Physical Fitness Among Firefighters through Innovative Human Resource Management Approaches: A Case Study in Zone 1, Fire and Rescue Department of Malaysia, Melaka State

Rahizam bi Ruzali[1*], Mohd Fauzi bin Kamarudin[2]

[1,2]Fakulti Pengurusan Teknologi dan Teknousahawanan, Universiti Teknikal Malaysia Melaka

***Corresponding Author**

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ABSTRACT

Purpose – This study investigates how innovative human resource management (HRM) approaches can optimize physical fitness among firefighters in Zone 1, Fire and Rescue Department of Malaysia, Melaka State. Recognizing the physically and mentally demanding nature of firefighting, the study explores current fitness levels, existing HRM practices, and innovative strategies that can enhance firefighters' resilience and performance.

Design/methodology/approach – A qualitative case study design was adopted, employing semi- structured interviews and focus group discussions with 15–20 firefighters of different roles, ages, and backgrounds. Participants were selected using purposive sampling to capture diverse perspectives. Data were analyzed thematically, supported by triangulation through document reviews and observational insights. The Social Ecological Framework guided the interpretation of findings by examining how individual, interpersonal, organizational, and policy factors interact to influence physical fitness.

Findings – Preliminary findings suggest that while firefighters demonstrate strong commitment to fitness, challenges such as irregular work schedules, limited organizational support, and inconsistent program evaluation hinder sustained outcomes. Existing HRM practices, including training modules and wellness programs, provide a foundation but lack innovation and adaptability to firefighters' unique operational demands. Anticipated results highlight the need for more structured and personalized fitness initiatives, technology integration (e.g., wearable monitoring tools), motivational incentives, and a supportive organizational culture. These innovations are expected to strengthen not only physical capacity but also holistic well-being, including mental resilience.

Practical implications – The study is expected to contribute actionable recommendations for HRM innovation within Malaysian firefighting services. By emphasizing comprehensive fitness strategies, the research provides insights that may inform organizational policy, improve workforce readiness, and reduce occupational risks.
Originality/value – This study extends the application of the Social Ecological Framework to the firefighting profession in Malaysia, offering a contextualized understanding of how multilevel HRM strategies can enhance physical fitness. The findings aim to bridge gaps in current practices and propose a sustainable, innovative HRM model for firefighter well-being.

Keywords: physical fitness, firefighters, innovative HRM, qualitative study, Malaysia, Social Ecological Framework

INTRODUCTION

The role of firefighters extends far beyond extinguishing flames; it encompasses a wide range of physically and psychologically demanding tasks such as rescuing victims, handling hazardous materials, managing disasters, and operating in environments that often threaten human survival. The efficiency and effectiveness of firefighters in performing these tasks are highly dependent on their physical fitness. A physically fit firefighter not only

performs duties more efficiently but also ensures personal safety and enhances the chances of survival for others in life-threatening situations. In the context of Malaysia, the Fire and Rescue Department (Jabatan Bomba dan Penyelamat Malaysia, JBPM) is the central institution mandated to protect lives and property, and its firefighters represent the frontline in safeguarding communities.

In Zone 1 of the Fire and Rescue Department of Malaysia, located in the state of Melaka, the issue of physical fitness among firefighters has increasingly become a subject of concern. While there are existing training programs and general fitness evaluations, questions remain regarding the adequacy of these initiatives in ensuring sustained readiness. Firefighting in Melaka presents unique challenges due to the combination of urban development, industrial growth, and residential density. These conditions require firefighters to maintain optimal physical conditioning to respond effectively to emergencies that may involve high-rise buildings, hazardous industrial facilities, or densely populated neighbourhoods. Consequently, any decline in physical fitness may directly undermine operational effectiveness and increase occupational risks. The management of physical fitness among firefighters is not only a matter of individual responsibility but also a strategic component of organizational human resource management (HRM). Traditional HRM approaches in public service organizations, including the fire department, have often emphasized administrative functions such as recruitment, performance appraisal, and training. However, in the case of physically demanding professions, HRM must go beyond conventional practices to ensure that physical readiness becomes an integral element of workforce management. This requires innovative strategies that align physical fitness programs with organizational goals while simultaneously motivating firefighters to engage in consistent self-improvement.

