

Enforcement Reimagined: Adaptive Approaches To Occupational Safety And Health Regulations In Malaysia

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Abstract: Malaysia's occupational safety and health (OSH) regulatory framework has undergone significant reform over the past three decades, notably with the enactment of the Occupational Safety and Health Act 1994 and its recent amendment in 2022. Despite these legislative milestones, enforcement outcomes remain inconsistent, particularly in high-risk and informal sectors. This conceptual paper examines the structural and behavioural limitations of Malaysia's predominantly deterrence-based enforcement model and argues for a paradigm shift toward an adaptive, risk-informed regulatory strategy. Grounded in deterrence theory, responsive regulation, and institutional capacity frameworks, this study proposes an Adaptive Enforcement Model (AEM) that integrates risk prioritization, digital surveillance, and stakeholder engagement into a multi-tiered enforcement continuum. The model is developed through a narrative review of peer-reviewed literature (2017–2025) and contextualized to Malaysia's evolving industrial landscape. Empirical insights from recent Malaysian studies further validate the need for targeted inspections, digital HIRARC tools, and behaviourally informed compliance mechanisms. The AEM aligns with national policy goals under the Occupational Safety and Health Master Plan 2021–2025 and reflects international frameworks such as the ILO Convention C187 and the Decent Work Agenda. It offers a scalable enforcement strategy that balances credible deterrence with consultative and capacity-building approaches. The paper concludes by outlining policy and institutional reforms necessary to operationalize adaptive enforcement and calls for future empirical validation of the model's effectiveness.

Keywords: Adaptive Enforcement Model; Deterrence; Digital Inspection; Malaysia; Occupational Safety and Health (OSH); Regulatory Enforcement; Responsive Regulation; Risk Governance

1. INTRODUCTION

Occupational Safety and Health (OSH) is a critical dimension of sustainable economic development and social well-being [1]. In Malaysia, the advancement of OSH regulation has been shaped by the country's rapid industrialization, the diversification of economic activities, and the increasing complexity of work environments [2]. The Occupational Safety and Health Act 1994 (Act 514) and its subsequent regulations laid the legislative foundation to secure the safety, health, and welfare of persons at work [3]. This legal framework has been further strengthened by sector-specific regulations, such as the Factories and Machinery Act 1967, the Use and Standards of Exposure of Chemicals Hazardous to Health Regulations 2000, and most recently, the Occupational Safety and Health (Amendment) Act 2022, which expanded coverage and increased penalties for non-compliance [4].

Despite these regulatory advancements, Malaysia continues to face persistent challenges in translating statutory obligations into consistent compliance across industries [5]. Annual reports from the Department of Occupational Safety and Health (DOSH) highlight recurrent issues: workplace accidents and fatalities remain prominent in sectors such as construction, manufacturing, and agriculture [2]; small and medium enterprises (SMEs) often lack the capacity or resources to meet regulatory standards [6]; and enforcement mechanisms are stretched thin by the sheer volume and diversity of worksites requiring oversight [7]. Moreover, technological developments, including the rise of automation and the gig economy, have introduced new hazards that traditional enforcement approaches may not adequately address [8].

Historically, OSH enforcement in Malaysia has relied heavily on deterrence-based strategies, emphasizing inspections, compound notices, stop-work orders, and prosecutions [7, 2]. While such measures remain essential to uphold accountability, over-reliance on punitive enforcement can inadvertently foster minimal

compliance attitudes rather than genuine commitment to safety culture [9]. This challenge is not unique to Malaysia: globally, scholars and practitioners have called for more adaptive regulatory approaches that combine credible deterrence with supportive, responsive, and technology-enabled strategies [10–11].

In this context, Malaysia's Occupational Safety and Health Master Plan 2021–2025 has underscored the need to modernize enforcement through risk-based targeting, stakeholder engagement, and digital transformation [4]. However, conceptual models that systematically integrate these elements remain limited in the Malaysian literature. Addressing this gap, this paper proposes an Adaptive Enforcement Model tailored to Malaysia's regulatory ecosystem. Drawing on theoretical insights from deterrence theory [7], responsive regulation [9], and institutional capacity frameworks [1], the model reimagines enforcement as a dynamic process that balances compliance incentives, capacity-building, and deterrence.

