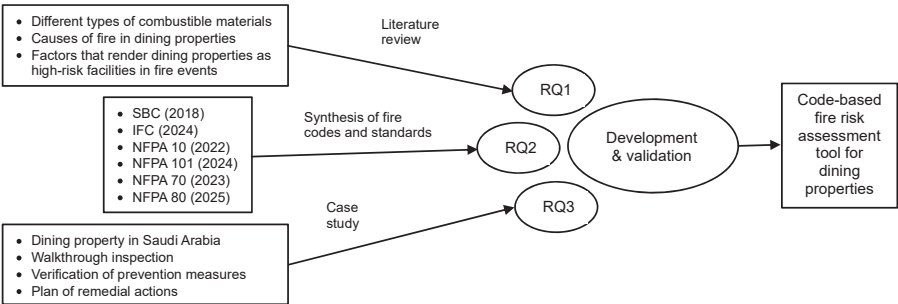
The research methodology, depicted in Figure 1, consisted of four main activities. These activities encompassed: (1) Examining pertinent literature on fire safety in dining properties, (2) Developing an evaluation tool, based on code regulations, for auditing fire safety in dining properties, (3) Applying the developed evaluation tool in a case study involving a dining property and (4) Formulating corrective measures to enhance the fire safety conditions in the studied property.

2.1 Analysis of the relevant literature

To gain a theoretical and knowledge-based understanding of fire hazard and safety in dining properties, a review of the literature was undertaken. This review aimed to explore various aspects related to fire safety in dining properties, including the typical combustible materials found in such settings, the reasons behind fires in dining properties and the criteria contributing to categorizing dining facilities as high-risk premises during fire incidents (Griffin and Morgan, 2014; Chow *et al.*, 2002; DSFRS, 2018; Dienstbühl *et al.*, 2008; Burton, 2019; Bukowski *et al.*, 1990; Chow, 1994; Flynn, 2007; FEMA, 2011; Ackland, 2012; Markowitz, 2014; Campbell, 2017).

2.2 Synthesis of fire safety code requirements

For the development of the fire safety evaluation tool, the study mainly focused on considering the requirements of widely deployed fire codes in Saudi Arabia. These include the National Fire Protection Association (NFPA) Code as well as the International Fire Code (IFC) as these are the most widely applicable fire code, before developing and mandating the local Saudi Building Code (SBC) in Saudi Arabia, in 2018. Hence, these relevant fire safety regulations were examined and synthesized (SBC, 2018; CFPA-E Guideline No 9, 2023; NFPA 61, 2017; IFC, 2024; NFPA 10, 2022; NFPA 101, 2024; NFPA 70, 2023; NFPA 80, 2025). This review aimed to identify the preventive measures necessary to uphold an adequate level of fire safety in dining properties. Consequently, an evaluation tool based on these codes was devised for evaluating the implementation of fire safety measures in such properties. The developed tool encompassed 40 preventive measures categorized under seven groups: “exit pathways”, “fire protection systems”, “electrical wirings and appliances”, “fire doors”, “housekeeping”, “miscellaneous” and “hazardous materials”. This evaluation tool is intended for use during walkthrough inspections of the case study dining property, providing guidance to both fire prevention inspectors and property managers in assessing compliance with fire code requirements. Table 1 outlines the devised evaluation tool for ensuring fire safety in dining properties.



