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Assessing Service Quality and Developing Improvement Strategies in Fire and Rescue Services

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Abstract

Fire disasters remain a major public safety concern in Indonesia, with more than 10,000 incidents recorded annually during 2020–2024. This study examines the quality of fire management services provided by the Ambon City Fire and Rescue Service, identifies factors influencing service performance, and proposes strategies for improvement. A qualitative approach was employed through interviews, observations, and document analysis. The findings reveal that service quality has not fully met community expectations due to inadequate facilities and infrastructure, limited human resource capacity, underutilized information technology, weak inter-agency coordination, and low public awareness of fire prevention. To address these challenges, the study recommends an integrated strategy encompassing human resource development, infrastructure modernization, digital technology utilization, strengthened regulations and coordination, and community empowerment. These measures are expected to enhance service quality, improve emergency response effectiveness, and strengthen public safety in Ambon City.

Keywords : Service Quality, Strategy, Fire Service, Fire Management

Introduction

Fire is one of the most destructive disasters worldwide, causing substantial losses in human life, property, and environmental sustainability. In Indonesia, fire incidents remain a persistent public safety concern. Data from the National Disaster Management Agency indicate that more than 10,000 fire incidents were recorded annually between 2020 and 2024, primarily resulting from electrical short circuits, human negligence, and natural factors. The continued occurrence of these incidents highlights the need for effective fire management systems encompassing prevention, preparedness, emergency response, and post-disaster recovery.

The importance of fire management is reinforced by the Regulation of the Minister of Home Affairs Number 114 of 2018 concerning Technical Standards for Basic Services under the Minimum Service Standards for Fire Affairs. The regulation requires local governments to establish integrated fire management systems capable of protecting communities from fire-related risks through prevention, mitigation, preparedness, emergency response, and recovery measures. Within this framework, fire and rescue agencies play a central role in safeguarding public safety by delivering rapid emergency response, effective operational management, and community protection. Consequently, the quality of services provided by these agencies has become a key determinant of the effectiveness of local fire management systems.

Ambon City, the capital of Maluku Province, faces distinctive challenges in delivering effective fire management services. Rapid urban development has increased the concentration of residential settlements and commercial activities, while the city's diverse topography creates additional operational complexities. Many densely populated areas are connected by narrow roads that restrict access for firefighting vehicles and emergency personnel. Moreover, strong seasonal winds frequently accelerate fire spread, making suppression efforts more difficult. These conditions require reliable resources, efficient operational systems, and rapid emergency responses to minimize damage and protect the community.

The urgency of strengthening fire management services in Ambon City is reflected in recent operational records. During 2025, the Ambon City Fire and Rescue Service responded to 75 fire incidents and 265 non-fire rescue operations across residential areas,

commercial centers, and forested regions. One of the most significant incidents occurred at Batu Merah Market in December 2025, where seven shop houses were destroyed, causing considerable economic losses. Although firefighters reached the location within four minutes after receiving the emergency report, suppression efforts were impeded by strong winds and large crowds that obstructed access to the affected area. This incident demonstrates that effective emergency response depends not only on response time but also on adequate operational resources, environmental conditions, and public cooperation.

Currently, the Ambon City Fire and Rescue Service operates four fire stations serving the city's five districts. Although these stations provide essential emergency coverage, their number remains inadequate to effectively serve all areas, particularly remote communities and locations with limited accessibility. The agency also faces persistent challenges associated with aging firefighting vehicles, limited operational equipment, and shortages of qualified personnel. As urban expansion and population growth continue, these limitations place increasing pressure on the agency's capacity to deliver timely and effective emergency services.

Several interconnected factors continue to affect the quality of fire management services in Ambon City. First, limitations in facilities and infrastructure reduce operational readiness. A considerable proportion of firefighting vehicles have exceeded their recommended operational lifespan, increasing the risk of technical failures during emergency operations. Supporting equipment, including hoses, pumps, communication devices, and personal protective equipment, also remains insufficient in both quantity and quality. These deficiencies reduce operational efficiency and may delay emergency response.