The remainder of this paper is organized as follows. Section 2 reviews the theoretical foundations underpinning regulatory enforcement. Section 3 identifies Malaysia-specific enforcement challenges. Section 4 presents the Adaptive Enforcement Model and elaborates its components. Section 5 discusses implications for practice, policy, and research. Finally, Section 6 concludes with recommendations for strengthening Malaysia's enforcement landscape to protect workers and sustain a culture of prevention.

2. LITERATURE REVIEW

A. Evolution of OSH Regulation and Enforcement in Malaysia

The enactment of the Occupational Safety and Health Act 1994 (Act 514) marked a major shift in Malaysia's regulatory framework, replacing the prescriptive Factories and Machinery Act 1967 with a more flexible, performance-based self-regulation model. This approach places the responsibility of managing workplace safety on employers through hazard identification, risk assessment, and control strategies [12].

Over time, this framework has evolved through the introduction of subsidiary regulations such as the Use and Standards of Exposure of Chemicals Hazardous to Health Regulations 2000, aimed at improving sectoral oversight in industries with significant chemical exposure risks. The Occupational Safety and Health (Amendment) Act 2022 further strengthened the legal landscape by extending the law's coverage to virtually all workplace types—including informal sectors and remote work settings—and increasing penalties to deter non-compliance [4].

Despite this progressive legislative structure, enforcement outcomes have remained mixed. A review by Naseri and Esa [12] concluded that although OSH policies are comprehensive, enforcement remains one of the weakest links in Malaysia's OSH ecosystem. Factors such as limited inspection resources, fragmented follow-up systems, and poor compliance culture, especially among SMEs, continue to hinder effective implementation.

Supporting this concern, data from the Department of Occupational Safety and Health (DOSH) show that the construction sector accounted for more than 30% of workplace fatalities in 2022, followed by manufacturing and agriculture—indicating persistent lapses in regulatory compliance despite routine inspections and awareness campaigns [13].

Meanwhile, new technological and organizational challenges are testing the limits of traditional enforcement methods. In the context of Malaysia's construction sector, Abdullah, Ismail, and Rohani [14] found that the adoption of digital technologies such as IoT sensors, drones, and e-inspection systems was limited due to infrastructural gaps and a lack of digital policy enforcement. These findings underscore the urgent need to modernize enforcement by integrating digital surveillance tools, enhancing inspectorate capacity, and promoting a culture of self-regulation anchored in real-time monitoring.

Taken together, the literature reveals a compelling case for rethinking OSH enforcement in Malaysia—not by discarding the current framework, but by augmenting it with adaptive strategies that respond to risk, sectoral needs, and technological changes. This sets the foundation for the Adaptive Enforcement Model proposed in this paper.

B. Deterrence-Based Enforcement: Strengths and Limitations

The deterrence-based approach has traditionally dominated occupational safety and health (OSH) enforcement strategies in many jurisdictions, including Malaysia. This model is grounded in classical deterrence theory, which posits that individuals or organizations will adhere to legal requirements when the expected costs of non-compliance—such as financial penalties, reputational damage, or operational

disruption—outweigh potential benefits [7]. Under this framework, regulatory authorities emphasize enforcement mechanisms such as inspections, issuance of compound notices, stop-work orders, and criminal prosecutions to dissuade violations.

In Malaysia, the Department of Occupational Safety and Health (DOSH) enforces this paradigm through targeted and routine inspections, particularly in high-risk industries like construction and manufacturing. The 2022 occupational accident statistics indicate over 52,000 inspections and more than 1,000 enforcement actions, including court proceedings and worksite closures [13]. This evidences the continued reliance on punitive tools to ensure compliance and uphold statutory obligations under the Occupational Safety and Health Act 1994 (Act 514).

