Journal Occupational Health Hygiene And Safety
Departement Public Health, UDINUS
E-ISSN: 2987-5625 ; P-ISSN: 2986-8491
http://publikasi.dinus.ac.id/index.php/johhs/index

Vol. 4, No. 1, July 2026

The Relationship Between Workload, Work Stress, Work Environment, and Management Role on Firefighter Performance

Gita Asmarani[1*], Bayu Yoni Setyo Nugroho[2]

1,2 Public Health Study Program, Universitas Dian Nuswantoro
Jl. Imam Bonjol No. 207, Pendrikan Kidul, Central Semarang District, Semarang City, Central Java 50131
Corresponding Author: *411202203453@mhs.dinus.ac.id*
Telephone: 081226068341

ARTICLE INFORMATION

Article history

Submitted: 30 May 2026
Accepted: 26 June 2026

Keywords
Keyword 1:Workload
Keyword 2: Work stress
Keyword 3: Work Environment
Keyword 4: Employee Performance

Copyright:© 2023 by the authors. Submitted for possible open access publication under the terms and conditions of the NonCommercial-ShareAlike 4.0 International License (CC BY-NC-SA 4.0)

ABSTRACT

Employee performance is an important factor in determining the success of an organization in achieving its established goals. At the Semarang City Fire Department, employees are required to work quickly, accurately, and responsively in emergency situations, making optimal performance essential. However, high job demands, psychological pressure, work environment conditions, and management role factors that have not been fully optimized may affect employee performance. In addition, firefighting is a high-risk occupation that may lead to increased workload and work stress. This study aimed to determine the relationship between workload, work stress, work environment, and management role with employee performance at the Semarang City Fire Department. This study was conducted from October 2025 to April 2026 using a quantitative method with a cross-sectional approach. The sample consisted of 102 employees. The research instrument was a questionnaire that had been tested for validity and reliability. Data were analyzed using univariate and bivariate analyses with the Chi-Square test at a significance level of 5% ($\alpha = 0.05$). The results showed that there was a significant relationship between workload and employee performance (p-value = 0.000), work stress and employee performance (p-value = 0.050), work environment and employee performance (p-value = 0.001), and management role and employee performance (p-value = 0.000). It is recommended that the Semarang City Fire Department implement proportional workload management, enhance work stress prevention and management programs, improve work environment conditions, and strengthen the management role to optimize employee performance.

Introduction

The advancement of the modern era has led to increasingly tight competition and challenges in various sectors, including public services. Government institutions are required to continuously improve the capability and quality of their Human Resources (HR). HR plays a highly fundamental and essential role in an organization, as achieving organizational targets and objectives relies heavily on optimizing employee potential. For organizations tasked with serving the public with a high level of risk and urgency, such as the Fire Department, achieving optimal employee performance is an absolute requirement to ensure the comprehensive

protection and safety of the community (1). Good performance is reflected not only in the quality and quantity of task completion but also in responsiveness and timeliness when facing critical situations.

The Fire Department plays a highly strategic role based on the mandate of the Regulation of the Minister of Home Affairs of the Republic of Indonesia Number 16 of 2020. The main tasks of this institution are not limited to firefighting alone but also include prevention efforts, public education, building fire protection inspections, and rescue operations in non-fire emergencies. In Semarang, a metropolitan city with an area of 373.78 km² and a population of over 1.6 million, the Fire Department faces increasingly massive operational burdens. Based on the department's recapitulation data, the frequency of fire incidents in Semarang fluctuates but tends to be high, with 152 incidents in 2021, spiking sharply to 489 in 2023, 349 in 2024, and reaching 235 incidents by September 2025. In addition to disaster response operations, this institution has also experienced a drastic increase in requests for external education and outreach. In 2024, there were 43 main outreach activities and 132 educational sessions at the kindergarten level. This number surged in 2025 with 150 outreach activities. This high frequency of activities demonstrates a high level of public trust in the institution; however, simultaneously, it multiplies the workload of personnel who must divide their focus between emergency preparedness and field outreach duties. Ironically, the evaluation of the Employee Performance Target (SKP) or Regional Apparatus Organization (OPD) Performance Target indicators in 2025 showed a significant gap. The percentage of buildings meeting the requirements for the installation of fire protection was only achieved at 14.02% out of the 24% target. The failure to achieve this specific target indicates a dissonance between workforce capacity and the accumulation of existing workloads.

