

A PROFILE OF FIRE INCIDENTS IN PEKANBARU CITY (2022–2025)

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Abstract

Fire incidents represent a recurring challenge in Indonesia, predominantly triggered by electrical short circuits, human negligence, gas leaks, and other contributing factors. The Fire and Rescue Department plays a pivotal role through preventive measures, suppression, rescue operations, and preliminary fire investigations. This study employs a descriptive quantitative method, analyzing valid and verified data from the Pekanbaru City Fire and Rescue Agency (DPKP). The data were analyzed to map the profile of fire incidents over a four-year period, spanning from 2022 to 2025. The results indicate that fire incidents in Pekanbaru City have experienced a significant annual increase. Notably, a drastic surge occurred in 2025 with 227 cases, far exceeding the 144 incidents recorded in the previous year. This substantial escalation is further evidenced by the rising fatality rate, with 7 fatalities reported in 2025. In addition to these casualties, significant losses were sustained by the surrounding environment and the firefighters operating in the field. Geographically, fire incidents are heavily concentrated in densely populated residential areas, particularly in the Payung Sekaki and Marpoyan Damai districts. Furthermore, electrical short circuits remain the predominant cause of these fire incidents. The conclusion emphasizes that the high frequency of fire incidents in Pekanbaru City, coupled with the rising number of fatalities, underscores the urgent need for a structured Organizational Management approach in fire prevention efforts to mitigate the resulting impacts. The findings of this study are expected to serve as vital input for the Pekanbaru City Fire and Rescue Agency (DPKP) in formulating more effective prevention policies and emergency response strategies, as well as in strengthening the implementation of safety standards.

Keyword : Fire; Incident; Pekanbaru

INTRODUCTION

According to the National Fire Protection Association (NFPA), fire is defined as an oxidation reaction involving essential components such as fuel, oxygen, and a heat source. This phenomenon invariably leads to significant losses, including property damage, injuries, and fatalities [1]. Statistical data from 2023 indicate that fire departments in the United States responded to approximately 1.39 million fire incidents. The scale of these events resulted in 3,670 civilian deaths and 13,350 injuries, with total estimated property losses reaching \$23 billion [2].

Data from the Indonesian National Police (Polri) indicate a high frequency of fire incidents in densely populated settlements, particularly among low-income communities. Between May 2018 and July 2023, a total of 5,336 fire incidents were recorded nationwide, with 1,323 cases (24.79%) occurring in residential areas [3]. Urban fire incidents result in severe consequences, including loss of life and material damage. These events also extend to affecting individuals and the socio-economic activities within the impacted environments [4]. The distribution of fire incidents in DKI Jakarta between 2018 and 2020 indicates high intensity in residential areas, with East Jakarta identified as the district with the highest frequency. This

condition contrasts with the uneven distribution of fire services, where operational coverage has yet to reach every sub-district and urban village, thereby creating significant challenges in emergency response [5]. This situation is deeply concerning, as current trends indicate that fire incidents in Indonesia are on a rising trajectory [6].

Approximately 60% of fire incidents are caused by human error or negligence. This negligence is defined as actions that disregard safety procedures, such as failing to conduct periodic inspections of equipment that poses a fire risk [7]. According to data obtained from the Fire and Rescue Agency, fire incidents reached 3,200 cases in 2024, the majority of which were caused by electrical short circuits (1,216 cases). Other significant contributing factors included garbage fires with 337 cases, gas-related incidents reaching 205 cases, and cigarette butts accounting for 130 cases [8]. Workplaces can be hazardous for professionals who routinely work with materials or devices that may serve as ignition sources or become combustible when exposed to heat-generating equipment. These hazards include, but are not limited to, open flames, pressurized gases, flowing oxygen, welding operations, surgical electrocautery, electrical systems, as well as flammable liquids and gases [9].

The number of fire incidents in Pekanbaru City over the four-year period from 2022 to 2025 has experienced a significant increase. Notably, in 2025, there was a drastic surge with the total number of fire incidents reaching 227 cases, compared to 144 cases in the previous year [10]. Furthermore, firefighters play a vital role as the frontline personnel in operational fire suppression. Consequently, it is imperative to prioritize the adequacy of Personal Protective Equipment (PPE) to prevent occupational accidents during field operations, as data indicate a significant increase in accident cases among personnel. Based on this background, this study aims to describe the profile of fire incidents over a specific period and to gather preliminary information regarding the factors that potentially contribute to fire incidents at the Pekanbaru City Fire and Rescue Agency.