However, despite the regulatory infrastructure and enforcement frequency, critical scholarship increasingly questions the efficacy of deterrence-based enforcement in achieving long-term safety outcomes. Over-reliance on punitive measures, especially in the absence of continuous monitoring and post-enforcement engagement, has been shown to encourage superficial or symbolic compliance. In such cases, duty holders may conform to legal requirements only at a minimal level—ticking boxes to avoid penalties—without embedding OSH practices into organizational culture [9, 12].

This issue is particularly pronounced among small and medium enterprises (SMEs) and informal sector operators, which often operate with constrained financial, human, and technical resources. Bluff et al. [11] and Gunningham and Sinclair [15] argue that deterrence mechanisms can unintentionally marginalize these groups, as uniform application of legal sanctions does not account for the heterogeneity of workplace capabilities. In these contexts, enforcement may not serve as a corrective mechanism but rather as a punitive force that discourages engagement with regulators.

Moreover, deterrence theory assumes that all regulated entities are rational actors, making calculated decisions based on risk-reward analysis. In reality, compliance behavior is often shaped by non-instrumental factors, including organizational values, trust in regulatory institutions, perceived fairness, and past interactions with enforcement personnel [10]. When these socio-psychological variables are overlooked, deterrence measures may produce diminishing returns. For instance, inconsistent enforcement, low prosecution rates, and absence of follow-up inspections—as reported in the Malaysian context—can weaken the perceived legitimacy and deterrent effect of regulatory actions [12].

Another major limitation of the deterrence model is its inherent inflexibility. It often fails to differentiate between deliberate violators and those who are willing to comply but face structural or contextual limitations. Uniform sanctions may therefore penalize well-intentioned organizations disproportionately, while habitual offenders may simply absorb the cost of penalties as an operational expense. This not only limits regulatory efficiency but may also cultivate adversarial relationships between inspectors and employers, undermining collaborative efforts to improve workplace safety.

In response to these criticisms, regulatory scholars advocate for hybrid or responsive regulatory models, which situate deterrence within a broader spectrum of enforcement strategies. Such models promote a graduated enforcement approach, wherein the intensity of regulatory intervention is calibrated based on the nature of non-compliance, the violator's compliance history, and sector-specific risk profiles [9, 15]. While deterrence remains an essential tool—particularly in cases involving gross negligence, repeated violations, or deliberate concealment—it must be embedded within an adaptive regulatory framework that prioritizes education, support, and participatory engagement alongside enforcement.

In summary, while the deterrence model plays a critical role in asserting legal authority and managing egregious non-compliance, it is insufficient as a standalone strategy. Malaysia's evolving OSH landscape demands a shift toward risk-informed, context-sensitive enforcement practices that recognize the diverse capacities of duty holders and the complex drivers of compliance. The limitations of deterrence thus underscore the need for responsive and adaptive enforcement models, which are explored in the subsequent sections of this paper.

C. Responsive Regulation and Graduated Enforcement

An alternative paradigm—responsive regulation—proposed by Braithwaite [9], promotes a graduated enforcement model. Regulators are encouraged to begin with supportive measures such as education, guidance, and persuasion, escalating to punitive actions only if compliance is not achieved. This approach

acknowledges the diversity of regulated entities and aligns with Malaysia's dual strategy of providing advisory services (especially to SMEs) while maintaining strong enforcement capacity.

Responsive regulation has been successfully adopted in countries such as Australia and the Netherlands, where OSH authorities combine soft and hard enforcement measures tailored to firm size, industry risk, and past behaviour [10]. Such adaptive enforcement can foster a cooperative regulatory relationship rather than one driven purely by fear of sanction.

D. Institutional Capacity and Regulatory Effectiveness

Enforcement efficacy is also determined by institutional capacity, including inspectorate size, training, operational systems, and legal authority [1]. In Malaysia, DOSH faces capacity challenges in terms of the inspector-to-workplace ratio and limited technological integration in inspection and compliance tracking [2]. A study by Walters and Wadsworth [8] highlights that weak institutional coordination and fragmented data systems reduce regulatory responsiveness and accountability.

