

Mohd Saiful Izwaan
Saadon
Dina Azleema Mohamed
Nor¹
Herna Ziana Ismail
Mohd Rizal Ismail
Wan Mariam
Wan Abdullah

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RESORTS AND RISKS: ENHANCING WORKER SAFETY AND HEALTH FOR HIGH-TOURISM AREAS IN PAHANG, MALAYSIA

Abstract: *This study aims to evaluate occupational hazard profiles and identify priority risk areas among workers across four operational departments namely Housekeeping, Kitchen, Engineering and Maintenance, and Front Office at two coastal resorts in Pahang, Malaysia. Despite existing legislative frameworks, enforcement and compliance among resort operators are still lacking. Using the HIRARC methodology, workplace hazards were identified and evaluated through direct field observations at both study sites. Results revealed physical, chemical, biological, mechanical, and psychosocial hazards across all departments. Kitchen operations recorded highest concentration of severe risks, caused by cut injuries, thermal burns, and machinery-related hazards. Housekeeping workers faced ergonomic strain and chemical exposure risks, while Engineering and Maintenance personnel were exposed to fall and electrical hazards. Both resorts share similar high-risk occupational conditions regardless of size and brand. Risk management strategies, enhanced safety training, and a proactive safety culture are essential to protect worker well-being and support coastal tourism development.*

Keywords: *Occupational Safety and Health, Hospitality Workers, HIRARC, Hazard Identification, Coastal Tourism*

1. Introduction

The tourism and hospitality industry is a fast and expanding economic sectors globally, generating a lot of employment opportunities across accommodation, food services, recreation, and destination management. In Malaysia, coastal resort destinations have become particularly significant drivers of regional economic development, with coastal beach destinations in Pahang recording sustained growth in visitor arrivals in the post-pandemic recovery period. This expansion cause high stress on resort workers, who perform physically intensive,

chemically exposed, and psychosocially demanding tasks across housekeeping, kitchen, engineering, maintenance, and front office departments. As visitor numbers grow, resort worker safety and health has become essential to sustainable tourism but it is poorly addressed in both research and policy in Malaysia (DOSH, 2023; Marbawi et al., 2023).

Worker safety and health in hospitality and tourism sectors facing different types of hazards including physical, chemical, biological, ergonomic, and psychosocial hazard categories. Hotel housekeepers, kitchen staff, and maintenance workers face higher occupational risks than most other

workers, but their salary is lower and less secured than other departments workers (Abdullah et al., 2025; Ciarlante et al., 2024). Poor OSH governance does not only harm workers but also raises operational costs, increases staff turnover, lowers service quality, and damages the reputation of tourism destinations. In Malaysia, despite the legislative framework provided by the Occupational Safety and Health Act 1994 (OSHA 1994) and its 2022 amendment, the enforcement is still low, and resort operators mostly those outside major international brand networks seldom comply with OSH regulations (Akter et al., 2025; DOSH, 2023)

1.1 Occupational Hazards among Resort and Coastal Tourism Workers

Resort and coastal tourism workers are regularly exposed to hazards from the physical environment, operational processes, and human interaction within hospitality settings. The scope of occupational risk in the tourism sector extends beyond conventional resorts, as workers in industrial tourism and high-altitude destinations face additional physical risks that comes from extreme environmental conditions, constrained access to emergency services, and underdeveloped safety infrastructure (Pavlaković Farrell, 2024)

Slips and falls on wet surfaces, burns in commercial kitchens, falls from height during maintenance, and muscle strain from repetitive manual work are the most common physical hazards faced by hospitality workers (Abdullahi et al., 2021; Shapoval et al., 2022). In kitchen environments specifically, laceration risks from sharp-edged equipment, thermal hazards from high-temperature cooking apparatus, and entanglement risks from powered processing machinery have been identified as critical sources of acute traumatic injury (Kini et al., 2025). Shapoval et al., (2022) found that hotel housekeepers reported the highest frequency of musculoskeletal pain, chemical burns, and stress-related health conditions among all

hospitality worker categories, driven by ergonomically deficient room configurations, inadequate cleaning equipment, and chronic time pressure.

