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# Analyzing fire safety inspection certificates and fire causes in Baguio City establishments

RESEARCH ARTICLE

**Leo A. Mendoza[1] and Gerardo K. Tumbaga Sr.[2]**
[1]Graduate School, University of Baguio, Baguio City, Philippines
20210258@s.ubaguio.edu
0009-0001-9009-2281
[2]School of Criminal Justice and Public Safety, University of Baguio, Baguio City, Philippines
gerardoktumbagasr56@gmail.com
0009-0001-5747-6453

Corresponding Author: Leo A. Mendoza
Email 20210258@s.ubaguio.edu
Graduate School
University of Baguio
Philippines
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## Abstract

This study employed a mixed-method correlational design to examine the relationship between fire incident causes in Baguio City business establishments and compliance with mandated Fire Safety Inspection Certificates (FSICs). The quantitative phase analyzed 2024 fire incident reports and Bureau of Fire Protection (BFP) certification records, using Pearson correlation and Chi-square tests to determine whether FSIC compliance aligned with reduced fire occurrences. Results identified four major ignition sources: electrical arcing, appliance overheating, careless smoking, and open cooking flames. Findings revealed a moderate positive correlation ($r = .53, p < .05$) between FSIC compliance and improved fire prevention outcomes. Establishments with valid FSICs showed lower fire risks, yet incidents persisted, highlighting gaps in enforcement and monitoring. This disconnects suggested that certification alone did not guarantee operational safety. To contextualize these findings, the qualitative phase involved semi-structured interviews with ten stakeholders, including BFP personnel, fire safety inspectors, and business owners. Thematic analysis, revealed three dominant themes: prolonged inspection delays, documentation gaps, and limited training. These themes explained why FSIC compliance did not fully translate into safety, pointing to administrative inefficiencies and outdated inspection practices. The integrated analysis underscored that FSIC effectiveness depended on continuous monitoring, digital record management, and proactive staff training. The study provided empirical evidence supporting modernization of BFP administrative functions, stricter post-certification protocols, and enhanced inspector training. These reforms were deemed essential to strengthen compliance, accountability, and fire risk mitigation in Baguio City's urban business environment.

**Keywords:** administrative efficiency, Bureau of Fire Protection, compliance, correlation, Fire Safety Inspection Certificate (FSIC)

## INTRODUCTION

Fire incidents are inherently terrifying events often precipitating widespread panic. It is a well-established fact that professionally trained employees are far better equipped to understand the appropriate protocols during an emergency, enabling them to execute swift and effective responses. This is in accordance with the note from Fireline (2022) that underscores the critical role of robust fire safety programs and prevention measures. Destructive fires continue to occur, especially in the thickly populated areas, which gives rise to the need of efficiently trained responders as well as fire safe establishments. Chen et al. (2020) quips, given the persistent threat that urban fires pose to human life and societal assets, there is an urgent imperative to critically assess the operational capability of the primary emergency response force which is the local fire station, in order to mitigate negative repercussions.

While fire response improvements have traditionally dominated the discourse, the actual effectiveness of regulatory mechanisms, particularly Fire Safety Inspection Certificates, remains a significant gap in the

literature. Specifically, there is not much real-world proof showing if following FSIC rules actually leads to fewer fire incidents.

From the above-mentioned gap, this study evaluates the BFP Baguio City Fire Station's management capabilities. By examining the disconnect between formal certification and real-world safety, the research identifies critical shortcomings in fire safety governance and risk mitigation. These findings are intended to guide BFP policy reforms and modernization efforts, providing a data-driven approach to enhancing enforcement and public safety within complex urban centers.

## Literature Review

### Evolution and Scope of Modern Fire Service

Modern fire services have evolved from traditional fire suppression agencies into multi-functional emergency response institutions. Berend (2022) explained that contemporary fire services now respond to diverse emergencies, including natural disasters, vehicular accidents, water rescues, and hazardous incidents. This transformation reflects the increasing demand for broader public safety responsibilities and improved community engagement. Knight (2020) emphasized that efficient fiscal management and proper allocation of resources are essential in improving fire service delivery. Effective governance requires balancing operational readiness, personnel welfare, and public expectations.