To address this, Malaysia's Occupational Safety and Health Master Plan (OSHMP) 2021–2025 has emphasized modernizing enforcement practices through risk-based inspection, stakeholder participation, and digital transformation [4]. However, there remains a lack of empirical models detailing how these strategies can be operationalized within the local enforcement ecosystem.

E. The Need for An Adaptive Enforcement Model

Contemporary literature increasingly advocates for hybrid or adaptive enforcement models that integrate deterrence, education, risk intelligence, and digital surveillance [15, 11]. Such models recognize that enforcement is not a one-size-fits-all function but must reflect organizational behaviours, sectoral risks, and evolving workplace technologies. In Malaysia, adaptive approaches could be especially beneficial given the diversity of its industrial sectors and the emergence of new employment forms such as gig work and platform-based labour.

Despite global progress, Malaysian scholarship on adaptive enforcement remains limited, and practical guidance on how to combine enforcement strategies within the national context is underdeveloped. This paper contributes to this gap by proposing a conceptual framework for adaptive OSH enforcement in Malaysia, rooted in regulatory theory and responsive to domestic enforcement realities.

3. Enforcement Challenges in Malaysia

Malaysia's OSH regulatory framework has evolved considerably, yet enforcement remains a persistent weakness in translating legal mandates into workplace safety outcomes. The challenges can be grouped into three interrelated domains: institutional and technological limitations, compliance culture and sectoral diversity, and enforcement consistency and behavioural dynamics.

A. Institutional Capacity and Technological Limitations

One of the most fundamental barriers to effective enforcement lies in the limited institutional capacity of the Department of Occupational Safety and Health (DOSH). With thousands of workplaces under its jurisdiction, the department faces a chronic shortage of trained inspectors, particularly in high-risk industries such as construction and manufacturing. The inspector-to-workplace ratio remains well below international norms, limiting the frequency and depth of inspections [13–14].

In addition to personnel shortages, technological underutilization hampers risk-based enforcement. Abdullah et al. [14] highlight the low adoption of tools such as IoT sensors, mobile inspection apps, and centralized data systems. Without these tools, inspections are often reactive and paperwork-driven, lacking real-time hazard intelligence and predictive analytics. Infrastructure deficits and limited investment in digital capacity further constrain DOSH's ability to transition into a modern enforcement body capable of targeted, data-driven interventions.

The gap between aspiration and implementation in digital OSH enforcement reflects broader issues of technological readiness across Malaysian industries. For example, Waqar et al. [16] found that small construction firms often lack the financial and technical infrastructure to integrate digital monitoring systems. These limitations reduce the enforcement agency's visibility into workplace hazards and compromise follow-up and regulatory impact evaluation.

B. Compliance Culture, Sectoral Diversity, and Informality

The prevailing compliance culture among Malaysian employers presents another major challenge. Many small and medium enterprises (SMEs) perceive OSH compliance as a regulatory cost rather than a strategic

investment in productivity and employee wellbeing. Naseri and Esa [12] found that SMEs often lack access to trained safety personnel and show limited understanding of OSH legislation, leading to token compliance driven more by fear of penalties than commitment to prevention.

This superficial engagement is compounded by the diversity of economic sectors and work arrangements in Malaysia. The workforce spans formal industrial sectors, traditional agricultural work, and rapidly growing informal sectors such as gig and platform-based employment. Gig workers, including e-hailing and delivery riders, frequently operate outside the conventional OSH oversight. Roszi et al. [17] report high accident exposure among P-hailing workers, compounded by limited platform accountability and weak enforcement reach in the informal economy.

Sector-specific studies reinforce these observations. In manufacturing, Yeow et al. [18] conducted an empirical investigation involving 272 firms and found that enforcement significantly moderated the relationship between work conditions and injuries. However, many SMEs reported limited contact with enforcement agencies, underscoring uneven regulatory reach and engagement.