The failure to achieve this target is closely related to the bureaucratic and administrative systems that burden the personnel. Currently, every employee is required to complete daily performance reporting through the E-Kinerja application with a target of 7,200 minutes, as well as monthly reporting through E-SAKIP. This dual administrative reporting system often has to be completed amidst heavy field mobilization. This unbalanced physical and mental workload can trigger cumulative fatigue. The physical burden stems from strenuous activities such as firefighting, evacuation, and the use of high-temperature personal protective equipment (PPE). Meanwhile, the mental burden arises from the pressure of administrative deadlines and making crucial, split-second decisions while in the field (2).

A workload condition that exceeds an individual's adaptive capacity ultimately leads to work stress. The firefighting profession is universally recognized as one of the jobs with the highest stress levels. Work stress arises due to an imbalance between job demands and the resources or abilities possessed by employees to meet those demands (3). If left without intervention, work stress can develop into overstress, which manifests in decreased concentration, irritability, demotivation, and even procedural negligence that poses fatal risks to both the personnel and the victims being rescued. Besides individual and task factors, the physical and psychosocial work environment at the Fire Department also plays a major role. Preliminary observations indicate that the office layout often feels crowded and noisy due to intense coordination activities between field units and administrative staff. Suboptimal air circulation and limited ergonomic facilities at workstations can disrupt the concentration of employees who are focusing on completing reports. An unsupportive work environment hinders the energy recovery of employees after field duties.

In moderating all the dynamics of workload, stress, and operational environment, a study by Satriadi et al. (2024) conducted directly at the Tanjungpinang City Fire Department found that the implementation of a structured performance management system significantly improved the efficiency, effectiveness, and operational responsibility of firefighting personnel. The study also revealed that with a performance assessment and management system, employee workloads become more directed according to their main tasks and functions, and employees are better able to plan and develop professional, high-integrity, and high-performing work methods (4). Management that is uncommunicative, provides ambiguous directions, and lacks an appreciation system will exacerbate stress and decrease performance. Conversely, a supportive management role can transform stress into motivating challenges (eustress).

Several previous studies have shown that workload, work stress, work environment, and management role are related to employee performance. A study by Ardina Rachmawati and Rismawati demonstrated that workload and work environment significantly affect employee performance (5). Another study by Yuliya Ahmad, Bernhard Tewal, and Rita N. Taroreh stated that work stress, workload, and work environment have a positive and significant impact on employee performance (6). Furthermore, research concerning management role indicates that effective management can significantly enhance employee performance.

Nevertheless, studies examining the relationship between workload, work stress, work environment, and management role on employee performance within the firefighting work environment remain limited, particularly in Semarang City. Therefore, this study was conducted to determine the relationship between workload, work stress, work environment, and management role on the performance of employees at the Semarang City Fire Department.

Method

This research is a quantitative study with an observational analytic design using a cross-sectional approach. The research was conducted at the head office of the Semarang City Fire Department, located on Jl. Madukoro Raya No. 6, West Semarang District, Semarang City. Data collection took place during the period of October 2025 to April 2026. The population in this study consisted of all staff and personnel based at the head office of the Semarang City Fire Department, totaling 106 people. The sampling technique used was total sampling, where all members of the population were used as research subjects. By applying inclusion criteria (active employees, present during the study) and exclusion criteria (employees on sudden out-of-town duties, on leave, or refusing to participate), 4 people were excluded. Thus, the final number of samples analyzed was 102 respondents.

The independent variables in this study include workload, work stress, work environment, and management role, while the dependent variable is employee performance. The research instrument used was a questionnaire that had been tested for validity and reliability prior to use in data collection. Because the data were not normally distributed based on the Kolmogorov-Smirnov test and were on a categorical scale, hypothesis testing was performed using the non-parametric Chi-Square statistical test with a 95% confidence level ($\alpha = 0.05$).

Results

Based on the descriptive analysis of respondents' characteristics, it is known that the majority of employees at the Semarang City Fire Department are in the early adulthood phase, namely 21-40 years old (71.6%). The gender composition is significantly dominated by males, with 82 people (80.4%), considering the high-risk nature of the job. In terms of education level, the majority hold a Bachelor's degree/S1 (49.0%). Based on experience, the majority of respondents have a working tenure of less than 10 years (81.4%).

The univariate analysis in Table 1 presents a portrait of the condition of each variable in the field. It is known that employee performance is still dominated by the poor category (52.9%). Despite this, the majority of employees perceive their cumulative workload to be in the low category (54.9%). In line with this, stress measurement using the DASS-21 shows that 52.0% of employees experience mild work stress, although the proportion of severe stress cannot be ignored (48.0%). For the variables of work environment and management role, employees' views tend to be negative; 64.7% rate the work environment as poor, and 52.0% evaluate the management role as not running well (poor category).