Second, human resource capacity remains a major challenge. The number of firefighters is not proportional to the population size and geographical area requiring service coverage. In addition, opportunities for continuous professional development and technical training remain limited, resulting in varying levels of competence among personnel. Since emergency operations require rapid and accurate decision-making, the availability of highly trained personnel is essential to ensure effective service delivery.

Third, emergency response is frequently constrained by geographical and organizational factors. Although the agency has demonstrated rapid response in several

incidents, emergency operations in remote areas often experience delays because of limited station coverage, inadequate transportation infrastructure, and difficult terrain. Inter-agency coordination also remains insufficiently integrated. Effective fire management requires close collaboration among electricity providers, disaster management agencies, security institutions, and health authorities. However, weaknesses in information sharing, resource mobilization, and emergency decision-making continue to reduce operational effectiveness, particularly during large-scale incidents requiring multi-agency responses.

Finally, community participation remains an important component of effective fire management. Public awareness of fire prevention and emergency preparedness is still relatively low, as reflected in unsafe electrical installations, improper use of cooking equipment, and the limited availability of basic firefighting equipment in many households. During emergency situations, residents may unintentionally hinder rescue operations by crowding incident locations rather than facilitating evacuation procedures. Therefore, strengthening community awareness and encouraging active public participation are indispensable for improving fire prevention and emergency response.

The importance of service quality in public organizations has been widely acknowledged in the literature. According to Supriyono, (2021), service quality should be assessed not only by its outcomes but also by the effectiveness and efficiency of the processes through which services are delivered. In emergency service organizations, performance is commonly evaluated based on response speed, operational reliability, service accuracy, and public safety. Consistent with this perspective, Wibowo et al., (2022) argue that the quality of firefighting services is largely determined by the adequacy of infrastructure, the competence of personnel, and effective coordination among relevant institutions. Rahayu, (2023) further emphasizes that successful fire management extends beyond technical and operational capabilities, requiring active community participation in fire prevention and emergency preparedness. Collectively, these studies indicate that improving fire service quality requires an integrated approach that combines organizational capacity, operational readiness, institutional collaboration, and community engagement.

Previous empirical studies have identified a range of factors influencing the performance of firefighting organizations. Rizky Pratama, (2021) found that investment in human resource development and infrastructure significantly improves firefighting

performance and public satisfaction. Siti Rahmawati, (2020) highlighted the importance of technological modernization and clear regulatory frameworks in enhancing service effectiveness, transparency, and responsiveness. Likewise, Andi Saputra, (2019) demonstrated that response time is strongly influenced by road infrastructure and the spatial distribution of fire stations, while inadequate inter agency coordination remains a persistent operational challenge. Furthermore, Nurhayati, (2022) reported that employee competence, service systems, and the utilization of information technology play critical roles in improving the effectiveness and transparency of public service delivery. Although these studies consistently identify organizational, technical, and managerial factors as important determinants of service quality, they generally examine these dimensions independently rather than as interconnected components of an integrated fire management system.

Moreover, most previous studies were conducted in regions with geographical, demographic, and institutional characteristics that differ considerably from those of Ambon City. Consequently, their findings cannot be directly generalized to areas characterized by dispersed settlements, limited transportation accessibility, complex topographical conditions, and constrained emergency service resources. Research specifically examining the quality of fire management services in Ambon City also remains scarce, despite the city's increasing exposure to fire hazards and the operational challenges faced by its Fire and Rescue Service. This limited empirical evidence restricts the development of context-specific strategies capable of improving service quality and organizational performance.

The present study addresses these limitations by adopting a comprehensive analytical framework that integrates managerial, technical, institutional, and community dimensions of fire management services. Rather than focusing on a single determinant, the study examines how human resource capacity, facilities and infrastructure, information technology utilization, regulatory support, inter-agency coordination, and community participation collectively influence service quality. By incorporating the perspectives of firefighters, government agencies, and community members, this research provides a more holistic understanding of the opportunities and constraints affecting fire management services in Ambon City.