The lack of tailored enforcement strategies across these diverse sectors undermines the ability of a one-size-fits-all regulatory approach to drive meaningful compliance improvements.

C. Enforcement Consistency, Behavioural Dynamics, and Safety Climate

A third challenge involves the inconsistent application of enforcement measures across regions and industries. While some sectors benefit from regular inspections and active prosecutions, others suffer from sporadic or superficial regulatory attention. Naseri and Esa [12] note that irregular enforcement and limited follow-up after inspections reduce the perceived seriousness of regulatory bodies and dilute deterrence effects. Additionally, the effectiveness of enforcement is deeply tied to behavioural and cultural dimensions. Traditional deterrence models assume that organizations are rational actors who will comply when the costs of non-compliance rise. However, research increasingly suggests that compliance is influenced by perceived legitimacy, trust in regulatory institutions, and internal safety values [9–10].

Recent findings by Sukadarin and Zakaria [19] on Malaysia's chemical manufacturing sector highlight the importance of positive safety climate—including management commitment and employee attitudes—as a predictor of safe behaviour. Firms that integrate safety into their organizational culture exhibit higher compliance regardless of enforcement pressure. Similarly, Krishnasamy et al. [20] demonstrated that companies certified to ISO 45001 consistently reported lower accident rates, highlighting the synergistic effect of internal standards and external regulation.

These findings suggest that enforcement strategies must account for both structural violations and the socio-cultural context within organizations. Without this, enforcement risks becoming adversarial and ineffective in promoting long-term behavioural change.

4. Adaptive Enforcement Model for Malaysia

In re-envisioning occupational safety and health (OSH) enforcement in Malaysia, the proposed Adaptive Enforcement Model (AEM) incorporates key theoretical foundations—responsive regulation, institutional capacity theory, and risk governance—and translates them into actionable policy mechanisms. This model positions enforcement not solely as punitive but as an instrument of organizational learning, behaviour change, and risk management, with digital integration and stakeholder engagement at its core.

A central pillar of the AEM is data-driven risk prioritization, which refines resource deployment toward the most hazardous settings. Empirical evidence from Zermane et al. [21] demonstrates that certain construction occupations—particularly general workers and roofers—contribute disproportionately to fatal fall incidents in Malaysia. Building on this, the empirical work of Lee, Baharudin, and Abdul Rahman [22] confirms the efficacy of Hazard Identification, Risk Assessment, and Risk Control (HIRARC) in identifying organizational vulnerabilities. Their study reveals that companies systematically applying HIRARC report significantly lower risk exposure and improved safety compliance. Together, these findings underscore the need for regulators to incorporate structured risk tools and fatality data analytics into enforcement strategies.

The AEM further prioritizes digital integration, advocating for the development of a centralized OSH risk intelligence platform that merges inspection records, accident statistics, insurance data, and industry profiles. This compound intelligence system would support the creation of dynamic risk heat maps, alert mechanisms for high-risk zones, and predictive maintenance of OSH priorities. As Abdullah et al. [14] and Waqar et al. [16] suggest, digital enforcement improves precision, transparency, and adaptability. Equally, evidence from

Lee et al. [22] supports the use of digital HIRARC platforms, where submission of e-risk registers enhances regulator capacity and employer accountability.

The graduated enforcement spectrum remains foundational within the AEM. Rooted in Braithwaite's (2002) responsive regulation theory, enforcement escalates from advisory interventions to warnings, to prosecutions—reflecting both the severity of violations and the regulated entity's compliance history. This structure promotes fairness and proportionality, ensuring that regulatory sanctions are reserved for intentional or repeat non-compliance, while less egregious violations are handled through collaborative means.