Source(s): Developed by the authors

Figure 1.  
Research methodology

Evaluation tool for fire safety audit in dining establishments		
<i>Exit pathways</i>		
	Yes	No
1 Exit pathways are always illuminated		✓
2 Signs leading to the fire exits are provided in all dining halls		✓
3 The fire exits, and their public discharges, are not obstructed		✓
4 Fire exits' structures are neither deteriorated nor altered		✓
5 When the number of occupants exceeds 500, three fire exits are provided	✓	
6 The maximum distance to the fire exit from any point is 22 meters		✓
<i>Fire protection systems</i>		
	Yes	No
7 Extinguishers are available throughout all spaces, ensuring a maximum travel distance of 22 m from any point		✓
8 Extinguishers are located in easily reachable areas	✓	
9 Extinguishers are either placed in cabinets or hanged on the wall, with an elevation not more than 1.5 m from the floor finish	✓	
10 Exchangers are provided in all cooking workplaces, with a maximum travel distance of 9 m from any point in these spaces	✓	
11 Fire extinguishers are serviced yearly	✓	
12 Automated sprinkler heads are in working order		✓
13 Fire protection systems are in an operative condition		✓
14 Fire protection systems are inspected on an annual basis	✓	
15 Carbon Monoxide detectors are installed throughout all dining halls		✓
16 Smoke alarms are installed at a distance of 0.25 meters from cooking appliances		✓
<i>Electrical wirings and appliances</i>		
	Yes	No
17 Electrical motors are free from dust and liquids' accumulation	✓	
18 The movable power taps are not connected with appliances	✓	
19 All movable power taps are connected directly to receptacles	✓	
20 All switches and power boxes are covered by approved covers	✓	
21 Electrical rooms are designated, through the signs on their doors		✓
<i>Fire doors</i>		
	Yes	No
22 The fire doors are clear and unobstructed		✓
23 Fire doors' components are assembled using materials with fire-resistant ratings		✓
24 The hinges of the fire doors rotate only in the egress direction	✓	
25 Fire doors are not locked by latch, unless they consist of panic hardware	✓	
26 The width of doorways of all fire doors is not less than 0.82 meter	✓	
27 The term "Push to Exit" is displayed on the interior face of all fire doors		✓
<i>Housekeeping</i>		
	Yes	No
28 Storage spaces are separated from heating equipment and sources	✓	
29 The materials and supplies are stored in shelves below the ceiling, in a minimum depth of 0.6 meter	✓	
30 The materials and supplies are not kept in areas accessible to the public	✓	
31 The materials and supplies are not kept in service areas	✓	
32 Heat and smoke are controlled throughout the property		✓
33 Waste is disposed of in fire-rated and covered containers	✓	
<i>Miscellaneous</i>		
	Yes	No
34 The facility's address is displayed on the side(s) fronting the street		✓
35 The fire equipment access road is free from any obstructions	✓	
36 Candles and sources of sparks are banned in all dining halls	✓	
37 Emergency evacuation drills are conducted and recorded periodically		✓
38 Fire-rated materials are used in finishes and construction elements	✓	
<i>Hazardous materials</i>		
	Yes	No
39 Flammable liquids are not stored in public and basement spaces	✓	
40 Cooking equipment are cleaned to avoid grease and dust accumulation	✓	

**Table 1.**  
An evaluation tool for  
fire safety audit in  
dining properties

**Source(s):** Developed by the authors

### *2.3 Application of the code-based evaluation tool*

The evaluation tool was applied to a selected dining establishment, to validate its comprehensiveness and applicability. This process aimed to uncover any deficiencies that could potentially affect the fire safety standards within the studied property.

### *2.4 Development of recommendations for corrective measures*

A set of recommendations for corrective measures for improving the selected property's level of fire safety was developed based on the outcomes of applying the evaluation tool.

## **3. Literature review**

Knowledge about fire hazards and safety measures in dining properties are fundamental requirements for the safe operation of these premises. This entails identifying the usually present combustible materials in dining properties, fire causes in these properties, and the criteria which render these properties as high-risk category of premises during fire events.

### *3.1 Combustible materials in dining properties*

Dining properties accommodate a high magnitude of combustible materials, which cause fatal and non-fatal fire accidents (Ackland, 2012; Campbell, 2017; Wu and Wang, 2016). These materials are present in different forms, including gases, solids and liquids. The primary components of dining properties, such as furniture and finishes, contain a significant quantity of flammable materials, such as plastics, fabrics, papers and wood. The susceptibility of these materials to ignition is heightened in the presence of heat sources (Chow, 2011). Cooking supplies are another form of combustible materials, which are present in dining properties (Griffin and Morgan, 2014). They comprise all types of oils, organics, soft goods, and utensils (FEMA, 2011). Additionally, cleaning products are considered combustible materials, given that they contain chemicals that can readily ignite in the presence of heat sources. Grease in dining hall kitchens poses several significant dangers due to its high flammability and the difficulty of removal. When it reaches its ignition temperature, it can catch fire easily (Charter *et al.*, 2017). Common kitchen equipment such as stoves, ovens and fryers generate high heat and can ignite accumulated grease. Grease fires spread quickly, making them difficult to control (Horton, 2015). They can rapidly engulf a kitchen and spread to other parts of the building. Attempting to extinguish a grease fire with water can be extremely dangerous. Water can cause the burning grease to splatter and spread the fire further (Liu and Chow, 2017).