Accordingly, this study aims to assess the current quality of fire management services provided by the Ambon City Fire and Rescue Service, identify the factors that

facilitate and hinder service improvement, and formulate practical and sustainable strategies to enhance organizational performance. The findings are expected to contribute to the growing body of knowledge on public emergency service management while providing evidence-based recommendations for strengthening local fire management systems and improving community safety in urban areas with similar geographical and institutional characteristics.

Theoretical Framework

Service Quality in Public Services

Service quality is a fundamental concept in public administration, reflecting the ability of public organizations to meet community expectations through effective, efficient, and responsive service delivery. In disaster management, service quality is assessed not only by service outcomes but also by the effectiveness of service processes. According to Widodo and Sutanto, (2023), service quality is characterized by responsiveness, accuracy, safety, and attention to public needs, requiring integrated organizational resources and support systems to ensure effective service delivery.

Service Quality in Fire and Rescue Management

Service quality is a fundamental aspect of public service delivery, particularly in emergency and disaster management, where speed, accuracy, and reliability directly influence public safety. It refers to an organization's ability to meet or exceed community expectations through responsive, accurate, and reliable services. According to Widodo and Sutanto, (2023), service quality is reflected in responsiveness, accuracy, safety, and attention to community needs, supported by the effective integration of human resources, infrastructure, technology, and regulatory frameworks. In the context of fire and rescue services, service quality extends beyond operational performance to include the development of sustainable service systems. Hidayat et al., (2024) emphasize that improving fire service quality requires integrated efforts involving personnel competency development, modernization of facilities and equipment, information technology utilization, and community participation in prevention and early response. Similarly, Pradana and Lestari, (2025) argue that adequate infrastructure, rapid response capability, and effective

inter-agency coordination are essential for enhancing emergency service effectiveness and ensuring sustainable fire management.

Methods

This study employed a qualitative approach to examine strategies for improving the service quality of the Ambon City Fire and Rescue Service within the fire management system. A qualitative design was considered appropriate because it facilitates an in-depth understanding of complex organizational and social phenomena in their natural settings (Moleong, 2021; Sugiyono, 2022).

The analysis was guided by five service quality indicators adapted from Kotler and Keller, (2012) human resource development, modernization of facilities and infrastructure, utilization of information technology, strengthening of regulations and policies, and community empowerment. Human resource development emphasizes personnel competence and operational preparedness (Wibowo et al., 2022), while modernization focuses on the adequacy and maintenance of firefighting facilities and equipment (Supriyono, 2021). Information technology includes emergency communication systems, incident reporting, risk mapping, and data management (Rahmawati, 2020). Regulatory strengthening addresses operational guidelines and institutional coordination (Rahayu, 2023), whereas community empowerment highlights public education and participation in fire prevention and emergency response (Andi Saputra, 2019).

Data were collected through structured, in-depth interviews with respondents selected using purposive sampling (Sugiyono, 2022). The study involved 50 participants, comprising 15 fire service personnel and 35 residents from fire-prone areas, particularly Honipopu and Ahusen. These participants were selected based on their experience and knowledge of fire management services, enabling them to provide comprehensive insights into existing service conditions, operational challenges, and strategies for service improvement.

Results of Research and Discussion

Research Results

This study analyzed the service quality of the Ambon City Fire and Rescue Service and formulated strategies for its improvement. Data were collected through in-depth interviews and questionnaires administered to 50 respondents, comprising 15 firefighters and 35 residents of the Honipopu and Ahusen sub-districts. These areas were selected because of their high population density and elevated fire risk. The analysis was based on five key indicators: human resource development, the availability of facilities and infrastructure, the utilization of information technology, the strengthening of regulations and policies, and community empowerment. The findings for each indicator are presented in the following sections.

Characteristics of Respondents

Research data were obtained from 50 respondents, comprising 30 men (60%) and 20 women (40%). The higher proportion of male respondents reflects the composition of participants involved in this study, particularly firefighters and community members who met the selection criteria. Based on age, most respondents were between 31 and 40 years old (40%), followed by those aged 20–30 years and over 40 years, each representing 30% of the sample. The predominance of respondents aged 31–40 years indicates that the study largely captured the perspectives of individuals within the productive age group, who are generally expected to possess sufficient experience and awareness of public service issues in their communities.