Fundamentally, the AEM recognizes organizational behaviour and safety climate as critical determinants of regulatory success. Sukadarin and Zakaria [19] provide compelling evidence that a positive safety climate—marked by managerial engagement, open communication, and trust—drives proactive safety behaviours. Certification schemes, such as ISO 45001, reinforce this by embedding risk management standards into organizational culture [20]. These insights suggest that enforcement should evolve into an enabling exercise—supporting reflective learning, behavioural transformation, and peer-driven compliance.

In sum, the Adaptive Enforcement Model presents a refined strategy for Malaysian OSH regulation that leverages data analytics, digital tools, stakeholder collaboration, and behavioural insight to foster a smarter, more sustainable enforcement ecosystem. By anchoring enforcement in both structure and culture, Malaysia can build a regulatory approach that is not only responsive but strategically aligned with its diverse workforce, emerging risks, and economic realities.

A. Approach to Model Development

The Adaptive Enforcement Model was developed through an integrative conceptual synthesis. Relevant theories, including deterrence theory [7], responsive regulation [9], and institutional capacity theory [1], were critically reviewed alongside empirical findings from recent OSH literature in Malaysia. A narrative review methodology was adopted, emphasizing peer-reviewed sources from 2017–2025 indexed in Scopus or Web of Science. The model components were identified through thematic coding of recurring challenges and best practices, and were then organized into four core pillars and enabling conditions. The model was further validated through comparison with existing international frameworks and adapted to fit Malaysia's regulatory ecosystem.

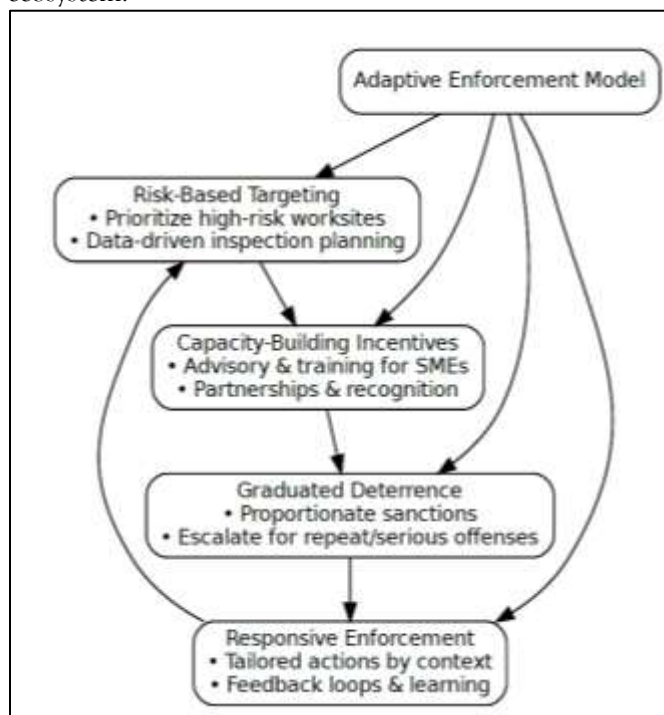


Fig. 1 Adaptive Enforcement Model (AEM)

B. Establishment of The Adaptive Enforcement Framework

The development of the Adaptive Enforcement Model (AEM) is grounded in the growing need to address enforcement limitations within Malaysia's occupational safety and health (OSH) landscape. While the country

has made notable strides in legislative development—such as through the Occupational Safety and Health (Amendment) Act 2022—empirical evidence suggests that enforcement mechanisms remain fragmented, reactive, and overly dependent on traditional deterrence strategies [13, 5]. This prompted a conceptual rethinking of enforcement, not as a static function of legal authority but as a dynamic, multi-layered process embedded within institutional capability, risk governance, and behavioural transformation.

The construction of the AEM draws upon several theoretical underpinnings. Deterrence theory, as articulated by Gunningham and Johnstone [7], explains how regulatory compliance is often shaped by the perceived likelihood and severity of punitive consequences. However, this theory alone cannot sufficiently explain variations in compliance behaviour, especially among small and medium enterprises (SMEs) or resource-constrained sectors. Therefore, the model integrates responsive regulation theory [9], which suggests that enforcement should be tiered—beginning with education and advice, and escalating only when cooperative strategies fail. This layered approach ensures proportionality, fosters regulator-regulatee trust, and reduces the adversarial nature of enforcement.