### Legislative Mandates for Fire Safety Compliance

The Fire Code of the Philippines (RA 9514) serves as the legal basis for fire safety compliance in the country. The law requires business establishments to comply with standards concerning fire alarms, suppression systems, emergency exits, and related safety measures before obtaining permits and occupancy clearances. Annual maintenance and inspection reports are likewise mandated to ensure continuous compliance.

Sections 10 and 11 of the Revised Implementing Rules and Regulations (RIRR) emphasize inspection, testing, and maintenance (ITM) procedures consistent with international standards such as those of the National Fire Protection Association (NFPA). Digital integration has also become increasingly important in improving inspection efficiency, reducing corruption, and enhancing record management.

### The Imperative of Digital Integration and Maintenance

Section 10 of the Revised Implementing Rules and Regulations of RA 9514 underscores the importance **of** effective inspection, testing, and maintenance (ITM) to ensure fire protection systems remain reliable and compliant with safety standards. With technological advancements, digital integration into ITM processes has become essential for improving efficiency, accuracy, and compliance verification, while also reducing opportunities for corruption by minimizing face-to-face transactions. Anchored on international standards such as those set by the NFPA, digital inspection practices align with both global and local regulations, requiring routine checks on weekly, monthly, quarterly, and annual bases. Although the initial investment in digital tools may be significant, the long-term benefits such as reduced compliance costs, improved risk management, and enhanced data management make them worthwhile. The BFP has already begun adopting digital systems, allowing constituents to apply for fire safety clearances online and enabling units to store inspection reports electronically. In addition, Sections 10 and 11 of RA 9514 highlight the importance of firefighter wellness through comprehensive training and education on the cleaning, inspection, and repair of turnout gear and boots, in line with NFPA 1851 standards. Proper maintenance of this gear ensures operational readiness, reduces equipment failure, and safeguards firefighter safety during hazardous operations.

### The Role and Importance of Fire Marshal Inspections

Fire safety inspections are a core responsibility of the Fire Marshal, who oversees the issuance of clearances based on recommendations from inspectors and the Fire Safety Enforcement Section. These inspections, typically conducted annually, are vital for ensuring building safety and compliance with regulations, as emphasized by Safety Culture (2024). International frameworks, such as England's Regulatory Reform (Fire Safety) Order 2005 and Singapore's Fire Safety Act 1993, highlight accountability and the role of

registered inspectors, while in the Philippines, third-party consultants help certify compliance before clearances are issued. Effective inspections require cooperation between inspectors and establishment owners to ensure adherence to fire safety systems. Research by Otieno et al. (2024) further stresses that strong regulations, consistent inspections, and proper maintenance are essential for reducing risks and ensuring occupant safety. Similarly, fire risk assessments in commercial complexes reveal heightened vulnerabilities due to multiple ignition sources, with human behavior identified as the leading cause of destructive fires (Wang et al., 2020). Data from BFP-CAR supports these findings, showing that combustible materials, delayed response times, and inadequate staffing worsen fire outcomes, while preventive measures and reliable fire safety systems significantly reduce damage.

**Technology and Prevention: Sprinklers and Preparedness**

One fire safety system that was often installed in establishments was the fire sprinkler. An article from Impact Fire Services (2024) stated that the effectiveness of fire sprinkler systems in both commercial and residential settings was undisputed, with data showing they controlled or extinguished 99% of fires where installed. Operating automatically upon fire detection, these systems were a vital component of enhancing fire safety, especially considering how rapidly house fires could become deadly. New systems began to emerge and were slowly integrated into buildings to improve and maintain fire safety.