Chemical hazard exposure represents a further significant risk category in resort operations. Housekeeping workers handle concentrated cleaning and disinfection agents in enclosed spaces, frequently without adequate respiratory protection or access to safety data sheets at the point of use (Shapoval et al., 2022). Engineering and maintenance personnel are exposed to pool treatment chemicals, including concentrated chlorine compounds, during pool maintenance activities. Housekeeping workers handle concentrated cleaning and disinfection agents in enclosed spaces, usually without proper respiratory protection or access to safety data sheets at the point of use (Shapoval et al., 2022).

1.2 HIRARC as a Risk Management Framework in Tourism and Hospitality Settings

Hazard Identification, Risk Assessment, and Risk Control (HIRARC) has widely adopted systematic framework for managing occupational hazards across Malaysian industries. This approach enables organisations to generate risk profiles that can directly inform safety resource allocation and regulatory compliance planning (Priyanka & Basaria, 2023).

Despite its widespread adoption in manufacturing, construction, healthcare, and fisheries sectors, empirical applications of HIRARC within tourism and hospitality workplaces is still limited in the published literature. Existing hospitality OSH studies have largely relied on survey-based assessments of safety culture, worker self-reported injury data, or qualitative investigations of management practices, rather than systematic observational hazard assessments grounded in a structured risk quantification framework.

Mahaboon et al. (2022) demonstrated the effectiveness of systematic hazard assessment in achieving statistically significant reductions in occupational risk levels among Thai food-sector workers, identifying 52 distinct workplace hazards through structured walkthrough assessment, a methodological approach like the HIRARC procedure applied in this study.

Although Malaysian resorts operate across multiple departments and are exposed to a wide range of occupational hazards, empirical HIRARC assessments in these workplaces is still limited. A further gap concerns the geographic focus of existing research. Although global awareness of hospitality worker safety has grown, particularly in the aftermath of the COVID-19 pandemic, the research base remains concentrated in developed economy contexts with established regulatory infrastructures and mature safety cultures (Sharior et al., 2023). Empirical evidence from Southeast Asian resort destinations including Malaysia, where the regulatory framework is comparatively recent and enforcement capacity is uneven, remains insufficient despite the region's growing tourism sector and the specific vulnerability of its coastal resort workforce (DOSH, 2023; Marbawi et al., 2023). This study responds directly to the dual gap in geographic coverage and methodological approach.

Therefore, this study aims to determine the current level of occupational safety and health risks among workers across key operational departments namely Housekeeping, Kitchen, and Other Departments (Engineering, Maintenance, and Front Office) in resort establishments at Northern Pahang and Eastern Pahang; and second, to identify specific workplace hazards and evaluate the adequacy of existing risk control measures using the HIRARC methodology.

The findings are intended to contribute empirical evidence to the limited body of literature on hospitality OSH in Southeast Asian coastal resort contexts and to provide actionable, evidence-based recommendations

for resort management, safety practitioners, and regulatory authorities seeking to improve occupational safety standards in Malaysian coastal tourism destinations.

2. Methodology

This research was conducted on two (2) coastal resorts in Pahang, Malaysia using a descriptive quantitative approach. This approach aims to present an empirical and measurable picture of the level of OHS risk in hospitality sector based on numerical data from field observations. Quantitative data were obtained through the application of the HIRARC technique as an instrument in the risk assessment process. Methodologically, the integration of the quantitative approach with the observation technique was carried out through the process of converting the results of potential hazard identification into numerical scores based on likelihood and severity parameters, which were then calculated using a risk matrix to produce a risk level value.

2.1. Study Site

Site selection was guided by purposive sampling, where locations were chosen according to predetermined criteria that aligned with the scope and objectives of the study. Two (2) beach resorts were selected as study sites based on their ability to represent the coastal tourism sector in Pahang, Malaysia. The resorts were chosen because of their multi-operational structure and the management willingness to assist the risk assessment activities. The selected sites are summarised in Table 1.