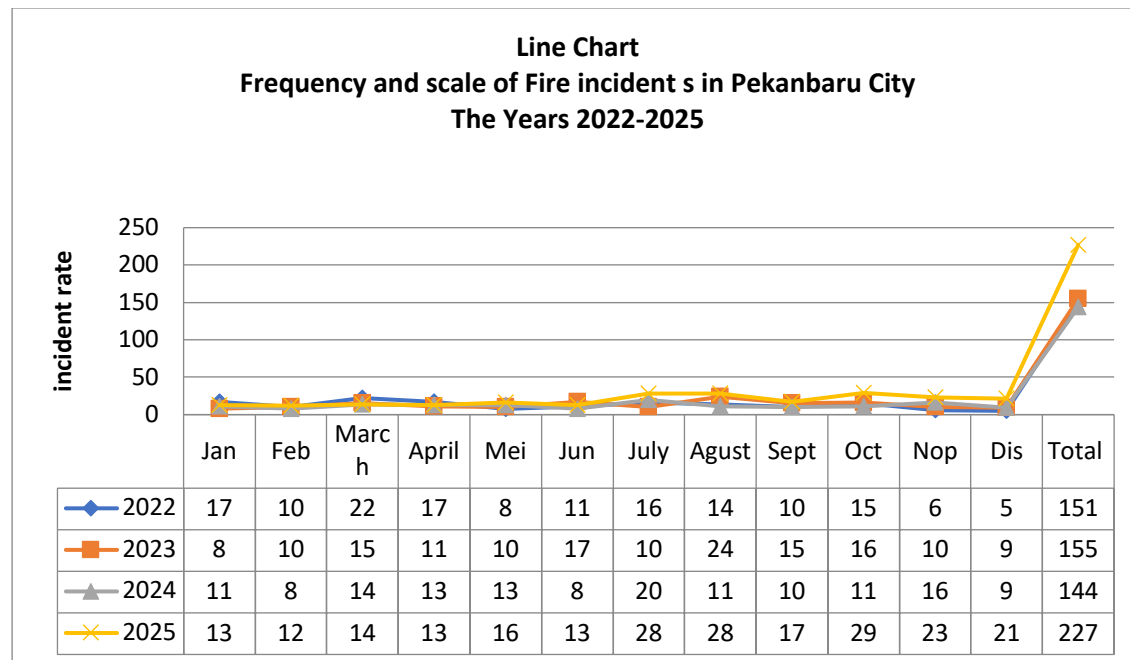
RESEARCH METHODS

The methodology employed in this study is quantitative with a descriptive approach. This design aims to describe and map the dynamics of fire incidents at the Pekanbaru City Fire and Rescue Agency, serving as a foundation for problem formulation and a theoretical framework for future research. The study was conducted at the Pekanbaru City Fire and Rescue Agency, with data obtained through the agency's official records. The data encompass both primary data, collected directly through field observations, and secondary data, retrieved from relevant document analysis.