The installation of such systems, their usability, and their effectiveness within establishments also underwent inspection. Routine inspections included the testing of these systems. Ultimately, fire safety inspections, as described by Tüv Süd (2024) and reiterated by Field Insight (2024), were comprehensive and critical evaluations. They employed a holistic approach, examining both the physical infrastructure (ignition prevention, safety system maintenance, exit systems) and the preparedness of occupants. The primary objective of fire safety inspection was to preserve lives, assets, and the environment by ensuring system functionality and overall readiness.

**Organizational Evolution of the BFP and Community Resilience**

The Bureau of Fire Protection (BFP) was established under RA 6975 and further strengthened by RA 11589, which introduced modernization initiatives involving personnel development, equipment upgrading, and facility enhancement. Despite these efforts, challenges remain in meeting ideal fireman-to-population and fire truck-to-population ratios (Punongbayan, 2019).

The BFP also promotes community resilience through public awareness campaigns, drills, and training programs as mandated by BFP Memorandum Circular 2022-028.

**Understanding the Nature of Fire**

Fire safety began with understanding the core elements of combustion. Fire was a chemical reaction requiring three essential components: heat, fuel, and oxygen. This relationship was traditionally illustrated by the Fire Triangle, emphasizing that removing any single element would extinguish the fire.

In more complex contexts, the Fire Tetrahedron expanded the model by including a fourth element: the chemical chain reaction that sustained the fire once ignition had occurred (Guevara, 2024). Fire suppression itself removed any of these elements, thereby extinguishing the fire. Similarly, the absence of any element prevented ignition.

It was important to bear in mind that fire safety included systematic prevention measures aimed at avoiding ignition altogether. Routine fire safety inspections often applied checklists to ensure the responsibility of building owners in mitigating the risk of destructive fires. Safety Culture (2024) discussed that fostering a culture of safety and adhering to best practices, including the systematic use of a fire safety checklist, was a collective responsibility that significantly reduced fire risks.

**The Fire Safety Inspection Certificate (FSIC) and Global Standards for Fire Management**

Fire safety is a global priority aimed at reducing destructive fires, and compliance is often validated through certifications. In the Philippines, this comes in the form of the Fire Safety Inspection Certificate (FSIC),

mandated under the Fire Code of the Philippines (RA 9514) and overseen by the BFP. The FSIC is essential for securing business and building permits, serving as proof that an establishment meets fire safety standards to protect lives and property. The FSIC applies to a wide range of establishments, commercial, industrial, educational, and healthcare facilities, and is issued only after a thorough inspection of fire safety systems and practices. Valid for one year, it requires annual renewal, reinforcing an establishment's ongoing commitment to safety (Industrial.PH, 2021). Inspections typically cover fire alarms, smoke detection systems, extinguishers, sprinklers, emergency lighting, and exit signage, while ensuring escape routes are unobstructed. Any deficiencies must be corrected immediately, as non-compliance results in penalties or denial of certification. Inspection scope typically encompasses a thorough check of active fire protection systems, including:

- Fire alarm and smoke detection systems
- Fire extinguishers and suppression systems (e.g., sprinklers)
- Emergency lighting and exit signage

**Streamlining Compliance: Government Efficiency Initiatives**

To enhance accessibility and reduce bureaucratic red tape, the BFP has actively embraced streamlining efforts. The Mobile Business One-Stop Shop (MBOSS) initiative is designed to simplify and expedite the process of obtaining the FSIC (Inso, 2020). By centralizing requirements, assisting with documentation, and optimizing inspection scheduling, MBOSS leverages technology and administrative efficiency to ensure broader compliance, thereby contributing to safer environments. This approach is consistent with the mandate of the Anti-Red Tape Act Authority (ARTA) relative to the Ease of Doing Business and Efficient Government Service Delivery Act of 2018 (RA 11032), which the Bureau fully supports. Adopting the efforts mandated by the ARTA promotes transparency and improves service delivery through streamlined