Institutional capacity theory also informs the framework by recognizing that the effectiveness of enforcement depends significantly on the capabilities of the regulatory body—particularly in terms of manpower, digital infrastructure, and strategic intelligence [1]. Malaysia's Department of Occupational Safety and Health (DOSH), despite demonstrating annual inspection volumes exceeding 50,000, often operates under resource constraints and growing sectoral complexity. To bridge this gap, the AEM emphasizes risk-based targeting through the application of empirical risk profiling. As shown by Zermane et al. [21], fall fatalities in the construction sector remain persistent, suggesting the need for focused enforcement guided by data analytics and predictive modelling.

The digitalization of enforcement processes forms a second core pillar. Supported by studies such as Abdullah et al. [14] and Lee, Baharudin, and Abdul Rahman [22], the model advocates for the incorporation of digital HIRARC (Hazard Identification, Risk Assessment and Risk Control) systems, e-inspections, and centralized OSH data platforms. These digital tools not only improve the precision of enforcement actions but also create transparency, enhance regulatory legitimacy, and facilitate proactive rather than reactive interventions.

Another critical input in the model's development is the recognition of behavioural and cultural factors. Enforcement is most effective when it aligns with an organization's internal values, safety climate, and management commitment. The work of Sukadarin and Zakaria [19] supports this, showing that organizations with stronger internal safety cultures are more likely to comply substantively rather than symbolically. The model, therefore, incorporates behavioural engagement strategies—such as consultative visits, safety leadership programs, and self-assessment schemes—as foundational to sustained compliance.

The establishment of the AEM also considers enabling and moderating conditions that affect its application. Legal flexibility provided by the OSH (Amendment) Act 2022 allows for broader coverage and higher penalties, while stakeholder collaboration—especially with industry bodies, unions, and third-party auditors—creates a supportive ecosystem for adaptive enforcement. Moreover, inspector readiness and technological literacy are viewed as crucial enablers for successful implementation.

In conclusion, the Adaptive Enforcement Model is established through an integrative process of theoretical synthesis, empirical grounding, and contextual adaptation. It moves beyond conventional compliance-checking paradigms by embracing risk intelligence, regulatory responsiveness, and behavioural change—positioning itself as a strategic tool for modernizing Malaysia's OSH enforcement system. The model is as per illustrated in Figure 1.

5. Policy And Practical Implications

The proposed Adaptive Enforcement Model (AEM) represents a significant shift in how Malaysia can approach regulatory governance within occupational safety and health (OSH). Grounded in both international best practices and domestic regulatory realities, the model offers a pathway for Malaysia to improve compliance outcomes, strengthen institutional efficiency, and foster a sustainable safety culture in alignment with its national and international commitments.

At the policy level, the model is congruent with the priorities outlined in the Occupational Safety and Health Master Plan 2021–2025 (OSHMP25), particularly under Strategic Thrusts 1 and 6, which emphasize governance enhancement, inclusive regulatory coverage, risk-based enforcement, and digital transformation

[23]. The AEM's layered enforcement strategy—ranging from advisory interventions to deterrence-based sanctions—complements the Master Plan's intent to modernize enforcement and make it more responsive to the diverse industrial landscape in Malaysia. For instance, the increasing use of digital inspection tools, predictive analytics, and centralized OSH intelligence systems proposed in the model would enable more accurate targeting of high-risk sectors, ultimately contributing to the OSHMP25's objective of reducing the accident rate to 2.13 per 1,000 workers by 2025.