Service Quality Conditions Based on Research Indicators

Human Resource Development

The findings indicate that the number of personnel in the Ambon City Fire and Rescue Service is not proportional to the agency's service area and the increasing frequency of fire incidents. Although the agency has implemented basic and advanced training programs, their coverage and frequency remain insufficient to reach all personnel. Consequently, many firefighters still require additional capacity building, particularly in the use of modern firefighting technologies and the management of complex fire incidents in densely populated areas. Interview findings further revealed that personnel shortages

frequently increase workload and fatigue, which may reduce operational readiness and vigilance during emergency response.

Modernization of Facilities and Infrastructure

The findings indicate that the facilities and infrastructure of the Ambon City Fire and Rescue Service remain inadequate to support optimal emergency operations. Most firefighting vehicles have exceeded their operational lifespan and frequently experience technical failures during field operations. In addition, the availability of essential equipment, including hoses, pumps, and personal protective equipment, remains limited and does not fully meet established technical standards. These deficiencies contribute to slower response times and reduce the effectiveness of firefighting operations, particularly in remote or difficult-to-access areas. Furthermore, the city's hydrant system remains inadequate and unevenly distributed, limiting the availability of reliable water sources during emergency response and further constraining operational effectiveness.

Utilization of Information Technology

The findings indicate that the utilization of information technology in the Ambon City fire management system remains limited. Fire incident reporting continues to rely primarily on telephone calls and direct reports from residents, often resulting in delays and incomplete or inaccurate incident information. In addition, the implementation of fire risk mapping and disaster management information systems has not been fully optimized. Consequently, operational planning and the distribution of fire service resources, including fire station placement, are not yet consistently supported by accurate and up-to-date risk data.

Strengthening Regulations and Policies

The findings indicate that the legal framework governing fire management in Ambon City is established through Mayor Regulation Number 21 of 2022 concerning Fire Management and Rescue Operations. The regulation defines the organizational structure, roles and responsibilities, and operational procedures of the Fire and Rescue Service. However, its implementation remains constrained by several challenges. Dissemination and understanding of the regulation have not been consistent across personnel and relevant agencies. In addition, operational guidelines provide limited detail regarding inter-agency

coordination mechanisms during emergency situations, resulting in inadequate synchronization of response efforts, particularly during large-scale fire incidents.

Community Empowerment

The findings indicate that community awareness and participation in fire prevention efforts in Ambon City remain relatively low. This is reflected in the continued occurrence of preventable fire incidents caused by unsafe electrical installations, improper use of cooking equipment, and limited attention to fire safety practices in homes and business premises. During fire emergencies, many residents act as bystanders and, in some cases, unintentionally obstruct firefighters' access to incident locations rather than supporting evacuation or other emergency response activities. Furthermore, educational and public awareness programs conducted by the Fire and Rescue Service have not yet reached all communities and areas of Ambon City, limiting their effectiveness in promoting fire prevention and preparedness.

Discussion

Analysis Based on Expert Views and Supporting Theories

Dimension of Service Quality

The findings indicate that the service quality of the Ambon City Fire and Rescue Service has not yet reached an optimal level, as reflected in the gap between community expectations and actual service delivery. This condition can be interpreted using the service quality framework of Parasuraman, Zeithaml, and Berry, (2008), further elaborated by Richadinata et al., (2022), which emphasizes five dimensions of service quality: tangibles, reliability, responsiveness, assurance, and empathy.

From the perspective of tangibles, the agency continues to experience significant limitations in facilities and infrastructure. Aging firefighting vehicles, inadequate operational equipment, and an insufficient maintenance and replacement system reduce operational readiness and constrain the agency's ability to respond effectively, particularly in areas with difficult accessibility. These findings support Supriyono, (2021), who argues that physical resources are a fundamental indicator of service quality because they directly influence organizational performance and public perceptions.

The reliability dimension also remains a major challenge. Limited personnel, uneven competency levels, and recurring technical problems with operational equipment reduce the consistency of emergency service delivery. These conditions are closely associated with the imbalance between workforce capacity, population growth, and increasingly complex fire risks. Consistent with Wibowo et al., (2022), the findings confirm that reliable emergency services depend on competent human resources supported by adequate facilities. Consequently, service inconsistency may weaken public confidence in the institution's ability to protect lives and property.