Table 1. Frequency Distribution of Research Variables

Variable	Category	Frequency (f)	Percentage (%)
Employee Performance	Poor	54	52.9
	Good	48	47.1
Workload	Low	56	54.9
	High	46	45.1
Work Stress	Mild	53	52.0
	Severe	49	48.0
Work Environment	Poor	66	64.7
	Good	36	35.3
Management Role	Poor	53	52.0
	Good	49	48.0

Based on the bivariate test results using the Chi-Square test in Table 2, it is known that all the independent variables studied have a significant relationship with the performance of Semarang City Fire Department employees. The workload variable shows a p-value of 0.000 (<0.05), which indicates a meaningful relationship between workload and employee performance. The work stress variable also has a significant relationship with employee performance with a p-value of 0.050 (≤0.05). Furthermore, the work environment obtained a p-value of 0.001 (<0.05), demonstrating that work environment conditions are related to the level of employee performance. Similar results were also found in the management role variable with a p-value of 0.000 (<0.05), meaning there is a significant relationship between the management role and employee performance. These findings indicate that workload, work stress, work environment, and management role are important aspects related to employee performance.

Table 2. Chi-Square Bivariate Test Results of the Relationship Between Independent Variables and Employee Performance

Variable	df	*p-value*	Conclusion
Workload	1	0.000	Significant Relationship

Variable	df	*p-value*	Conclusion
Work Stress	1	0.050	Significant Relationship
Work Environment	1	0.001	Significant Relationship
Management Role	1	0.000	Significant Relationship

Discussion

Relationship Between Workload and Employee Performance

Workload represents a certain amount of tasks and responsibilities that must be completed by employees within a specific time period. The results showed a significant relationship between workload and employee performance, indicated by a p-value of 0.000 (<0.05). The cross-tabulation results show that the majority of respondents with a high workload have good performance, while respondents with a low workload tend to have poor performance. This result indicates that the workload received by employees relates to their performance attainment. The workload assigned to employees is part of the job responsibilities that must be completed. In the Fire Department, high job demands can increase employee engagement in various operational activities, making employees more active, skilled, and experienced in carrying out their duties. Such conditions enable employees to demonstrate better work capabilities, which impacts performance improvement.

According to Mangkunegara's theory, performance is the work outcome achieved by an individual based on quality and quantity in accordance with the responsibilities given. The greater the responsibilities and job demands received, the greater the opportunity for employees to showcase their competence and work productivity (7). According to Tarwaka, a workload that matches the worker's capacity can increase productivity and work effectiveness. Conversely, a workload that is too low can lead to a lack of challenges at work, causing workers to be less motivated to show their best abilities (8).

The findings of this study are in line with research by Ami, Rasyid, and Ahmad, which showed that workload has a positive and significant effect on the performance of Fire Department employees. Research by Syifa Amalia (2022) at PT PLN (Persero) also found that workload affects employee performance (9). Moreover, the study by Muslimin and Razak at PT PLN (Persero) UP3 Pinrang Regency showed similar results, namely that workload has a positive and significant effect on employee performance (10). Thus, a workload that aligns with

the worker's capacity can act as a driving factor in increasing employee productivity and performance.

Relationship Between Work Stress and Employee Performance

Work stress is an individual's response to job demands that are perceived to exceed their abilities or available resources. The results showed a significant relationship between work stress and employee performance, with a p-value of 0.050 (≤0.05). Most respondents experienced mild work stress, yet nearly half experienced severe work stress. This indicates that work pressure remains an issue requiring the institution's attention. Based on the item-by-item questionnaire results, there are still respondents who experience difficulty concentrating, feel tense at work, easily feel pressured, and experience mental fatigue due to job demands. These conditions reveal that stress symptoms are still felt by some employees in carrying out their duties.

Nevertheless, the cross-tabulation results show that some respondents who experience severe work stress are still able to demonstrate good performance. This condition can be explained through Robbins and Judge's theory, which states that stress does not always have a negative impact on performance. At a certain level, stress can be positive (eustress) as it can increase alertness, motivation, and work focus. Therefore, the work stress experienced by firefighters is likely still at a manageable level, thereby encouraging them to continue working optimally (11).

The results of this study are supported by research by Eksan and Burhan, which showed that work stress has a positive effect on employee performance (12). Research by Ni Luh Putu Yuniari found that work stress is related to a decline in employee performance (13), while a study by I Gede Adnyana Sudibya stated that work stress has a significant effect on performance (14). Thus, work stress that can still be well-managed can encourage increased motivation and work readiness, but excessive and prolonged stress has the potential to decrease employee performance.