From a practical enforcement standpoint, the AEM addresses the persistent inefficiencies in resource allocation and inspection consistency reported in prior assessments of Malaysia's enforcement regime [6, 14]. The model calls for a hybrid approach that blends traditional deterrence mechanisms with supportive strategies such as consultative inspections, training, and digital hazard identification, particularly for SMEs and informal sector employers. This is crucial, as studies have consistently shown that smaller enterprises struggle with compliance due to lack of awareness, technical capacity, or financial resources [13].

Incorporating behavioral dimensions into enforcement practices is also essential to fostering long-term safety compliance. Research indicates that punitive approaches often result in symbolic compliance rather than meaningful behavioral change, particularly when applied uniformly across sectors with varying risk profiles [9, 15]. By introducing proportionality, engagement, and trust-building into enforcement actions, the AEM improves the legitimacy of regulatory authorities and encourages proactive risk management. This aligns with findings from Parker [10], who emphasizes the importance of perceived fairness, trust, and dialogue in regulatory relationships.

At the global level, the model echoes international frameworks, particularly the ILO's Decent Work Agenda, which advocates for integrating OSH into broader social protection and sustainable development strategies. As Schulte et al. [24] observe, expanding the role of OSH is central to ensuring decent work, especially in an era of technological change, precarious employment, and evolving workplace risks. The AEM supports this by embedding flexibility, innovation, and social dialogue into enforcement, thereby enhancing the resilience of Malaysia's OSH system.

To operationalize the model, several strategic steps are recommended. First, legislative integration is essential, whereby relevant provisions under the Occupational Safety and Health Act 1994 (Act 514) and the newly enforced Occupational Safety and Health (Amendment) Act 2022 are amended to formalize risk-based and adaptive enforcement protocols. Parallel to this, inspector capacity building should be prioritized through the development of comprehensive training modules that encompass behavioural regulation, the application of digital tools, and industry-specific hazard knowledge. The establishment of a centralized, real-time enforcement intelligence platform is also critical to support inspection planning, compliance tracking, and predictive risk analytics. In addition, incentivizing compliance can be achieved through the introduction of recognition schemes or reduced inspection burdens for employers that demonstrate voluntary compliance via ISO 45001 certification, effective HIRARC implementation, and strong safety leadership programs. Collaborative governance further strengthens the model by fostering partnerships between DOSH, employer federations, unions, and academic institutions to co-develop sectoral guidelines, conduct outreach initiatives, and share compliance innovations. In conclusion, the Adaptive Enforcement Model is not merely a theoretical proposition but a pragmatic and policy-aligned strategy. It reflects a maturation of Malaysia's OSH governance ecosystem—one that balances authority with adaptability, deterrence with education, and compliance with capacity building. If systematically adopted, the model has the potential to significantly enhance Malaysia's ability to achieve the goals of OSHMP25 and contribute meaningfully to global commitments such as the ILO Convention C187 on the Promotional Framework for Occupational Safety and Health.

6. CONCLUSIONS

The enforcement of occupational safety and health (OSH) regulations in Malaysia stands at a critical juncture. The Occupational Safety and Health Act 1994, strengthened by the 2022 amendment, provides a solid legislative base, yet enforcement outcomes remain uneven, particularly in high-risk and underserved sectors. This paper highlights the limitations of a predominantly deterrence-based approach and advances the Adaptive Enforcement Model (AEM) as a more dynamic alternative. The AEM integrates risk-based targeting, stakeholder engagement, digital innovation, and capacity building, balancing deterrence with responsive and

consultative strategies. It aligns with the Occupational Safety and Health Master Plan 2021–2025 and supports global commitments such as the ILO Decent Work Agenda and Convention C187.

The framework contributes to policy and scholarly discourse by offering a structured yet adaptable model suited to Malaysia's evolving industrial and socio-economic context, while also providing a basis for future empirical validation. Strengthening OSH enforcement is not only about legal compliance but also about human dignity, sustainable economic growth, and national development. As Malaysia continues to industrialize and diversify its labour market, it must embrace enforcement strategies that are firm, fair, and forward-looking. The Adaptive Enforcement Model represents a timely and necessary step in this direction.

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