Similarly, responsiveness remains constrained by geographical and operational factors. Remote locations, hilly terrain, narrow roads, and the absence of an integrated real-time reporting system frequently delay emergency response. As emphasized by Rahayu, (2023), response speed is a critical determinant of emergency service effectiveness because delays increase material losses and public safety risks. These findings suggest that improving response systems requires not only additional fire stations but also greater utilization of digital technologies to support emergency communication and operational decision-making.

Regarding assurance, the study found that although firefighters demonstrate strong commitment and professionalism, variations in technical competence limit the agency's ability to provide consistent service quality. This condition reflects the limited availability of continuous training and competency development programs. The findings are consistent with Arianto, (2021), who emphasizes that assurance in public services is fundamentally determined by the competence and professionalism of service personnel. Strengthening standardized training and competency certification is therefore essential for improving operational safety and service reliability.

Among the five dimensions, empathy represents the strongest aspect of service quality. Despite operational constraints, firefighters consistently demonstrate dedication and concern for community safety. This finding supports Tjiptono and Chandra, (2021), who identify empathy as a key factor in building trust and positive relationships between service providers and service users. Although empathy cannot compensate for deficiencies in infrastructure or organizational capacity, it provides an important foundation for future service improvement.

Overall, the findings demonstrate that improving the quality of fire management services requires a comprehensive approach that integrates organizational resources, infrastructure modernization, human resource development, technological innovation, and institutional coordination. Strengthening these dimensions is essential to narrowing the gap between community expectations and actual service performance while enhancing the effectiveness and sustainability of fire management services in Ambon City.

Service Quality Improvement Strategy

The findings highlight the need for a comprehensive and integrated strategy to improve the quality of fire management services. Kotler and Keller, (2022) argue that service improvement should encompass five key dimensions: human resource development, modernization of facilities and infrastructure, utilization of information technology, strengthening of regulations and policies, and community empowerment. In addition, Fred R. David, (2021) emphasizes that effective strategies must be formulated based on a thorough assessment of an organization's internal and external environments while considering local characteristics. In the context of Ambon City, geographical constraints, including hilly terrain, narrow access roads, and strong winds, should therefore be incorporated into strategic planning. Likewise, Bryson, (2022) argues that public sector strategies should align organizational capacity with external demands. Accordingly, improving fire management services requires not only addressing internal constraints, such as limited personnel and infrastructure, but also strengthening inter-agency collaboration and community participation to respond effectively to external challenges.

Analysis Based on Relevant Research Results

The findings of this study are generally consistent with previous research conducted in various regions of Indonesia, although the challenges identified in Ambon City exhibit distinctive characteristics. M. Sahid et al., (2023) reported that delays in firefighting services in Makassar were primarily associated with response speed and operational effectiveness. Similarly, Rudi Hartasetiadi et al., (2025) identified limitations in personnel and infrastructure as major constraints in Dumai City, while Mohammad Abdurrahman Saleh and Meirinawati, (2025) highlighted the influence of narrow roads and delayed incident reporting in Surabaya. In Ambon City, however, these challenges are compounded by hilly

topography, limited water supply infrastructure, constrained financial resources, and low community awareness of fire safety, making service improvement more complex than in many other urban areas.

The findings also reinforce previous studies emphasizing the importance of organizational capacity in improving emergency services. Rizky Pratama, (2021) demonstrated that investments in personnel training and equipment modernization significantly enhance organizational performance, whereas Siti Rahmawati, (2020) stressed the role of information technology and regulatory support in improving service effectiveness. Consistent with these studies, the present research indicates that limited training opportunities, aging infrastructure, and the slow adoption of digital systems continue to hinder service quality in Ambon City. These findings suggest that improving fire management services requires an integrated approach that simultaneously strengthens human resources, infrastructure, technological capacity, institutional support, and community preparedness.