Relationship Between Work Environment and Employee Performance

The work environment encompasses both physical and non-physical conditions around the workplace that can affect the comfort, safety, and work effectiveness of employees. The results showed a significant relationship between the work environment and employee performance, with a p-value of 0.001 (<0.05). Employees working in a good work environment

tend to have higher performance compared to those working in a less conducive environment.

Most respondents rated the work environment in the poor category. The problems identified included unharmonious relationships between employees, suboptimal job security guarantees, poor air circulation, and inadequate work facilities. In firefighting, a safe and comfortable work environment is highly necessary because the job carries a high level of risk. Good working relationships among team members are needed to support coordination when handling emergencies, while job security and adequate environmental conditions can help employees work more calmly and focused. Therefore, a good work environment not only plays a role in creating work comfort but also supports safety and task execution effectiveness. According to Sedarmayanti, the work environment refers to all tools, materials, work methods, and environmental conditions around the workplace that affect task execution. Tarwaka adds that the work environment also includes potential hazards that can affect workers' safety, health, and performance (15).

The results of this study are supported by research by Syada Chika and Didin Hikmah Perkasa, which showed that the work environment has a positive and significant effect on employee performance (6). Sedarmayanti's research emphasizes that the work environment plays an important role in increasing productivity, while research by Andriani and Agustina at PT Kuala Mina Persada showed that a good work environment can increase effectiveness and employee performance (16).Therefore, improving the quality of the work environment is an important step in supporting employee performance.

Relationship Between Management Role and Employee Performance

The management role involves the activities of leaders in planning, organizing, directing, and supervising work to achieve organizational goals. The results showed a significant relationship between the management role and employee performance, with a p-value of 0.000 (<0.05). Employees who evaluate the management role as good tend to have better performance compared to those who evaluate it as poor. Most respondents rated the management role in the poor category. Several respondents stated that management's attention to employees is still lacking, and the resolution of work problems has not been optimally carried out collaboratively. This condition indicates that management functions have not been fully implemented effectively. A strong management role can encourage positive work behaviors, increase organizational commitment, strengthen teamwork, and help employees understand the core work values that must be applied.

Research by Satriadi et al. (2024) at the Tanjungpinang City Fire Department proved that implementing a structured performance management system can improve the efficiency, effectiveness, and professionalism of firefighting personnel (4). Research by Pratama and Sukarno (2021) showed that structured performance appraisals by management have a significant impact on employee work outcomes because employees feel cared for and receive meaningful feedback. Furthermore, Mintzberg's theory states that managers have interpersonal, informational, and decision-making roles that heavily determine organizational effectiveness (17). Thus, an optimally executed management role is an important factor in improving employee performance at the Fire Department.

Conclusion

Based on the results of the research regarding the relationship between workload, work stress, work environment, and management role on the performance of Semarang City Fire Department employees across 102 respondents, it is known that the majority of respondents have performance in the poor category, amounting to 54 respondents (52.9%), while respondents with good performance amounted to 48 respondents (47.1%). The bivariate analysis results using the Chi-Square test showed that all the variables studied have a significant relationship with employee performance. The workload variable has a p-value of 0.000 (<0.05), which indicates a relationship between workload and employee performance. The work stress variable also has a significant relationship with employee performance with a p-value of 0.050 (≤0.05). Furthermore, the work environment shows a significant relationship with employee performance with a p-value of 0.001 (<0.05). Similarly, the management role has a significant relationship with employee performance with a p-value of 0.000 (<0.05). Therefore, it can be concluded that workload, work stress, work environment, and management role are factors related to employee performance at the Semarang City Fire Department.

Acknowledgments

The author expresses their deepest gratitude to the Semarang City Fire Department for granting permission, support, and the opportunity for the author to conduct this research. Expressions of gratitude are also extended to all employees of the Semarang City Fire Department who were willing to act as respondents and provide the necessary information during the research process. The author also extends appreciation to the academic supervisor

who provided guidance, feedback, and mentorship during the preparation of this study. Furthermore, thanks to the Faculty of Health, Dian Nuswantoro University for the academic support provided so that this research could be completed successfully. Hopefully, the results of this research can be beneficial for the development of science and serve as a consideration in efforts to improve employee performance within the Semarang City Fire Department.