### *3.2 Fire causes in dining properties*

There are various causes that contribute to incidents of fires in dining properties (Chow *et al.*, 2002). The prime cause for the occurrence of fire in kitchen and dining properties is gas leakage (Xu *et al.*, 2019). In addition, the negligence of the workers at the kitchen (Gao *et al.*, 2014), as well as the unconscious attitudes of users are among the causes of fire accidents (Ackland, 2012). Several fire incidents have occurred in these properties due to inefficient control over cooking activities, taking into consideration that cooking is the main business activity in these properties. These fire incidents have resulted in significant property losses (FEMA, 2011; Campbell, 2017). Additionally, fires can be attributed to indoor smoking (Markowitz, 2014). Consequently, inadequate operation and supervision of dining properties, insufficient implementation of safety protocols and a lack of awareness among employees regarding proper housekeeping practices are notable factors that contribute to fire incidents. Moreover, fires resulting from electrical issues, including short circuits and improper use of electrical devices, have been responsible for significant losses (Xu *et al.*, 2019). These

incidents are often triggered by electrical faults, equipment malfunctions and inadequate wiring and circuit distribution (Campbell, 2017). Other fire causes stem from non-compliance with fire code regulations, such as the use of non-fire-rated construction materials and the absence of smoke control techniques (Chow, 1994).

Although the use of candles is a common cause of fire incidents in many types of buildings, maintaining candle usage in dining properties, while adhering to life safety requirements involves several strategies and considerations. NFPA 101 (2024) and NFPA 1 (2024) provide guidelines on the safe use of open flames. These guidelines include using enclosed candle holders that prevent the flame from coming into contact with flammable materials. The holders are required to be manufactured out of non-combustible materials, such as metal or glass. Further, candles must be placed on fire-resistant surfaces such as metal or ceramic trays, and away from curtains, paper or any other flammable objects. Furthermore, the use of candles could be restricted to specific, controlled areas where fire safety measures are more easily enforced.

### *3.3 Dining properties: a high-risk category of premises in fire incidents*

Dining properties fall into the high-risk category of premises in fire incidents (Garis and Clare, 2014). Numerous factors contribute to a potential compromise in the fire safety level in these venues (Flynn, 2007). One such factor is a lack of awareness regarding essential fire safety measures and practices among users of these properties (Dienstbühl *et al.*, 2008), posing a potential threat to lives in case of sudden fire incidents (Burton, 2019). Additionally, the availability of a diverse and numerous population of occupants, varying in age, gender and health conditions, significantly impacts the overall fire safety level of these properties (DSFRS, 2018; Wu and Wang, 2016). Evacuating such a large number of occupants within a short time frame becomes challenging (Hassanain *et al.*, 2016). The existence of multiple stoves and the presence of combustible products further contribute to the hazardous nature of dining properties (Bukowski *et al.*, 1990).

### *3.4 Stakeholders accountable for fire safety and prevention in dining establishments*

In dining establishments, responsibility for fire safety and prevention is shared among several stakeholders. Owners and property managers must ensure that the premises meet all fire safety regulations and maintain safety systems in operational condition. These systems include extinguishers, alarms and sprinkler systems. Owners and property managers must also arrange for training the employees to ensure compliance. Employees are responsible for using fire extinguishers and executing emergency evacuation plans. Fire safety inspectors and local fire departments are required to conduct regular inspections, provide guidance and respond to emergencies. Although not directly responsible, users should be aware of the emergency exits and procedures.

## **4. Code requirements for fire safety in dining properties**

The dining establishment selected for validating the devised evaluation tool is located in Saudi Arabia, where the applicable fire safety regulations are derived from the Saudi Building Code (SBC, 2018). This code integrates regulations from the International Fire Code (IFC) and incorporates mandates from the National Fire Protection Association (NFPA) codes. An analysis of these codes was conducted to identify the necessary fire preventive measures, which were categorized into seven groups: “exit pathways”, “fire protection systems”, “electrical wirings and appliances”, “fire doors”, “housekeeping”, “miscellaneous” and “hazardous materials”.

#### 4.1 Exit pathways

Being a key fire safety precaution in dining properties, it involves ensuring a sufficient number of unobstructed exits that serve as evacuation routes during emergency situations (CFPA-E Guideline No 9, 2023). In dining properties, fire safety codes require that three fire exits be provided when the number of occupants exceeds 500 users. To ensure a safe evacuation, the distance to reach a fire exit must not exceed 22 meters (SBC, 2018; IFC, 2024). The maximum travel distance is a terminology that is used by codes to refer to the lengthiest distance in which occupants would need to travel from an inner space to the farthest fire exit. The capacity of these exits should neither be reduced by any kind of physical obstructions, nor deteriorated by misuse and poor maintenance. Moreover, these exits should be adequately illuminated and clearly identified by signage systems (SBC, 2018; NFPA 101, 2024).