Resort A is a mid-range beach resort located along the northern coastal belt of Pahang, within an established beach tourism destination known for its natural coastal environment and recreational attractions. Resort B is a full-service resort located at an urban coastal destination on the eastern coast of Pahang, near the state capital. Within the hospitality industry, obtaining institutional

access for risk assessment research is quite challenging, as management bodies are often cautious about disclosures that may affect their organisation's reputation. The willingness of both Resort A and Resort B to cooperate with the research process was treated as a key selection criterion alongside operational and geographical considerations.

Table 1. Summary of Study Sites

Study Site	Location	Resort Property	Departments Assessed
Coastal Beach Destination	Northern Pahang	Resort A	Housekeeping, Kitchen, Engineering & Maintenance, Front Office
Urban Coastal Destination	Eastern Pahang	Resort B	Housekeeping, Kitchen, Engineering & Maintenance, Front Office

Resort B is a full-service resort offering a comprehensive range of facilities including food and beverage outlets, swimming pools, conference and event spaces, and beachfront recreational areas. The selection of these two places as study sites in Pahang area, will provide valuable assessment of occupational risk profiles across various resort environments.

2.2. Scope of Assessment: Departments

Data collection targeted workers across three main operational department groupings at each study site. The first is the Housekeeping Department. The department is responsible for guest room cleaning, linen management, bathroom sanitation, and public area maintenance. The second is Kitchen Department. This department is responsible for food preparation, cooking operations, and kitchen sanitation. Lastly is Other Departments such as Engineering and Maintenance (building systems, pool maintenance) and Front Office (reception, concierge, and guest services).

These three departmental groupings were selected to represent the full perspectives of operational hazard environments found in resorts, comprising indoor and outdoor work, manual and machine-assisted tasks, chemical and biological exposures, and customer-facing psychosocial demands.

2.3 HIRARC Methodology

This study employed the Hazard Identification, Risk Assessment, and Risk Control (HIRARC) methodology as main analytical framework, following the procedures established in the Department of Occupational Safety and Health (DOSH) Malaysia's. HIRARC is the standard risk management tool adopted by DOSH Malaysia for systematic workplace hazard evaluation and is mandated under the Occupational Safety and Health Act 1994 (Act 514). It comprises three sequential stages namely Hazard Identification, Risk Assessment and Risk Control.

Hazard identification was conducted through direct workplace observation during inspections of each working area at both study sites. The observation was facilitate by supervisors to identify routine and non-routine tasks. Some hazards may not be visible during a standard observation period. All identified hazards were recorded and categorised by type into five standard classes in accordance with DOSH guidelines, as presented in Table 2.

Risk assessment was conducted using the DOSH Malaysia HIRARC risk matrix, in which the composite Risk Rating (R) is derived from the formula $R = P \times S$, where Probability (P) is scored from 1 (Rare) to 5 (Almost Certain) and Severity (S) from 1 (Negligible) to 5 (Catastrophic). Risk scores are classified into three categories: Low (1–6), routine monitoring required; Medium (7–14), additional control measures within a certain timeframe needed; and High (15–25), required immediate intervention before proceed with work activities (DOSH, 2008). If risk ratings fell at the boundary between

two classifications, assessor judgement was applied in consultation with the relevant departmental supervisor, considering contextual factors such as the frequency of task performance, the number of workers exposed, and the availability of existing control measures.

Table 2. Hazard Categories and Site-Specific Examples

Hazard Category	Examples Identified at Study Sites
Physical	Slips and falls on wet floors, ergonomic strain from manual handling, falls from height during maintenance, heat stress from outdoor work, noise from kitchen equipment
Chemical	Skin and respiratory exposure to cleaning agents and sanitisers (Housekeeping), pool treatment chemicals including chlorine (Engineering), concentrated detergents (Kitchen)
Biological	Contact with blood and bodily fluids from soiled guest linen and room waste (Housekeeping), food contamination risks (Kitchen)
Psychosocial	Work-related stress from irregular shift patterns and high service demands (Housekeeping, Front Office), customer-facing pressures
Mechanical	Laceration and entanglement risks from kitchen machinery including meat grinders, slicers, and commercial mixers; powered maintenance equipment

2.4 Data Analysis

Collected HIRARC data were analysed to determine the risk levels across departments and study sites. Comparative analysis across the study sites was carried out to establish whether the risk profiles were site-specific or characteristic of resort operations in general.