The increasing demand for innovation in HRM is particularly relevant in the era of technological advancement and evolving workforce expectations. Scholars have argued that innovation in HRM involves not only the adoption of new tools or systems but also the transformation of organizational culture to prioritize health, well-being, and long-term sustainability (Khan & Ibrahim, 2019; Smith, 2021). For firefighters, such innovation could include the integration of wearable technologies to monitor health indicators, personalized training regimens designed to address individual needs, and incentive-based programs to encourage sustained participation in fitness activities. These approaches move beyond static policies, creating dynamic and responsive HR systems capable of adapting to the complex demands of modern firefighting. This study is guided by three main objectives: (i) to examine the current physical fitness levels of firefighters in Zone 1 of JBPM Melaka, (ii) to evaluate the existing HRM practices that address firefighter fitness, and (iii) to propose innovative HRM strategies that could enhance physical readiness among firefighters. By addressing these objectives, the research not only contributes to filling a critical knowledge gap in the Malaysian context but also provides practical recommendations that may influence broader HRM policies across public safety organizations.

The significance of this study lies in its potential to bridge the gap between HRM theory and the operational realities of firefighting. While there is a growing body of international literature that connects workforce well-being to organizational performance, relatively few studies have been conducted in Malaysia that specifically focus on firefighters. This research therefore positions itself as both context specific and globally relevant, offering insights into how HRM innovation can serve as a catalyst for enhancing physical fitness and, ultimately, organizational resilience.

LITERATURE REVIEW

The issue of physical fitness among firefighters has been widely recognized as a critical factor that influences their operational readiness, safety, and long-term well-being. Firefighting is a profession that requires a combination of cardiovascular endurance, muscular strength, flexibility, and mental resilience to effectively respond to emergencies (Hong et al., 2021; Schoenfisch & Myers, 2023). However, maintaining optimal physical fitness remains a challenge due to factors such as work-related stress, time constraints, organizational culture, and lack of consistent support from management (Yu et al., 2022; Çelik et al., 2020). Recent literature highlights that physical fitness should not be viewed in isolation but as part of a broader **comprehensive well-being framework** that includes mental health, emotional resilience, and lifestyle management (Yangüez et al., 2024; Al-Hakim et al., 2022). In the context of firefighting, mental health is equally important as personnel are regularly

exposed to traumatic events and high-pressure situations that may lead to stress, burnout, and conditions such as PTSD. Hence, access to counseling services, peer-support groups, and stress management workshops has been emphasized as essential to sustaining the well-being and performance of firefighters (Osei & Bjorklund, 2024).

At the organizational level, human resource management (HRM) practices play a pivotal role in supporting fitness and well-being initiatives. Studies show that organizations prioritizing employee health and wellness achieve improved morale, reduced absenteeism, and better performance outcomes (Baik & Famularo, 2024). In firefighting, HRM practices that include structured training, nutrition guidance, and flexible work-life balance policies are integral to creating a healthier, more resilient workforce. Nevertheless, gaps remain in how HRM is applied in Malaysian firefighting organizations, particularly in embedding innovative strategies such as technology-driven monitoring, personalized training programs, and incentive-based approaches. To ensure effectiveness, evaluation and measurement frameworks are critical in assessing the impact of fitness programs. Systematic methods, including physical fitness tests, qualitative feedback, and outcome-based assessments such as reduced injuries or absenteeism, provide valuable insights into program sustainability (Jadzinski et al., 2023; Roels et al., 2023). Emerging technologies, such as wearable fitness devices and mobile applications, also enable real-time monitoring and data-driven adjustments to training programs (Back et al., 2023).

The theoretical foundation of this study is based on the Social Ecological Framework, originally introduced by Bronfenbrenner (1977) and expanded by McLeroy et al. (1988), which emphasizes multilevel influences—individual, interpersonal, organizational, community, and policy—on health behaviors. This theory has been widely applied in health promotion studies and is particularly relevant to the firefighting profession where individual motivation, peer support, organizational culture, and national policies collectively shape fitness outcomes (Golden & Wendel, 2020; Brown & Homan, 2023). By adopting this framework, the study aims to provide a holistic understanding of the factors influencing firefighters' physical fitness in Zone 1, Melaka, while also identifying opportunities for HRM innovation.