#### 4.2 Fire protection systems

To ensure the functionality of fire protection systems, given the presence of various potential ignition sources, it is crucial to maintain them in an operational condition (FEMA, 2011). These systems include sprinklers, systems that detect heat, fire alarm systems, smoke control systems and fire extinguishers (SBC, 2018; IFC, 2024). Fire extinguishers should be visibly and conveniently positioned, with one placed every 22 meters in occupied spaces (NFPA 10, 2022). It is important to appropriately distribute and keep the sprinkler heads operational in all areas (SBC, 2018; CFPA-E Guideline No 9, 2023; NFPA 101, 2024). Accessible placement of heat detectors and fire alarms is necessary in all occupied spaces, including dining halls and kitchens. Likewise, smoke control systems should be installed and actively utilized in all areas to prevent the buildup of toxic smoke and excessive heat levels generated during cooking activities (IFC, 2024).

#### 4.3 Electrical wirings and appliances

Electrical fire safety measures should be fulfilled in an appropriate level, to avoid any occurrence of ignition, caused by electric faults and overheating in dining properties (NFPA 101, 2024). Property managers should ensure that the electrical system is adequate for handling the electrical loads, and all electrical equipment are placed in safe locations. Electrical equipment should be serviced on periodical basis, to avoid the accumulation of hazardous materials such as oils and dust (CFPA-E Guideline No 9, 2023; NFPA 61, 2017). In addition, all power taps, switches and boxes should neither be in a deteriorated condition, nor overloaded. They should be also directly connected to receptacles (NFPA 70, 2023). Finally, electrical rooms should be clearly designated, and made accessible only to the facilities management personnel. Every electrical room's doors should be labeled "Electrical Room" (SBC, 2018; IFC, 2024).

#### 4.4 Fire doors

As crucial fire safety measures that significantly contribute to users' survival in fire incidents by aiding their escape. Fire doors separating kitchens from dining halls should be kept in appropriate condition. The components of these fire doors should be constructed using fire-rated materials and must not be either deteriorated or physically modified (NFPA 80, 2025). A net width of 0.82 meters must be maintained for all fire doors, ensuring they are not blocked or hindered by any physical elements. Additionally, the internal panel of these doors should be labeled "Push to Exit" to enable easy use (SBC, 2018; IFC, 2024).

#### 4.5 Housekeeping

Housekeeping in dining properties contributes to providing an appropriate level of safety. This entails safe storage of supplies on stable surfaces and deployment of effective waste

management procedures. Flammables should be stored away from heat sources (CFPA-E Guideline No 9, 2023). Supplies in dining properties should be stored in shelves below the ceiling level by at least 0.6 meters. Operators of dining properties should prohibit the storage of flammable products in the spaces designated for support services (IFC, 2024).

#### *4.6 Miscellaneous*

There are special safety requirements that need to be enforced in dining properties, to maintain an acceptable fire safety level, according to code requirements. Dining properties should maintain the provision of effective means for the arrival and smooth operation of the fire protection team. This entails the provision of a clear address number on the dining facility, as well as an accessible apparatus road (IFC, 2024). Moreover, dining halls' operators should prohibit, or at least observe the use of candles and sources of sparks (CFPA-E Guideline No 9, 2023). They should conduct fire drills on a periodic basis, to ensure that employees are adequately trained on the evacuation and fire protection procedures. They should also maintain that fire-rated materials are used in all finishes (NFPA 101, 2024).

#### *4.7 Hazardous materials*

Since dining properties accommodate a high magnitude of combustible materials, dining halls' operators should enforce all preventive measures to mitigate their potential risks. These prevention measures pertain primarily to the handling and storage of hazardous materials (CFPA-E Guideline No 9, 2023). They should prohibit the storage of all flammable liquids in public and basement spaces (IFC, 2024). Cooking equipment and appliances should always be cleaned, to avoid the accumulation of grease and dust (NFPA 61, 2017).