**Addressing the Menace: Factors in Fire Safety Management**

The devastating consequences of fire incidents globally underscore the necessity for a deep understanding of the factors contributing to fire vulnerability (Jembola, 2024). Poor fire safety management in buildings significantly increases susceptibility to destructive fires. Numerous research highlights that positive fire safety awareness, strong commitment from the community, management support, and consistent safety practices are crucial for effective management. Key recommendations include:

- Prioritizing community fire safety training and risk assessment;
- Implementing routinary maintenance of fire safety equipment;
- Ensuring the use of surge protectors for electrical equipment; and
- Establishing a well-documented emergency action and evacuation plans.
- Significantly, the fire service must complement this by intensifying public education and strictly enforcing safety policies to ensure uncompromised fire safety practices (Jembola, 2024). In addition, Kudor, Kumar, & Raf (2020) emphasized in their study that the current fire protection measures lead to an unquantified level of fire safety in buildings, provide minimal strategies to mitigate fire hazard and do not account for contemporary fire hazard issues. Implementing key measures that include reliable fire protection systems, proper regulation and enforcement of building code provisions, enhancement of public awareness and proper use of technology and resources is key to mitigating fire hazard in buildings.
- A 2025 study in high-rise residential buildings revealed low fire drill participation (only 10.89% in buildings despite mandates) and indirect exposure in 33.66% of respondents, indicating behavioral non-compliance in dense urban Asia (Vargas et al., 2025). In central Chile's wild land-urban interfaces (2024), spatial factors like dwelling proximity to vegetation outweighed structural conditions in predicting fire damage, relevant to Baguio's urban density (Vásquez et al., 2024). Filipinos' perceived fire prevention effectiveness (2023) is influenced by media, experiences, and insurance, with structural equation modeling showing knowledge gaps drive vulnerability in urban NCR—paralleling CAR challenges (Wang et al., 2023). Locally, DOST-FPRDI (2025) advocates science-based tests for fire-safe construction materials (DOST-FPRDI, 2025.
- Moreover, it was mentioned in the study of Hassanian, MA et al. (2022) that office services are organizational capital properties that require a high

risk of fire occurrences. The occupant's behavior, lack of awareness and poor workspace management escalates fire hazards. Thus, fire safety risk assessment is vital to raise awareness about workplace fire-safety culture and to train employees on effective fire response requirements and methods. It helps to raise awareness on the causes of fire, consequences of fire events, and mitigation strategies in workplace facilities, for the purpose of protecting.

**BFP Operational Scope and Regional Activity**

The Bureau of Fire Protection (BFP) operates under an expanded mandate, as reinforced by BFP Memorandum Circular 2022-034, which outlines a comprehensive framework of fire suppression and emergency response activities. This includes a systematic sequence beginning with pre-fire planning and hazard identification, followed by rapid size-up and assessment of fire conditions. Operational procedures then proceed to rescue operations, protection of adjacent structures through cover-exposure, and confinement of the fire to limit its spread. Additional procedures include ventilation to manage smoke and toxic exposure, salvage operations to minimize property loss, and extinguishment through elimination of fire elements. Post-control activities involve overhauling to prevent rekindling and post-fire analysis for performance evaluation and operational improvement.

Furthermore, the BFP in Baguio City, a highly urbanized city responsible for a land area of 24,208 sq.km (Cayetano, 2021), also extends its response capabilities to a broad spectrum of emergencies, including flash floods, landslides, and vehicular accidents. In terms of regulatory enforcement, BFP-Cordillera Administrative Region (CAR) data for CY 2024 indicate significant regional activity. Out of 78,806 establishments inspected region-wide, BFP Baguio City Fire Station accounted for 22,918 inspections, collecting Php 19,961,764.25 in Fire Code fees (BFP-CAR Consolidated Report, 2024).