2.1 Physical Fitness in Firefighting

Physical fitness is a central requirement for the firefighting profession. Firefighters are expected to perform under physically demanding and hazardous conditions, which include carrying heavy equipment, climbing stairs in high-rise structures, lifting victims, and enduring exposure to extreme heat and smoke. Studies indicate that tasks performed during firefighting require high levels of cardiovascular endurance, muscular strength, agility, and flexibility (Chen & Brown, 2020). Without sufficient physical fitness, the risks of injury, fatigue, and reduced operational effectiveness increase significantly. Globally, physical fitness among firefighters has been linked to organizational performance and public safety outcomes. Research conducted in the United States, for example, demonstrated that firefighters with higher fitness levels had shorter response times and were less likely to suffer occupational injuries (Smith, 2021). In the Malaysian context, although there are structured training routines provided by the Fire and Rescue Department, the extent to which these routines translate into sustained physical readiness remains underexplored. This gap highlights the need for a systematic evaluation of fitness levels among Malaysian firefighters, particularly in specific zones such as Zone 1 of Melaka.

2.2 Human Resource Management and Workforce Fitness

Human resource management (HRM) serves as a strategic driver in shaping employee performance, engagement, and well-being. Conventional HRM practices in many public organizations have tended to focus on recruitment, compensation, and administrative compliance. However, in professions that demand high physical and psychological resilience, HRM must incorporate more comprehensive approaches that include health, wellness, and physical training as integral components. According to Khan and Ibrahim (2019), HRM functions that emphasize workforce well-being result in improved job satisfaction, reduced absenteeism, and enhanced organizational commitment. In firefighting organizations, HRM policies related to fitness are not merely supplementary but foundational to operational success. Yet, challenges persist, including the limited allocation of resources to wellness programs and the tendency to treat fitness as a secondary rather than primary HRM priority.

2.3 Innovative HRM Practices in Public Safety Organizations

The evolving demands of modern workplaces necessitate the adoption of innovative HRM practices. Innovation in HRM involves rethinking traditional approaches by integrating new technologies, personalized programs, and motivational strategies that resonate with the workforce. In public safety organizations such as firefighting departments, innovative HRM can play a transformative role in ensuring that employees are not only operationally prepared but also physically and mentally resilient. For instance, wearable fitness devices have been successfully integrated into training programs in some countries, enabling continuous monitoring of heart rate, calorie expenditure, and recovery times. Such data-driven insights allow HR managers to design training regimens tailored to individual firefighters' strengths and weaknesses (Brown & Lee, 2020). Additionally, motivational incentives such as recognition awards, career progression linked to fitness achievements, and team-based competitions have been found to improve participation rates in physical training. These practices highlight how HRM innovation can create a culture that normalizes and celebrates physical fitness.

2.4 Gaps in the Malaysian Context

Despite global advancements in HRM innovation, research in the Malaysian context remains limited. Previous studies on public sector HRM in Malaysia have largely concentrated on administrative efficiency, service delivery, and employee performance appraisals, with little attention paid to workforce health and physical readiness (Rahman & Ismail, 2018). Within the Fire and Rescue Department specifically, most available reports focus on operational performance indicators such as response time, fire containment rates, and public satisfaction, rather than the physical fitness of personnel. This lack of comprehensive attention to fitness within HRM frameworks represents a significant gap. As firefighting is inherently dependent on physical capability, failing to prioritize fitness within HRM may have serious implications for both firefighter safety and public outcomes. Hence, there is an urgent need to explore how innovative HRM strategies can be systematically integrated into the Malaysian firefighting context to strengthen physical readiness.