### **5. Case study**

The selected dining property is a one-story facility, situated in the Eastern Province of Saudi Arabia, covering a total area of 5,450 square meters. It was constructed and occupied in the late 1970s, featuring three dining halls and two kitchens. Additionally, it includes supporting spaces like storage areas, electrical and mechanical rooms and restrooms. Figure 2 provides a visual representation of this dining facility. The facility serves its users, who belong to different age groups, three times a day, during breakfast, lunch and dinner. The peak times for the dining property are during lunch and dinner hours, where the number of users could range from 350 to 400 in every dining hall. The spaces are enclosed by precast walls, with a floor height of 6 meters, ceramic tile floor finishes and exterior walls made of glass panels. The maximum occupancy of the facility is around 3,000 users, falling under group A2 occupancy classification, as per the fire code (IFC, 2024).

### **6. Results and analysis**

A walkthrough inspection for fire safety was carried out on the selected dining facility using the devised evaluation tool to confirm its applicability and thoroughness. The results of the conducted fire safety audit are outlined in Table 1, and discussed in this section, following the sequence established by the evaluation tool. The primary objective of the findings was to pinpoint any existing deficiencies that might affect the fire safety level in the selected dining property.

#### *6.1 Exit pathways*

The inspection revealed significant deficiencies in the compliance of fire exits with the requirements of the code, despite their proper provision. It was observed that none of the



Source(s): Developed by the authors

Figure 2.  
Visual representation  
of the dining property

exits were illuminated, and the directional signs guiding the way to these exits were insufficient. Additionally, some equipment and tools were stored in these exits, diminishing their physical capacity. The construction of these exits lacked consistency, as they had undergone multiple renovations in an incompatible manner. An analysis of the maximum distance that should be traveled indicated that the distance to reach the fire exit from any

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point in each of the three dining halls exceeded the permissible limit set by code requirements, which is 22 meters, as depicted in [Figure 2](#).

#### *6.2 Fire protection systems*

The inspection identified numerous deficiencies in the adherence of the fire protection systems to the requirements of the fire code. In particular, there was insufficient provision of portable fire extinguishers in the occupied spaces, notably in the dining halls. Sprinkler heads were not provided, and there was inadequate installation of fire detection and alarm systems in the dining halls.

#### *6.3 Electrical wirings and appliances*

The audit indicated that the dining facility has largely adhered to the recommended fire code regulation concerning electrical wiring and appliances. This is due to the fulfillment of an acceptable level of cleanliness over the mechanical and electrical equipment. All power tabs were provided as per the recommended safety measures in the applicable fire safety codes. Moreover, the electrical switches and power boxes were protected by sturdy coverings. Nonetheless, the outsides of the doors in the electrical rooms lacked the designation “Electrical Room”.

#### *6.4 Fire doors*

The inspection revealed several violations to the code requirements pertaining to fire doors. The assemblies of the majority of the provided fire doors were not manufactured out of fire-rated products. Moreover, these doors lacked the indication of their use as fire doors, through missing the attachment of the term “Push to Exit”. The inspection also pointed out that the property complied with the other code requirements.

#### *6.5 Housekeeping*

The inspection indicated that the facility has almost complied with the requirements of the code, pertaining to the housekeeping practices. An effective control over the storage of the materials and facility supplies was achieved, in terms of their location and arrangement in the storage spaces. In addition, an effective mechanism for waste management was implemented on a daily basis. However, the case study facility has lacked adequate control over the development of smoke and heat during the lunch and dinner meals. It was noted that the heat and smoke, produced from cooking, were easily migrating to the dining halls.

#### *6.6 Miscellaneous*

The inspection revealed that the case study property complied with the majority of the miscellaneous fire code requirements. The fire equipment access road was not obstructed by any physical elements. The construction materials and systems in the case study facility were manufactured out of fire-rated products. Candles and all sources of sparks were banned in all dining halls. However, the address number of the case study facility was not clearly provided in the side fronting the street. Additionally, there were no available records of previous emergency evacuation drills.

#### *6.7 Hazardous materials*

The walkthrough inspection indicated that the case study property has fulfilled the safety requirements pertaining to the hazardous materials. This is attributed to prohibiting the storage of flammable liquids, such as oils, in the public spaces as well as the dining halls.

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Further, the cooking equipment and appliances were continuously cleaned, to avoid any accumulation of grease and dust.

## 7. Conclusion and recommendations

Many catastrophic fires have occurred in dining properties. These fires have resulted in fatal and non-fatal losses. Thus, these properties are considered among the high-risk category of premises in fire events. The high-risk stems from three main criteria that characterize the design and operation of these properties. The first criterion is the presence of a high magnitude of active sources of heat and fire ignition. The second criterion is the open-plan layout of these properties. This architectural feature may result in jeopardizing the occupants' life and properties during fire incidents due to the ease of flame and smoke propagation. The third criterion is the presence of large numbers of occupants that could be available in the building, at any time.