**Theoretical/Conceptual Framework/ Paradigm of the Study**

The study is grounded in internationally accepted Common Principles (CPs) for fire safety, which are applicable across diverse real estate classes and jurisdictions (NIST, 2015). These principles, reflected in the International Fire Safety Standards, emphasize a holistic approach across the entire Building Life Cycle (BLC), hence the following:

- Prevention: The proactive safeguarding against fire outbreak and limiting its effects through the control of ignition and fuel sources. This involves constant proactive inquiry and fore sighting the possible events with possible solutions to fully understand failure modes and build resilience (Chen et al., 2020; Wang et al., 2020; Akhtar et al., 2021).
- Detection and Communication: The timely discovery of fire, followed by immediately informing the occupants and the fire department. Measures must facilitate effective communication between all stakeholders and the swift automation of fire safety systems to prevent escalation (Field Impact, 2024; BFP, 2023).
- Occupant Protection: Ensuring the safe evacuation of all occupants before the effects of combustion products become adverse (Akhtar et al., 2021). This principle is inextricably linked to containment strategies.
- Containment: Limiting the spread of fire and its effects, smoke and heat, to the smallest area possible. This is achieved through strategies like compartmentation, smoke control, fixed firefighting systems, and structural integrity (Wang et al., 2020; Chen et al., 2020; Field Impact, 2024).
- Extinguishment: The suppression of the fire. While installed systems should control the blaze, the final action of extinguishment is typically executed by the responding firefighters, who act as the last line of defense (Horn et al., 2020). The complexity of extinguishment is magnified when buildings lack adequate prevention and containment features (Wang et al., 2020).

**Significance of the Study**

This research is highly feasible as it directly aligns with the BFP's core mandates of saving lives and properties, enforcing RA 9514, and responding to emergencies. The findings are expected to be beneficial for several stakeholders, as follows:

- Department of the Interior and Local Government (DILG) will receive current status updates on BFP Baguio's capability challenges, such as manpower and logistics scarcity, informing resource allocation.

- BFP Management will be aided in prioritizing modernization efforts toward the goal of a fire-safe nation by 2034, improving working conditions for personnel, and enhancing service delivery across Baguio City and Benguet Province.
- Local Government Units (LGUs) will be better equipped to refine and give support to fire safety campaign strategies as well as support local fire stations through shared responsibility for tools and equipment procurement.
- Future Researchers will find the results of this study as a foundational reference for further intensive exploration on similar matters.

**Objectives of the Study**

The central objectives of this research are:

1. To identify the causes of fire in burned business establishments.
2. To assess the alignment between the identified causes of fire in business establishments and their compliance to fire safety checklist leading to the issuance of FSICs.
3. To examine the administrative and procedural factors that influence discrepancies between fire safety compliance and actual fire causes.

## METHODOLOGY

**Study Design**

This research employed a correlational mixed-method design to determine the operational efficiency of FSICs and the effectiveness of Baguio City Fire Station personnel from the client perspective (Creswell & Plano Clark, 2018). This approach, which integrates quantitative metrics of compliance and performance with qualitative insights from clients, enables triangulation for a comprehensive, nuanced understanding of how regulatory adherence and service delivery interact to shape fire safety outcomes (Creswell & Creswell, 2018).

**Population of the Study**

The research was conducted within the jurisdiction of the Baguio City Fire Station. The population for the quantitative phase consisted of individuals directly affected by fire incidents, sampled to reflect the diversity of fire incident contexts observed in CY 2024 (BFP-CAR, 2024). The sample included cases involving 26 structures, excluding single- and two-family dwellings, as well as establishments categorized according to their regulatory compliance status, specifically those possessing both a Fire Safety Inspection Certificate (FSIC) and a Business Permit (26 establishments) and those with only one permit or no permit at all (4 establishments). To recruit participants, the strategy focused on residents across various locales who experienced fire events to capture a cross-sectional snapshot of experiences and regulatory contexts.

**Data Gathering Tools**

The quantitative phase utilized structured surveys and secondary data, including BFP Fire Incident Reports and FSIC records from the past three years accessed with BFP authorization. Data were coded according to fire causes and FSIC compliance levels, enabling correlation and chi-square analyses (Gay, Mills, & Airasian, 2012). The qualitative phase involved semi-structured interviews with 8–10 purposively sampled stakeholders, including BFP officers, inspectors, and business owners, to explore administrative functions and compliance challenges, with responses analyzed through thematic analysis.