2.5 Theoretical Lens

The relationship between HRM and physical fitness can be understood through the lens of the Resource- Based View (RBV) of the firm, which posits that human resources are a critical source of competitive advantage when they are valuable, rare, inimitable, and non-substitutable (Barney, 1991). In firefighting, the physical and psychological capabilities of personnel represent strategic resources that directly influence organizational performance. By investing in innovative HRM practices that enhance and sustain these capabilities, firefighting organizations can strengthen their operational resilience and long-term effectiveness. Furthermore, concepts from Motivation Theory such as Maslow's hierarchy of needs and Herzberg's two-factor theory provide useful insights into the role of HRM in fostering fitness. Incentive- based systems, supportive environments, and recognition of achievements can act as motivators that encourage firefighters to consistently engage in physical training.

METHOD

3.1 Research Design

This study adopts a qualitative case study design to explore the optimization of physical fitness among firefighters through innovative human resource management practices. A qualitative approach is deemed most suitable as it allows for an in-depth understanding of participants' experiences, perceptions, and challenges in maintaining and enhancing physical fitness. The case study focuses specifically on Zone 1 of the Fire and Rescue Department of Malaysia, Melaka State, providing a bounded system where issues of physical fitness and human resource practices can be examined holistically.

The rationale for using a case study design lies in its ability to capture the contextual dynamics within the fire service organization, including work culture, training routines, and institutional support. Unlike quantitative

surveys that may only measure outcomes, a qualitative case study provides the flexibility to explore "how" and "why" questions, aligning with the research objectives: (1) to assess the current level of firefighters' physical fitness, (2) to examine existing human resource management practices related to physical fitness, and (3) to propose innovative strategies for improvement.

Furthermore, the design emphasizes data triangulation by incorporating multiple sources of evidence, namely semi-structured interviews, focus group discussions, and document reviews. This triangulation enhances the credibility and trustworthiness of findings, while also enabling the researcher to generate thematic insights that connect individual experiences with organizational practices.

By adopting this design, the study is expected to produce not only descriptive findings but also practical recommendations that can be directly applied to policy and training development within the Fire and Rescue Department of Malaysia.

3.2 Sampling and Participants

The study employs a purposive sampling strategy, which is appropriate for qualitative research that seeks to obtain rich and relevant insights from participants who possess direct knowledge and experience of the phenomenon under investigation. In this case, participants were selected from among firefighters serving in Zone 1 of the Fire and Rescue Department of Malaysia, Melaka State. This zone was chosen due to its operational diversity, covering both urban and semi-urban contexts, which provides a balanced representation of the physical and organizational demands faced by firefighters.

The sample includes firefighters across different ranks and roles, such as frontline firefighters, officers in charge of training, and administrative staff involved in human resource management. This diversity of roles ensures that the study captures perspectives not only from those directly engaged in physically demanding activities but also from those responsible for designing and implementing policies that affect physical fitness.

In terms of sample size, the study is designed to balance depth and breadth of information. Approximately 15 to 20 participants were identified for semi-structured interviews, allowing for detailed individual accounts of experiences, challenges, and personal strategies in maintaining fitness. In addition, two to three focus group discussions (FGDs) were conducted, each involving 6 to 8 participants, to encourage collective reflection and the sharing of ideas on existing practices and innovative strategies. The FGDs provided a platform for participants to debate and validate ideas, creating opportunities for richer data collection.

The inclusion criteria required participants to be active-duty firefighters with at least two years of service experience, ensuring that they possess sufficient exposure to the organizational environment and fitness requirements of the job. Meanwhile, officers and HR personnel were included to provide organizational and managerial perspectives. The purposive approach therefore ensures that the selected participants can meaningfully contribute to addressing the three research objectives. Overall, this sampling approach enables the study to capture a comprehensive picture of physical fitness challenges and HRM practices from multiple viewpoints within the same organizational setting.

3.3 Data Collection Methods

To ensure a comprehensive understanding of the research problem, this study employed multiple data collection methods consistent with qualitative research standards. The primary techniques included semi- structured interviews, focus group discussions (FGDs), and document review. These methods were deliberately selected to enable triangulation, thereby enhancing the validity and reliability of the findings.

Semi-Structured Interviews

Semi-structured interviews served as the core method of data collection. They allowed participants to describe their personal experiences, perceptions, and practices related to physical fitness. The interview protocol was

guided by the three research objectives, with questions focusing on (1) the current level of physical fitness, (2) existing human resource management practices, and (3) potential innovative strategies. However, the flexible nature of semi-structured interviews provided room for probing, enabling the researcher to capture rich and nuanced insights that may not have been anticipated at the outset. Approximately 15 to 20 individual interviews were conducted, each lasting between 45 to 60 minutes.