2.5 Ethical Considerations

Workplace access for HIRARC observations and walkthroughs was granted with the knowledge and cooperation of resort management at both study sites. Departmental supervisors were informed of the study objectives and the non-intrusive nature of the walkthrough assessment. No personally identifiable worker information was collected at any stage of the study.

The risk assessment process was conducted in accordance with the standard DOSH HIRARC procedural framework, which does not require individual worker consent for observational hazard assessments conducted as part of an organisational safety evaluation. To protect the interests and reputation of participating organisations, the identities, exact locations, and specific identifying characteristics of both study sites have been withheld throughout this manuscript in accordance with research ethics principles.

3. Results

3.1 Resort A: Northern Coastal Destination, Pahang

Table 3 presents the HIRARC results for the Housekeeping Department at Resort A. Two (2) High-risk conditions were identified. The first risk is ergonomic hazards from room cleaning and bed making activities. These conditions are consistent with the musculoskeletal disorder risk profiles identified by (Yusof et al., 2021; Yasin et al., 2024) among labour-intensive Malaysian hospitality workers.

The second risk is chemical hazards from concentrated cleaning products. Chemical hazard exposure during cleaning and sanitising activities was rated equally High (P=4, S=3), as housekeeping workers were observed applying concentrated spray disinfectants in enclosed bathroom spaces without respiratory protection. Site observations found that Safety Data Sheets

(SDS) were not displayed and respiratory protection was not consistently used by the workers. SDS are an important tool to communicate any potential hazard from

chemicals and ensuring safe handling practices in workplaces, including housekeeping operations (Joshi et al., 2024).

Table 3. HIRARC Summary for Housekeeping Department Resort A

Dept/Activity	Hazard Identified	Hazard Type	Prob.	Sev.	Risk	Recommended Control
Room Cleaning	Prolonged awkward postures; bed-making, vacuuming	Physical/ Ergonomic	4	4	High	Ergonomic training; lightweight tools; rest breaks
Chemical Handling	Skin/respiratory exposure to cleaning agents	Chemical	4	3	High	Gloves, masks; SDS posting; chemical substitution
Linen Transport	Heavy cart handling; wet floor slips	Physical	3	3	Medium	Trolley brakes; anti-slip matting; manual handling training
Waste Disposal	Sharps injury; biological contamination	Biological	2	4	Medium	Puncture-resistant gloves; sharps containers; Hep B vaccine
Shift Work	Psychosocial stress; irregular hours	Psychosocial	3	2	Low	Adequate staffing; EAP programme; transparent scheduling

Table 4 shows the HIRARC findings for the Kitchen Department at Resort A. From four work activities assessed, three were identified as having a High level of risk. Among these hazards, machinery-related activities

recorded the highest Severity rating (5 – Catastrophic), shows the possibility of serious injuries such as cuts, crushing injuries, or even severe injuries when using powered equipment.

Table 4. HIRARC Summary for Kitchen Department, Resort A

Dept/Activity	Hazard Identified	Hazard Type	Prob.	Sev.	Risk	Recommended Control
Food Preparation	Laceration from knives and processors	Mechanical	4	4	High	Cut-resistant gloves; knife training; blade guards
Cooking	Burns/scalds from hot surfaces and steam	Physical/ Thermal	4	4	High	Heat-resistant gloves; splash guards; safe distance rules
Machinery Operation	Entanglement in meat grinder and mixer	Mechanical	3	5	High	Machine guarding; lockout/tagout (LOTO); authorisation list
Kitchen Sanitation	Skin/respiratory exposure to detergents	Chemical	3	3	Medium	Gloves; ventilation; dilution protocols; SDS training

The assessment also found that a formal lockout/tagout (LOTO) procedure was not available, shows weakness in the safety control measures. According to the Factories and Machinery Act 1967, LOTO procedures should be implemented for relevant types of machinery so that the equipment is properly isolated before any maintenance or cleaning work is conducted.