RESEARCH RESULTS

1. Fire Incident Data

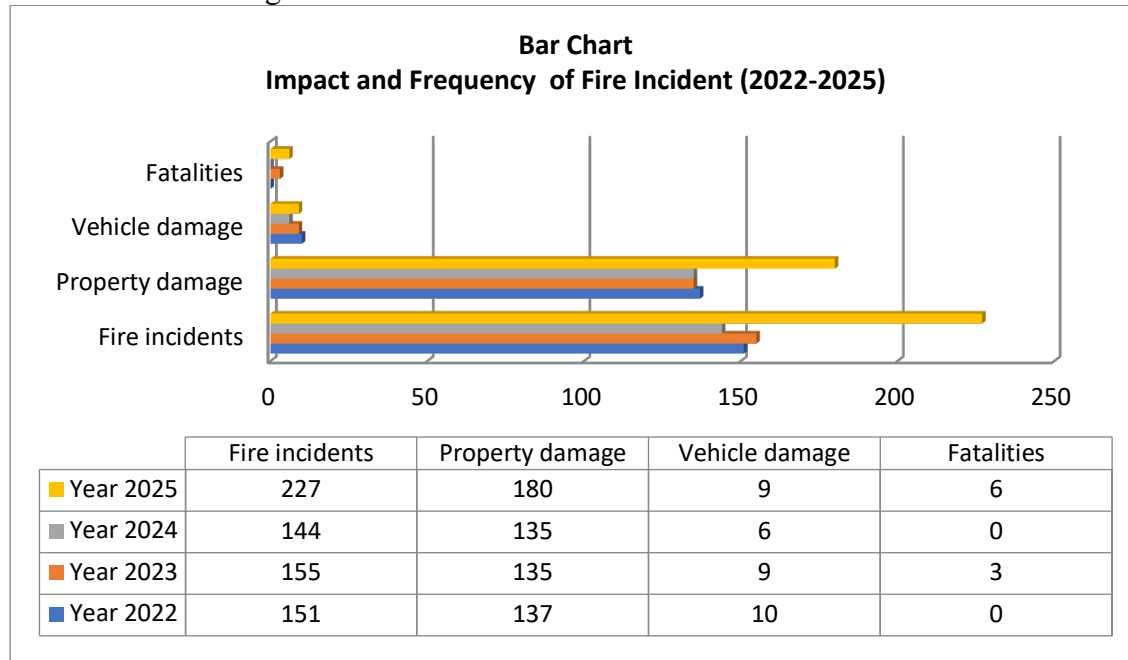
Based on the data obtained regarding fire incidents occurring over a four-year period, the details are presented in the following explanation :



This line chart illustrates the monthly distribution of fire incidents over a four-year period from 2022 to 2025, revealing substantial seasonal variations. The highest cumulative total of cases was recorded in 2025, whereas the lowest occurred in 2024. Based on these data, it is evident that the number of fire incidents has experienced a consistent year-to-year increase. Observing the annual trends, there is no decline in fire occurrences, raising a significant question as to why these cases never decrease. Notably, the surge in 2025 was highly significant, rising from 144 cases in the previous year to 227 cases. Furthermore, the average annual frequency of fire incidents remains consistently above 100 cases.

2. Impact of Fire Incidents

In view of the fire incidents and the resulting losses, the impact of these occurrences is illustrated in the diagram below :



a) Overview of Fire Frequency

A review of fire incident frequency data reveals a significant surge over the four-year period from 2022 to 2025, although the trend generally remains at a high level. The peak frequency was recorded in 2025 with a total of 227 incidents, slightly exceeding the 155 incidents that occurred in 2023. In contrast, 2024 showed the lowest figures with 144 cases. The substantial increase of nearly 10% from 2024 to 2025 indicates that preventive efforts may not yet demonstrate sustainable consistency in reducing annual incident rates.

b) Property Loss

Equally significant is the property loss resulting from fire incidents. Although the number of fire cases rose in 2025, the figures for building damage also showed an upward trend, increasing from 137 units in 2022 to 180 units in 2025.

c) Vehicle Loss

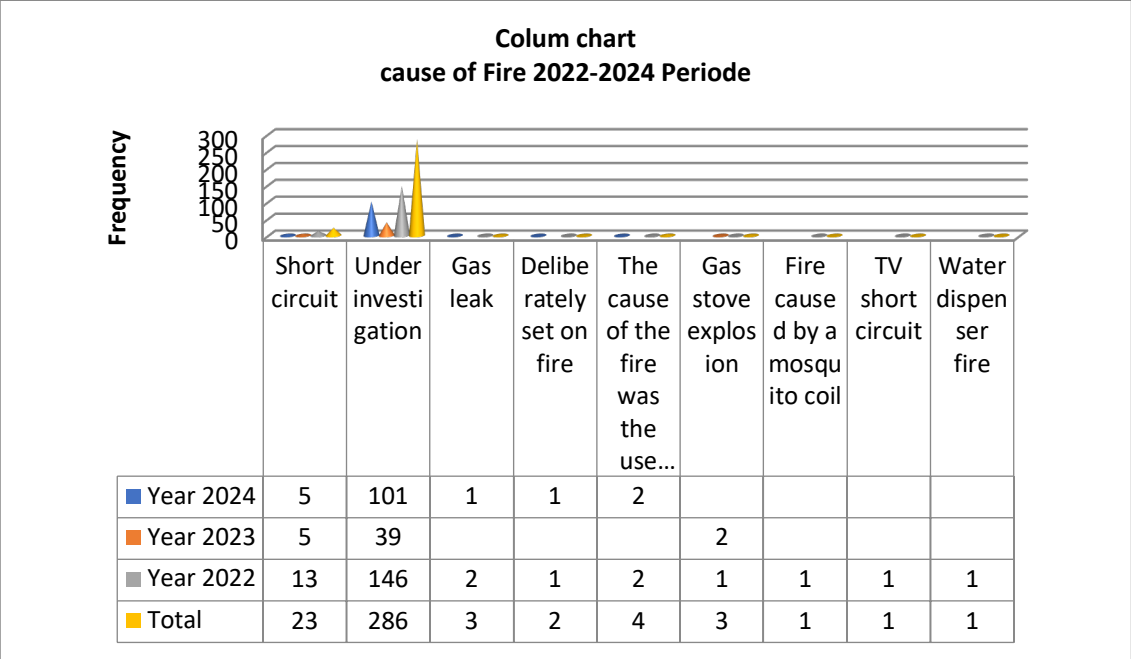
Losses involving vehicles show a much lower and relatively stagnant rate, with an annual average of approximately eight to nine units. Minor fluctuations are observed between the peak in 2022 (10 units) and the lowest point in 2024 (6 units).