Although information on fire safety requirements for dining properties exists in different sections of codes, a comprehensive study that consolidates and audits all relevant fire safety provisions in a single source is lacking, as revealed by the literature review. This paper aims to establish a method for auditing the adherence to fire safety codes in dining properties. The research questions arising from this study include: In what manner has the literature discussed the implementation of fire safety measures in dining properties? What are the regulations and preventive measures outlined in codes for ensuring fire protection in dining properties? How can the evaluation of fire safety in dining properties be conducted?

The answer to the first question was provided within the literature review, revealing a lack of comprehensive inspection tools readily applicable for evaluating the adequacy of fire safety measures in the constructed environment of dining properties. Consequently, this study has undertaken the development and implementation of a code-based performance evaluation tool. This tool is intended for adoption by operators and administrators of dining properties to ensure a satisfactory standard of fire safety. A thorough examination and analysis of relevant literature were conducted to understand associated aspects of fire safety in dining properties. This encompassed typical combustible materials, fire causes and criteria contributing to categorizing dining properties as high-risk premises in fire incidents.

The devised evaluation tool is designed to address the second and third inquiries in the research. It encompasses 40 preventative measures for enhancing fire safety in dining properties, categorized into seven groups: "exit pathways", "fire protection systems", "electrical wiring and appliances", "fire doors", "housekeeping", "miscellaneous" and "hazardous materials". The performance evaluation tool, based on code, has been effectively utilized in evaluating a selected dining facility. This tool is intended to address the third research question and pinpoint any deficiencies in adherence to fire codes through an exemplary and illustrative case study.

The outcomes of the case study were documented and analyzed. The findings revealed specific shortcomings in the enforcement of the fire safety requirements. It is noted that most of the shortcomings can be avoided through the active enforcement of fire preventive measures, within the scope of the property management team. These shortcomings included: (1) deficiencies in the exit pathways in terms of their illumination, adequacy and signage system; (2) various shortages in the provision of the recommended number of extinguishers, sprinklers, detection systems for smoke and fire alarm systems in the dining halls as per the applicable standards; (3) lack of identifiers to the electrical rooms through the posting of the term "Electrical Room" on their doors; (4) non-compliance with the performance criteria of fire doors; (5) lack of control over the propagation of heat and smoke in the dining halls; (6) lack of clear address number of the facility and (7) deficiency in conducting and keeping record of fire drills.

Consequently, a set of recommendations for remedial actions, to be acted upon by the various stakeholders, was put forward to address the identified deficiencies at the selected case study. These encompass:

- (1) Installing a clear signage system to direct the occupants on the location of the nearest fire exits in each of the three dining halls. Installing these systems with the consideration to the visually and hearing disabled occupants should be assessed, to ensure the facility accessibility in times of fire.
- (2) Providing additional fire exits proportional to the maximum capacities of the dining halls.
- (3) Providing sufficient number of portable fire extinguishers throughout all three dining halls.
- (4) Installing sufficient number of sprinklers, smoke detectors and fire alarm systems throughout all three dining halls, and particularly near cooking appliances.
- (5) Installing fire doors throughout all dining halls.
- (6) Installing active ventilation and smoke control systems throughout all dining halls.
- (7) Installing fire preventive smoke curtain walls which aim to separate fire zones in fire situations, to limit fire spread through the spaces of the facility and to allow easier fire suppression, especially in properties which have open spaces such the case study dining hall.
- (8) Providing fire extinguishing grenades and ampoules which depress fires by creating a vacuum, while directing the depressing effect into the source of fire. These extinguishers are made of more environmentally friendly ingredients, that do not require as much maintenance and replacements as in the regular fire extinguishers.
- (9) Installing carbon monoxide detectors throughout all dining halls.
- (10) Adopt greaseless and industrial-level air fryers to reduce the risk of oil-related injuries and fires and eliminate the need for costly ventilation hoods. This not only improves safety but also reduces installation and maintenance costs.

This paper presented a comprehensive, yet practical code-based performance evaluation tool for property managers and business operators of dining properties. Essentially, it synthesizes knowledge relevant to fire safety in dining properties. Property managers should periodically conduct fire safety inspections, and implement the devised evaluation tool, to ensure that dining properties maintain an acceptable level of fire safety.

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**Corresponding author**

Mohammad A. Hassanain can be contacted at: [mohhas@kfupm.edu.sa](mailto:mohhas@kfupm.edu.sa)