Service Quality Improvement Strategy

Based on the research findings, expert perspectives, and previous studies, improving the quality of services provided by the Ambon City Fire and Rescue Service requires a comprehensive and integrated strategy that addresses both operational challenges and their underlying causes. The strategy should focus on five interconnected priorities: human resource development, modernization of facilities and infrastructure, utilization of information technology, strengthening of regulations and policies, and community empowerment.

Human resource development should be strengthened through workforce planning aligned with service coverage and fire risk levels, supported by continuous technical and managerial training to enhance competence, reduce workload, and improve operational reliability. Modernization of facilities and infrastructure should prioritize replacing aging firefighting vehicles, upgrading operational equipment, and expanding the city hydrant network to improve operational readiness and reduce technical failures. At the same time, greater utilization of information technology is needed through an integrated fire management information system that supports emergency reporting, fire risk mapping,

resource allocation, and inter-agency communication, thereby improving response speed and operational efficiency.

Regulatory improvement should emphasize clearer operational procedures, stronger inter-agency coordination mechanisms, and broader dissemination of policies to ensure consistent emergency response. Equally important, community empowerment should be promoted through continuous public education, fire prevention campaigns, and the establishment of community-based fire response teams. Strengthening these five strategic areas is expected to enhance the reliability, responsiveness, assurance, tangibles, and long-term sustainability of fire management services while fostering stronger collaboration between government institutions and the community in safeguarding public safety.

Conclusion

This study found that the quality of services provided by the Ambon City Fire and Rescue Service has not fully met community expectations or the standards established in the Regulation of the Minister of Home Affairs Number 114 of 2018. Based on the service quality framework of Parasuraman, Zeithaml, and Berry, as refined by Richadinata et al., (2022), the most significant gaps were identified in the dimensions of tangibles, reliability, and responsiveness, primarily due to inadequate infrastructure, aging firefighting equipment, limited human resources, and delayed emergency response. Although the assurance and empathy dimensions were positively reflected in the commitment and dedication of firefighters, these strengths were insufficient to offset existing operational limitations.

The study further indicates that these challenges are rooted in inadequate budget allocation, limited long-term planning, insufficient technological utilization, weak inter-agency coordination, and low community awareness. Addressing these issues requires an integrated strategy encompassing human resource development, infrastructure modernization, digital transformation, regulatory strengthening, and community empowerment. Implementing these measures is expected to improve service quality, strengthen emergency response capacity, and enhance public safety in Ambon City.

Suggestions

Based on the findings, the Ambon City Fire and Rescue Service should strengthen its institutional capacity by aligning personnel numbers with service demands, providing continuous competency-based training, modernizing firefighting vehicles and equipment, and implementing systematic maintenance programs. The development of an integrated digital system for emergency reporting, fire risk mapping, and inter-agency communication is also recommended to improve operational efficiency, response accuracy, and emergency coordination. In parallel, the local government should ensure sustainable funding and reinforce policy implementation through stronger inter-agency coordination and regular monitoring of operational and infrastructure standards.

Community participation should also be strengthened through continuous public education on fire prevention, safe electrical practices, the use of basic fire safety equipment, and appropriate public involvement during emergency response. Collectively, these measures are expected to enhance institutional capacity, improve service effectiveness and response time, and strengthen public safety and the sustainability of fire management services in Ambon City.

Research Limitations and Recommendations for Future Research

This study has several limitations. First, it was conducted exclusively within the Ambon City Fire and Rescue Service, which may limit the generalizability of the findings to regions with different geographical, demographic, and socio-cultural characteristics. Second, the qualitative approach focused on participants' perceptions and experiences without quantitatively examining the relationships among factors influencing service quality. Although the study explored human resources, infrastructure, information technology, regulations, and community empowerment as integrated dimensions of service improvement, each dimension was examined at a general rather than in-depth level.

Future research should include fire and rescue agencies from different regions, particularly other island cities, to enable comparative analyses of fire management practices and service quality. The use of quantitative or mixed-method approaches is also recommended to provide more comprehensive evidence regarding organizational performance and community satisfaction. In addition, future studies may focus on specific issues, including the economic impacts of infrastructure investment, the effectiveness of

community-based fire prevention programs, and the design of fire stations adapted to geographically challenging environments.

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