d) Fatalities

The most critical aspect of the human impact—fatalities—shows sporadic results. No fatalities were reported in 2022 and 2024. However, the 2025 data raises serious concern, with a surge in fatal incidents reaching 7 fatalities. This figure represents the highest recorded total and is more than double the number seen in 2023, which recorded 3 fatalities.

3. Causal Factors of Fire Incidents

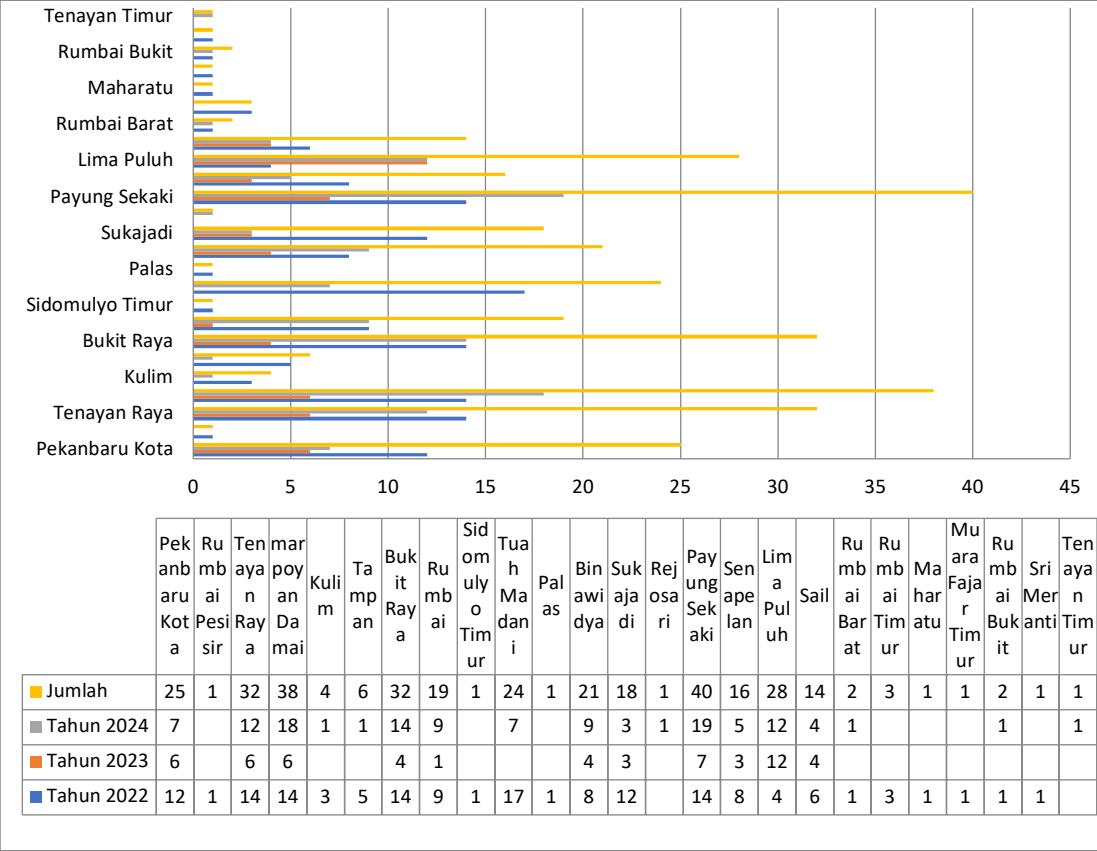
Based on the data obtained from observations over the past three years, the causes of fire are as follows:



The diagram of fire incident causes from 2022 to 2024 identifies the most dominant root causes as well as those of an incidental nature. The most significant finding is the predominance of cases originating from electrical short circuits (23 cases).

4. Location of Fire Occurrences

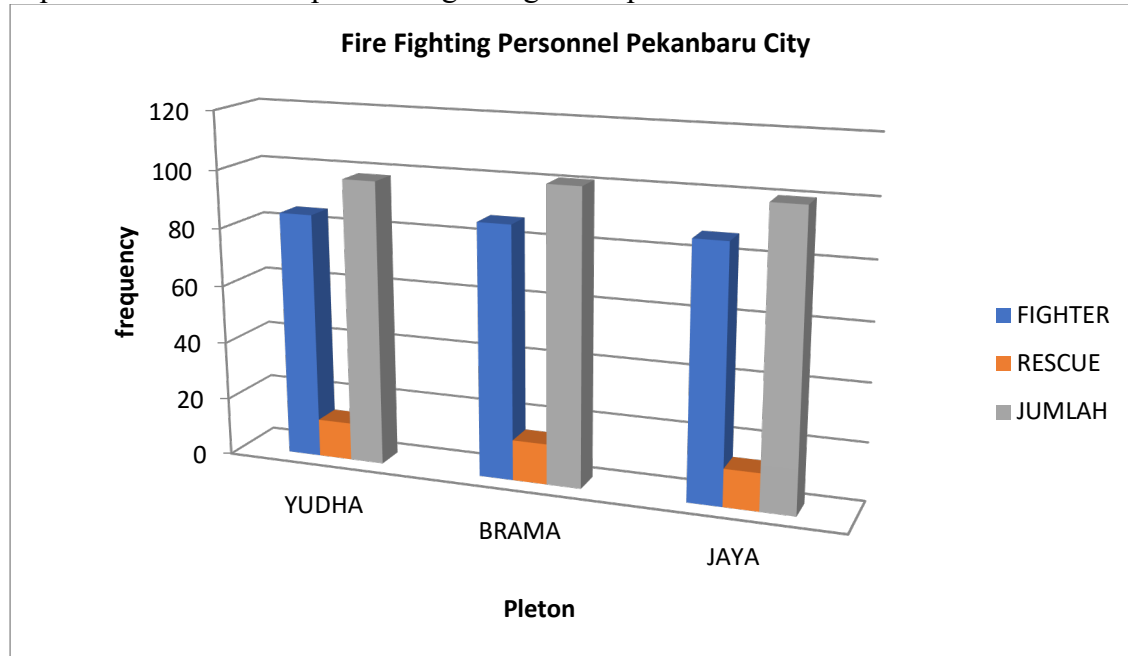
Based on the distribution of fire incidents at the District level, the data are as follows :



Based on the fire location categories, the fire incidents are distributed across 25 districts within Pekanbaru City. Within this distribution, the highest frequency of fire events occurred in the Payung Sekaki district with 40 incidents, followed by Marpoyan Damai with 38 incidents. Conversely, the districts with the lowest number of fire occurrences include Rumbai, Sidomulyo Timur, Palas, Maharatu, Muara Fajar Timur, Sri Meranti, and Tenayan Raya.

5. Firefighters

Firefighters serve as the frontline responders who must remain prepared for any situation or condition; therefore, the number of personnel is a determining factor in achieving optimal field response during fire incidents. Furthermore, the firefighters' suppression capabilities are dependent on their competence regarding their specific duties and functions.