Reference

1. Putra KAG. Pengaruh Beban Kerja dan Lingkungan Kerja terhadap Kinerja Pegawai Pada Dinas Pemadam Kebakaran dan Penyelamatan Kabupaten Buleleng. 2024;12(2):518–26. Tersedia pada: https://repo.undiksha.ac.id/id/eprint/21521%0Ahttps://repo.undiksha.ac.id/21521/9/2017041196-LAMPIRAN.pdf
2. Nurhasanah, Jufrizen, Tupti Z. Pengaruh Etika Kerja, Budaya Organisasi Dan Beban Kerja Terhadap Kinerja Karyawan Dengan Kepuasan Kerja Sebagai Variabel Intervening Nurhasanah. Jesya (Jurnal Ekon Ekon Syariah). 2022;5(1):245–61.
3. Rachmawati A. Pengaruh Beban Kerja, Stres Kerja Dan Lingkungan Kerja Terhadap Kinerja Pegawai Di Dinas Sosial Kota Surabaya. J Ilmu dan Ris Manaj [Internet]. 2022;11(4):1–16. Tersedia pada: http://jurnalmahasiswa.stiesia.ac.id/index.php/jirm/article/download/4460/4464
4. Satriadi, al. et. Implementasi Sistem Manajemen Kinerja dalam Meningkatkan Kinerja Pegawai pada Dinas Pemadam Kebakaran Kota Tanjungpinang. J Adm Publik. 2024;
5. Saputra AA. Pengaruh Kompensasi, Lingkungan Kerja dan Beban Kerja Terhadap Kepuasan Kerja Karyawan. Technomedia J. 2021;7(1):68–77.
6. Chika Nikita Cendani Rezki Winoto S, Hikmah Perkasa D. Pengaruh Beban Kerja, Stres Kerja dan Lingkungan Kerja Terhadap Kinerja Karyawan UP PKB Pulogadung. Revenue Lentera Bisnis Manaj [Internet]. 2024;2(1):1. Tersedia pada: https://lenteranusa.id/
7. Mangkunegara AAP. Manajemen Sumber Daya Manusia Perusahaan. Bandung: PT Remaja Rosdakarya; 2017.
8. Tarwaka. Keselamatan dan Kesehatan Kerja: Manajemen dan Implementasi K3 di Tempat Kerja. Surakarta: Harapan Press; 2017.
9. Amalia S. Pengaruh Beban Kerja, Lingkungan Kerja Dan Budaya Organisasi Terhadap

Kinerja Karyawan (Studi Kasus Pada Karyawan PT. PLN (Persero) Unit Induk Transmisi Jawa Bagian Tengah UPT Bekasi) [Internet]. Universitas Islam Negeri Syarif Hidayatullah Jakarta; 2023. Tersedia pada: https://repository.uinjkt.ac.id/dspace/handle/123456789/70209

10. Muslimin U, Razak N. Pengaruh Kompensasi dan Beban Kerja Terhadap Kinerja Karyawan PT. PLN (Persero) UP3 Kabupaten Pinrang. J Manaj dan Organ Rev [Internet]. 2023;5(2). Tersedia pada: https://journal.unifa.ac.id/index.php/manor/article/view/619
11. Robbins SP, Judge TA. Organizational Behavior. New York: Pearson Education; 2017.
12. Ekhsan M, Septian B. Pengaruh Stres Kerja , Konflik Kerja dan Kompensasi Terhadap Kinerja Karyawan Pendahuluan. 2021;1(1):11–8.
13. Saraswati NLGW, Sintaasih DK. Peran Kepuasan Kerja dalam Memediasi Pengaruh Stres Kerja terhadap Kinerja PNS BAKEUDA Kabupaten Tabanan. E-Jurnal Manaj [Internet]. 2021;10(9). Tersedia pada: https://ojs.unud.ac.id/index.php/manajemen/article/view/71215
14. Suarjana IWG, Pomalingo MF, Palilingan RA, Parhusip BR. Perancangan Fasilitas Kerja Ergonomi Menggunakan Data Antropometri Untuk Mengurangi Beban Fisiologis. J Ilm Tek Ind. 2022;10(2):109–17.
15. Sedarmayanti. Tata Kerja dan Produktivitas Kerja: Suatu Tinjauan dari Aspek Ergonomi atau Kaitan antara Manusia dengan Lingkungan Kerjanya. Bandung: Mandar Maju; 2017.
16. Andriani R, Agustina T. Hubungan Lingkungan Kerja Terhadap Kinerja Karyawan (Studi Kasus Pada PT Kuala Mina Persada). J Adm Bisnis [Internet]. 2020; Tersedia pada: https://jurnal.bsi.ac.id/index.php/jab/article/view/1173
17. Pratama IW, Sukarno G. Analisis Penilaian Kinerja, Reward, dan Punishment Terhadap Kinerja Pegawai Pada Badan Kepegawaian Daerah Provinsi Jawa Timur. J STEI Ekon [Internet]. 2021;30(2). Tersedia pada: https://doi.org/10.36406/jemi.v30i02.460