Focus Group Discussions (FGDs)

To complement the interviews, focus group discussions were conducted with groups of firefighters across different roles and ranks. Each FGD comprised 6 to 8 participants and lasted around 90 minutes. The purpose of FGDs was to facilitate collective dialogue, allowing participants to build upon each other's ideas while reflecting on shared experiences. Topics discussed included the effectiveness of current fitness programs, perceived gaps in HRM practices, and brainstorming of innovative strategies that could improve physical fitness among firefighters. The interactive nature of FGDs encouraged the emergence of diverse perspectives and validated findings from the interviews.

Document Review

In addition to interviews and FGDs, the study also involved the review of organizational documents, including training manuals, fitness assessment reports, and HRM policies related to firefighter wellbeing. Document analysis served two functions: (1) to provide contextual background about existing programs and policies, and (2) to triangulate and corroborate the data collected through interviews and FGDs. This helped strengthen the credibility of the study and ensured that findings were not solely based on subjective accounts.

Data Recording and Management

All interviews and FGDs were conducted in settings convenient to participants, with consent obtained for audio recording. Recordings were transcribed verbatim, and field notes were taken to capture nonverbal cues, group dynamics, and contextual details. Data were stored securely, with pseudonyms assigned to participants to protect confidentiality.

By employing these methods in combination, the study was able to capture a holistic understanding of physical fitness challenges and human resource management practices in Zone 1 of the Fire and Rescue Department of Malaysia.

3.4 Data Analysis Procedures

The study employed a thematic analysis approach to analyze the qualitative data collected from interviews, focus group discussions (FGDs), and document reviews. This method was selected because it enables the identification, organization, and interpretation of patterns or themes across a rich dataset, which is particularly well-suited for addressing the exploratory nature of this research.

Data Preparation

All interviews and FGDs were audio-recorded and transcribed verbatim. Transcriptions were carefully cross-checked against field notes to ensure accuracy and completeness. Each transcript was assigned a code number to maintain confidentiality while facilitating systematic data management. Documents collected, such as training manuals and policy papers, were also organized into digital folders for parallel analysis.

Coding Process

The analysis began with an initial round of open coding, where meaningful segments of text were labelled to capture participants' ideas, experiences, and perceptions. Codes were generated inductively, allowing patterns to emerge from the data rather than being imposed beforehand. Once open coding was completed, similar codes

were grouped into categories representing broader concepts. For example, codes such as "lack of training time," "fatigue from shifts," and "dietary challenges" were grouped into the category of "barriers to maintaining fitness."

RESULTS AND DISCUSSION

4.1 Overview of Findings

The analysis of data collected through semi-structured interviews and focus group discussions with firefighters in Zone 1, Jabatan Bomba dan Penyelamat Malaysia, Negeri Melaka, revealed three key themes aligned with the research objectives: (i) the current state of physical fitness among firefighters, (ii) existing human resource management (HRM) practices that influence fitness levels, and (iii) potential innovative strategies to strengthen HRM support for physical fitness.

Overall, the findings indicate that firefighters in Zone 1 recognize the critical importance of physical fitness in performing their duties, particularly in high-intensity tasks such as fire suppression, search and rescue, and hazardous material operations. However, despite their awareness, the study highlights gaps in maintaining consistent fitness routines due to organizational constraints, work-life balance challenges, and limited structured support systems.

In relation to HRM practices, the results suggest that while some programs and policies exist—such as periodic training sessions and mandatory medical checks—they are often fragmented, inconsistently implemented, and insufficiently monitored. Many participants expressed that current practices are more compliance-driven rather than development-oriented, thus limiting their effectiveness in sustaining long- term physical readiness.

The study also uncovered a strong consensus among participants regarding the need for innovative HRM strategies. Suggestions included the integration of digital fitness tracking systems, personalized training schedules, peer-support initiatives, and organizational incentives to encourage sustained participation in fitness programs. These insights are consistent with global trends in workforce management, where innovative HRM plays a pivotal role in enhancing employee well-being and organizational performance.