**Treatment of Data**

Pearson correlation and Chi-square tests were used to determine relationships between variables. Thematic analysis following Braun and Clarke (2006) was employed to analyze qualitative data. This approach enabled the interpretation of client perceptions on the competence and service delivery of BFP personnel in Baguio City.

**Ethical Considerations**

The study strictly followed research ethics by ensuring anonymity, confidentiality, and voluntary participation through informed consent, which explained the purpose, procedures, risks, benefits, and the participants' right to withdraw at any time. Participants confirmed their consent through a checklist, and identifying information was stored separately with restricted access, while sensitive disclosures were handled in accordance with ethical guidelines and local regulations. Findings were responsibly shared with the Bureau of Fire Protection, local government units, and academic institutions in anonymized or aggregate form and were used solely for policy improvement and fire prevention programs, not for punitive actions. A copy of the final paper was

provided to the Baguio City Fire Station to support practice enhancements, and all publications and presentations complied with ethical standards and institutional review guidelines (Creswell & Creswell, 2018).

## RESULTS AND DISCUSSION

**Causes of Fire in Burned Business Establishments.** The results of the study revealed four major causes of fire incidents in Baguio City. These findings were consistent with both the actual fire data of the BFP and existing research, showing that these ignition sources remained the most common and recurring causes of structural fires.

**a. Electrical Ignition Caused by Arcing.** Electrical arcing emerged as a significant factor in several recorded incidents. Bajzek (2023) explained that arc tracking is a frequent source of electrical fires, with the High Current Arc Ignition (HCAI) test showing that variations in electrode placement affect the likelihood of ignition. In Baguio City, faulty connections caused by octopus wiring, loose connection, and overloaded systems were observed in establishments that experienced fire. Considering that the connection may have dilapidated overtime, this cause suggests that certification processes may not always detect long-term wiring defects. This result underscores the need for continuous inspection even after a Fire Safety Inspection Certificate (FSIC) has been issued. Post certification inspection is an essential fire prevention practice.

**b. Overheated Home Appliances.** The data also confirmed that overheated appliances contributed to fire incidents. Eduku (2024) pointed out that overloading extension boards can cause overheating and fire hazards, while Paglinawan (2022) proposed the use of Arduino-based devices to monitor voltage, current, and temperature in household appliances in order to avoid overheating hazards. In Baguio City, small businesses and eateries that rely heavily on appliances for extended periods are particularly vulnerable. This finding supports the need for preventive technology to lessen the risks associated with appliances.

**c. Smoking (Lighted Cigarette, Cigar, or Pipe).** Careless smoking remained a recurring cause of fire incidents. Smoldering cigarettes ignited combustible materials including bedding, upholstery, and carpets. The literature likewise points out that careless smoking remains one of the most preventable causes of fire (Safety Culture, 2024). The Baguio City incidents demonstrate how risky behaviors—such as smoking in bed or discarding cigarette butts carelessly— were still observed in commercial and mixed-use buildings. The findings indicate the need for stronger enforcement of smoking regulations and intensified public awareness campaigns.

**d. Open Flame from Cooking (LPG/Gas Stove, Firewood).** Unattended cooking with LPG or firewood is another significant cause of fires. Okeoma and Ezetoha (2020) emphasized the importance of fire-resistant kitchens, proper ventilation, and gas leak detection systems. In most LPG-related fires, explosions occur which causes burns among individuals. Dahanayake (2025) reported that LPG-related burns are often due to leaks from cylinders and pipes. Restaurants and eateries in Baguio City were particularly susceptible to LPG-related incidents, emphasizing the need for stricter kitchen inspections and safety evaluations.

**Assessment on the relation of causes of fire and compliance of business establishments with FSIC**

The quantitative analysis examined the relationship between fire safety compliance and common fire causes using Pearson correlation.