The distribution and composition of the Pekanbaru City Fire Department personnel are divided into three main units: Jaya, Brama, and Yudha. The data encompasses personnel specializations, including 'Fighters' (Firefighters) and 'Rescue' teams, as well as the total headcount per unit. Although the allocation of personnel across the Jaya, Brama, And Yudha units is already optimal, a drastic increase in the total quantity of personnel is necessary to ensure adequate public safety services in alignment with the city's demographic growth. Overall, the number of personnel across the three units is relatively equal, ranging from 98 to 101 individuals. The Brama unit has the highest total personnel (101), followed by Jaya (100), and Yudha (98).

DISCUSSION

1. Fire Occurrences and Consequences

Based on the research findings, 2025 recorded the highest number of incidents (227 cases), with the frequency of occurrences showing a significant year-over-year increase in fire events. Rising temperatures, particularly related to urban environments, are also associated with an increase in fire incidents. The data indicates a correlation between warming cities, the rising number of summer fires, and increasing global temperatures [11]. While summer marks the period of highest wildfire intensity in North America, its destructive impacts extend far beyond the fire season itself. The loss of vegetation and long-term effects persist into periods typically expected to be fire-free, highlighting an unusual seasonal cycle [12]. The characteristics of urban areas make fire a disaster with extremely serious consequences. This vulnerability arises from extreme population density and infrastructural complexity, which directly contribute to a significant increase in material losses, physical damage, and the potential loss of life [13].

Urban areas with high population density and poor spatial configuration, such as the informal settlements in Jakarta, face significant evacuation challenges due to low connectivity and

accessibility [14]. Reviewing and adopting international fire safety standards, such as those implemented in Chile, the United States, Europe, and Australia, can provide a robust framework for improving fire safety in vulnerable areas [15].

In contrast to the situation in Pekanbaru City, fatalities increased to seven cases in 2025. This phenomenon reveals a critical disparity between fire suppression capabilities and life-saving effectiveness. The rise in casualties during the year with the highest incident rate (2025) suggests significant weaknesses in non-operational aspects, such as self-evacuation awareness, poor access in densely populated areas, or the failure of early warning systems.

2. Factors causing accidents

Fire causes tend to be dominated by electrical short circuits, as well as the use of gas and other electronic equipment. Various human-triggered fire categories—such as arson, electrical system malfunctions, smoking habits, cooking errors, and industrial operational accidents—require comprehensive analysis. This understanding is key to facilitating truly effective preventive measures [16].

Gas leaks from stove burners are a leading cause of domestic gas explosions in residential areas. It should be noted that even a small volume of gas is sufficient to trigger a fire that escalates into uncontrolled combustion [17]. Indoor gas explosions are largely triggered by minute gas leaks (micro-leaks). These leaks cause gas to accumulate around household appliances until it reaches hazardous concentration levels [18].

3. Fire Location

Based on the location of the incidents, fires occurred in urban villages and districts categorized as high-density areas. Consequently, the type and condition of buildings significantly influence the occurrence of these fires. Fire, with its sudden onset and destructive nature, causes property loss and, at times, fatalities and injuries within a short period. High population and building density make urban areas more vulnerable to fire hazards. [22]. The high density, combined with narrow roads and closely packed houses, creates an environment conducive to the spread of fire. Furthermore, the prevalence of multi-story dwellings and the use of flammable materials further increase the risk of fire escalation [23].

4. Firefighter

The competence of firefighters is crucial for effective performance and safety. This includes openness to multiculturalism, technical and professional aptitude, decisiveness, self-control, optimism and enthusiasm, teamwork, empathy, and participatory leadership [24]. Officers must possess the sensitivity to engage in collaborative efforts and understand team dynamics [24]. Firefighting is considered one of the most physically demanding professions with a high propensity for stress, given the hazardous working conditions and the responsibility for human lives. They demonstrate superior physical performance but may experience lower stress levels [25]. In Australia, with a population of 20 million, there are 220,000 volunteer firefighters serving in rural areas. This high proportion represents a ratio of approximately one volunteer firefighter for every 91 people [26].

CONCLUSION

This study has identified and described fire incidents in Pekanbaru City over a four-year period (2021-2025). Data analysis confirms that the frequency of fire cases remains at a consistently high level, showing no significant decline from year to year. In fact, data for 2025 indicated a drastic increase in cases compared to the previous year (158 cases versus 227 cases). It is

evident that densely populated environments are among the locations with a high potential for fire occurrences. This persistently high incident rate underscores the urgency of implementing more effective organizational management approaches for fire prevention and mitigation in Pekanbaru.

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