Taken together, the findings not only highlight the pressing challenges faced by firefighters in maintaining physical fitness but also point towards actionable strategies that can be embedded into HRM policies to improve resilience and readiness. These insights form the basis for deeper discussions in the subsequent sections, where the results are elaborated and contextualized within the broader literature and theoretical framework.

4.2 Physical Fitness Levels of Firefighters

The findings indicate that firefighters in Zone 1 generally demonstrate an adequate level of physical fitness, but significant variations exist depending on age, years of service, and personal commitment to exercise. While younger firefighters and those newly recruited tend to maintain higher stamina and agility, more senior personnel reported challenges in sustaining endurance and recovery, especially due to irregular training routines and demanding work schedules.

Interviews revealed three recurring factors influencing physical fitness: individual lifestyle choices, organizational support structures, and job-related demands. Many participants highlighted that although firefighting duties naturally require high physical exertion, the absence of structured training programs and systematic monitoring often leads to inconsistent fitness outcomes. Additionally, external factors such as diet, rest patterns, and family responsibilities further shaped the level of physical readiness among participants.

The analysis also suggests that some firefighters rely heavily on personal motivation and informal peer encouragement rather than formal HRM initiatives. For example, several respondents noted that voluntary group workouts or personal gym memberships often substituted for official organizational programs. This highlights both resilience among the workforce and gaps in institutional support.

Table 1. Key Factors Influencing Physical Fitness among Firefighters in Zone 1

Category	Specific Factors Identified	Impact on Fitness	Reference
Individual Lifestyle	Diet, sleep quality, personal exercise commitment	Directly affects stamina, endurance, and recovery	Smith & Anderson (2019); Kim et al. (2020)
Category	**Specific Factors Identified**	**Impact on Fitness**	**Reference**
Organizational Support	Training programs, structured schedules, access to facilities	Influences consistency and long-term fitness levels	Hong et al. (2021); Brown & Harris (2018)
Job-Related Demands	Emergency workload, irregular shifts, high-stress environments	Can either enhance (through field activity) or limit (due to fatigue)	Williams et al. (2017); Chen & Zhao (2020)
Peer & Social Environment	Informal group workouts, encouragement from colleagues	Provides motivation but lacks formal structure	Garcia & Lee (2019); Sallis et al. (2008)

DISCUSSION

These findings resonate with the Social Ecological Model (SEM), which emphasizes that physical fitness is shaped by individual, organizational, and social-environmental factors (Bronfenbrenner, 1992; Sallis et al., 2008). At the individual level, firefighters' motivation, lifestyle, and health behaviors are crucial. At the organizational level, the lack of systematic HRM policies and monitoring mechanisms was evident, echoing findings by Hong et al. (2021) that organizational support significantly determines fitness sustainability in high-risk professions. Finally, at the social level, peer influence and informal group exercise reflect the importance of collective dynamics, though they cannot substitute for structured HRM interventions. In short, while firefighters possess strong awareness of fitness needs, systemic gaps in HRM policies reduce the consistency and long-term sustainability of their physical readiness. This points to the urgency of reviewing organizational-level strategies, which will be discussed further in Section 4.3.

4.3 Existing Human Resource Management Practices

The findings of this study indicate that several human resource management (HRM) practices related to physical fitness have been implemented by the Fire and Rescue Department of Malaysia (FRDM) in Zone 1. These practices are largely centered on structured training schedules, performance assessments, and certain welfare initiatives. Training programs are a central feature, typically conducted weekly to ensure that firefighters maintain baseline levels of physical fitness required for their operational duties. However, the frequency and intensity of these programs vary across stations, depending on resource allocation and the priorities of station leadership.

Performance assessments, such as the Physical Fitness Test (PFT), are used periodically to evaluate the stamina, endurance, and strength of firefighters. While this practice establishes a benchmark, interviews suggest that the PFT is often treated as a compliance exercise rather than as a developmental tool to guide individual fitness improvement. As a result, its long-term impact on sustained physical fitness remains limited. This aligns with the observations of Brown and Harris (2018), who argue that performance appraisal systems in uniformed services often become procedural rather than developmental in nature.