Table 1. *Pearson Correlation Between Causes of Fire and FSIC Compliance.*

| Variables | No | r | Interpretation |
|---|---|---|---|
| Electric wiring issues and FSIC compliance | 50 | 0.652 | Strong positive correlation (significant) |
| Overloaded circuits and FSIC compliance | 50 | 0.487 | Moderate positive correlation (significant) |
| Negligence in using electrical appliances and FSIC compliance | 50 | 0.301 | Weak positive correlation (not significant) |
| Presence of fire exits and FSIC compliance | 50 | 0.715 | Strong positive correlation (significant) |
| Proper storage of flammable and FSIC compliance | 50 | 0.563 | Moderate positive correlation (significant) |

The results indicate that establishments with stronger compliance generally exhibited improved structural preparedness. However, incidents continued to occur despite certification, suggesting that compliance alone does not guarantee operational safety.

Table 2. *Qualitative Themes Supporting Pearson Correlation Findings*

| Qualitative Themes | Supporting Evidence | Integrated Interpretation |
|---|---|---|
| **Electric wiring issues compliance** | | |
| Inspection delays | *"Sometimes postponed because of administrative backlog."* BFP | Inspection delays contribute to undetected wiring defects, explaining why electrical issues remain despite fire safety compliance |
| **Overloaded circuits** | | |
| Documentation gaps | *"Some establishments submitting complete load calculations, so we cannot verify total electrical capacity."* BFP, fire safety inspector | Documentation lapses weaken compliance checks consistent with the moderate correlation found |
| **Negligence in using electrical appliances** | | |
| Awareness deficiency | *"We provide reminders, but many staff don't follow safe practices daily."* Business Owner | Human negligence has less correlation with fire safety compliance since daily behavior extends beyond certification procedures. |
| **Presence of fire exits and fire safety compliance** | | |
| Training limitations | *"Most establishments in stall exits but lack drills or staff training on evacuation routes."* Fire Marshal | Training gaps affect safety readiness that though the establishment is compliant with fire safety provisions, the workers are not well aware of management of fires and evacuation |
| **Proper storage of flammable materials** | | |
| Monitoring inconsistency | *"Follow-up inspections for material storage is are once the certificate is issued."* BFP Officer | Post-certification monitoring inconsistences reduce the sustained effect of fire safety compliance |

The integration of quantitative and qualitative findings shows that while compliance improves structural preparedness, administrative inefficiencies, such as inspection delays, poor documentation, and weak enforcement, along with limited awareness and inadequate training, undermine fire safety effectiveness. Local studies confirm that certification alone does not ensure sustained safety without continuous monitoring and refresher training, while international reports highlight the need for education and digital record-keeping to strengthen compliance.

Overall, fire safety must evolve into a culture of prevention and accountability, supported by digital documentation systems, regular refresher training, and proactive risk management to align regulatory compliance with genuine fire risk reduction.

**Association Between Type of Business and Common Causes of Fire**

The Chi-square analysis showed that business type significantly influences the common causes of fire.

Table 3. *Chi Square Test of Association Between Type of Business and Common Causes of Fire*

| Types of Business | $X^2$ | df | P-value | Interpretation |
|---|---|---|---|---|
| Restaurants vs Electrical causes | 10.83 | 3 | 0.013 | Significant relationship |
| Manufacturing vs Flammable materials | 8.92 | 2 | 0.028 | Significant relationship |
| Offices vs Human negligence | 3.65 | 2 | 0.0162 | Not significant |
| Retail store vs Electrical overload | 11.73 | 3 | 0.009 | Highly significant Rerelationship |
| Storage facilities vs Lack of fire exit | 9.15 | 2 | 0.027 | Significant relationship |

The findings reveal that different business types face distinct fire risks. Restaurants were strongly associated with electrical fires, while manufacturing facilities were linked to flammable materials.