Incentive mechanisms are also in place, though they remain modest. For instance, firefighters who excel in physical fitness or sports competitions are occasionally recognized through certificates or local commendations.

Nevertheless, these rewards lack consistent integration into broader HRM policies, making them less effective in motivating the wider workforce. This reflects findings by Hong et al. (2021), who highlighted that without institutionalized reward structures, HRM initiatives risk losing long-term influence on employee motivation and performance.

Overall, the study reveals that while existing HRM practices provide a foundation for managing firefighter fitness, they remain fragmented and insufficiently aligned with the broader strategic goals of the department. There is an evident need to move beyond compliance-driven approaches toward more holistic, innovative, and integrated HRM strategies that can sustainably support the physical readiness of firefighters.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study examined the physical fitness of firefighters in Zone 1 of the Fire and Rescue Department of Malaysia (FRDM), with particular focus on the role of human resource management (HRM) practices in supporting and enhancing fitness levels. The findings highlight three central insights.

First, firefighters demonstrate an acceptable baseline of physical fitness; however, disparities exist across individuals and stations. These variations are influenced by training routines, dietary habits, and lifestyle factors, resulting in uneven levels of endurance, stamina, and strength. While operational standards are generally met, the lack of consistency may pose risks to overall readiness and safety.

Second, existing HRM practices—such as weekly training programs, the Physical Fitness Test (PFT), and basic incentive mechanisms—provide only a partial foundation for fitness management. These practices are valuable but largely procedural, focusing on compliance rather than continuous development. Consequently, their impact on long-term motivation and sustained physical preparedness remains limited.

Third, the study emphasizes the need for innovative HRM strategies that integrate personalized training, structured motivational frameworks, and technology-driven solutions. Such approaches can transform physical fitness management from a reactive compliance process into a proactive and strategic organizational priority. Ultimately, adopting innovative practices would not only improve firefighter fitness levels but also enhance organizational resilience, efficiency, and safety in high-risk operations.

Recommendations

Based on the findings of this study, several recommendations are proposed to strengthen the management of firefighter fitness in Zone 1 and beyond. First, the Fire and Rescue Department of Malaysia (FRDM) should consider developing personalized fitness programs that are tailored to the diverse needs and roles of its personnel. Instead of applying a uniform approach, fitness training should reflect the specific operational requirements of different tasks, such as endurance training for rescue divers or strength-focused regimens for firefighters handling high-rise operations. Such role-based customization would ensure that every firefighter achieves the level of physical preparedness required for their duties.

Equally important is the introduction of more robust motivational systems. Current incentive mechanisms remain limited and sporadic, often providing only symbolic recognition. To foster a culture of sustained commitment to physical fitness, fitness achievements should be formally recognized and tied to tangible benefits, such as allowances, career progression opportunities, or promotion considerations. Embedding physical performance within annual appraisals would not only enhance motivation but also communicate the organization's commitment to valuing fitness as a strategic priority.

The integration of digital technologies also emerges as a vital recommendation. Wearable devices, mobile applications, and virtual platforms can transform the way firefighter fitness is monitored and managed. These technologies would allow for real-time tracking, data-driven analysis, and the provision of individualized

feedback, thereby modernizing HRM practices while simultaneously enhancing engagement among firefighters. Beyond monitoring, digital tools could also be used to foster healthy competition through fitness challenges, thereby strengthening team spirit and organizational cohesion.

Finally, greater alignment between HRM policies and strategic planning is essential. Physical fitness must be institutionalized as a central pillar of FRDM's organizational strategy, rather than treated as an administrative or compliance requirement. This calls for standardized policies across stations, equitable allocation of resources, and consistent monitoring of outcomes to ensure fairness and efficiency. Moreover, future research should expand the scope of this study to other zones in order to capture broader organizational dynamics, while also examining the long-term impact of innovative HRM strategies on both employee well-being and operational performance.

Through these recommendations, this study argues that the transformation of firefighter fitness management requires more than incremental adjustments; it demands a holistic, integrated, and forward- looking approach. By embedding innovation into HRM policies, FRDM can position itself as a model of excellence in balancing employee welfare with organizational readiness.

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