Table 4 *Qualitative Themes Supporting Chi-Square Findings*

| Types of Business | Qualitative Themes | Supporting Insight | Integrated Interpretation |
|---|---|---|---|
| Restaurants | Overdependence on appliances | "Kitchen staff often use multiple stoves and fryers with out checking circuit loads." BFP Inspector | Explains the significant association between restaurant operations and electrical fires |
| Manufacturing | Improper chemical handling | "Workers store flammable solvents near heat sources." Plant Safety Officer | Supports the significant link between manufacturing and flammable materials |
| Offices | Low risk perception | "We don't think offices can catch fire easily so we skip annual training." Employee | Justifies the non-significant relationship between office type and negligence-related fires. |
| Retail stores | Hidden wiring in display areas | "Wiring behind shelves are not inspected regularly." Store Manager | Corroborates the highly significant association between retail stores and electrical overload as cause of fire. |
| Storage facilities | Poor structural compliance | "Old storage areas lack emergency exits and retrofitting is expensive." Warehouse Owner | Explains the significant link between storage facilities and the absence of proper fire exits. |

The qualitative data show that business-specific practices directly heighten fire risks, underscoring the need for industry-tailored inspection and education programs. Analysis of 2024 fire incidents in Baguio City revealed certification gaps: none of the affected establishments held only an FSIC, three had business permits only, 26 had both, and four had neither. These findings highlight two points: certification alone does not guarantee safety, as incidents occurred even in fully compliant establishments, and enforcement gaps persist where permits are absent.

## CONCLUSION AND RECOMMENDATION

The study concludes that fires in business establishments are primarily caused by faulty wiring, overheated appliances, cigarette smoking, and open flames from cooking, with small eateries and appliance-heavy businesses in Baguio City being especially vulnerable. Possession of Fire Safety Inspection Certificates (FSIC) and business permits did not guarantee protection, as incidents occurred even in compliant establishments, revealing gaps in enforcement, monitoring, and daily safety practices. Certification alone is insufficient; continuous risk management, preventive technologies, and a strong safety culture are essential.

### Policy Recommendations

1. **Enhance Post-Certification Oversight and Targeted Inspections.** The BFP, in collaboration with the Department of the Interior and Local Government (DILG), should institutionalize mandatory follow-up inspections within 6–12 months after the issuance of the Fire Safety Inspection Certificate (FSIC), prioritizing high-risk areas such as electrical systems, commercial kitchens, and LPG storage facilities.
2. **Mandate the Adoption of Preventive Fire Safety Technologies.** The Department of Trade and Industry (DTI), in coordination with BFP and the Department of Science and Technology (DOST), should issue technical guidelines requiring the installation of gas leak detectors, thermal sensors, and electrical load monitoring devices in high-occupancy or high-load establishments.

### Practice Recommendations

1. **Promote Preventive Technologies and Real-Time Monitoring Systems.** Local government units (LGUs) and BFP regional offices should implement public-private partnerships (PPPs) to subsidize and promote smart meters, temperature sensors, and LPG leak detectors in high-risk establishments.
2. **Strengthen Fire Safety Culture through Capacity-Building and Regulation Compliance.** The Civil Service Commission (CSC), in collaboration with BFP and LGUs, should integrate mandatory fire safety and emergency response training into employee orientation and annual refresher programs, especially in hospitality, food service, and manufacturing industries.

### Research Recommendations

1. Expand national fire databases to include equipment age, maintenance history, and electrical load profiles.
2. Conduct longitudinal and comparative studies involving multiple cities and municipalities.
3. Develop predictive fire risk models considering establishment type, compliance status, and ignition sources.

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#### Declaration of Generative AI use in the Writing Process

During the preparation of this work, the author utilized ChatGPT (GPT-5) developed by OpenAI**,** were utilized in the preparation and refinement of this document. The AI was used to assist in drafting, editing, summarizing, and organizing content**,** as well as enhancing clarity, coherence, and formatting in accordance with academic writing conventions**.** The content generated by the tool was carefully reviewed, edited, and validated by the author. The author accepts full responsibility for the accuracy, originality, and integrity of the final manuscript.

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