Regular and comprehensive training sessions should be conducted to ensure all kitchen department workers are familiar with LOTO procedures and the importance of compliance to avoid accidents (Malysa et al., 2026).

Table 5 shows the HIRARC findings for the Engineering, Maintenance, and Front Office departments at Resort A. The work activity involving working at height in the Engineering and Maintenance sections was classified as High risk. This was mainly because the permit-to-work system for working at height was not always implemented consistently, and lack of fall protection equipment. Besides that, the handling of pool chemicals and landscape maintenance activities were assessed as Medium risk. Although these activities were not too critical, the findings suggest that better planning and more systematic control measures are still needed to reduce the possibility of accidents at the workplace.

Table 5. HIRARC Summary for Other Departments, Resort A

Dept/Activity	Hazard Identified	Hazard Type	Prob.	Sev.	Risk	Recommended Control
Engineering / Maintenance	Falls from height during facility maintenance	Physical	3	5	High	Fall arrest systems, working-at-height permit, scaffold checks
Pool Maintenance	Chemical exposure from pool treatment agents (Cl)	Chemical	3	3	Medium	Respiratory protection, chemical handling training, ventilation
Grounds Maintenance	Heat stress; insect/snake encounters outdoors	Physical/ Biological	3	3	Medium	Hydration protocols, PPE, first aid for insects bites
Front Office	Prolonged static posture; psychosocial stress	Ergonomic/ Psychosocial	4	2	Low	Ergonomic workstations, micro-breaks, stress management support

3.1 Resort B: Urban Coastal Destination, Pahang

Table 6 presents the HIRARC findings for the Housekeeping Department at Resort B. The assessment found that ergonomic hazards connected to cleaning guest rooms were categorized as High risk. This is due to repetition of movements and manual handling tasks. The most critical hazard was making beds activities where the highest risk were detected (Yusof et al., 2021) Another

important finding at this site was the pool area maintenance activity, which was rated as Medium risk. During the assessment, it was observed that lifeguard was not available at all time, creating a potential safety concern for both guests and employees. Although the overall risk level was assessed as Medium, this issue should be highlighted to improve the safety level and prevent any incidents. While cleaning the toilets, chemical exposure (Medium) and contact with soiled linen and guest waste risk assessment is low.

Table 6. HIRARC Summary for Housekeeping Department, Resort B

Dept/Activity	Hazard Identified	Hazard Type	Prob.	Sev.	Risk	Recommended Control
Room Cleaning	Back pains	Physical/ Ergonomic	4	4	High	Ergonomic tools, workload limits, stretching protocols
Chemical Handling	Exposure to concentrated cleaning chemicals	Chemical	3	3	Medium	Gloves, masks, chemical inventory control
Pool Area Maintenance	Slip/fall on wet floor, drowning risk	Physical	3	3	Medium	Anti-slip surfaces, safety signage, lifeguard rotation
Biological Exposure	Contact with blood/fluids in guest room cleaning	Biological	2	4	Medium	Universal precautions, PPE

Table 7 presents Kitchen Department findings at Resort B. Three (3) High-risk findings were identified. The large size of the resort kitchen means that workers are exposed more often and for a longer time to different hazards, especially heat, machinery, and sharp tools (Prah et al., 2025; Saad et al., 2024). Because the kitchen operates at a high volume every day, the chance of accidents can become higher if the safety measures are

not fully followed. The assessment found that work activities involving the walk-in cold room (P=3, S=3, Medium) and cleaning of machinery before all energy sources had been fully shut down (P=3, S=4, Medium) need better administrative controls. These improvements can be implemented using the existing workplace resources and do not involve major additional cost.

Table 7. HIRARC Summary for Kitchen Department, Resort B

Dept/Activity	Hazard Identified	Hazard Type	Prob.	Sev.	Risk	Recommended Control
Food Preparation	Cut from knives and kitchen machines	Mechanical	4	4	High	Cut-resistant gloves; staff training; blade management
High-Volume Cooking	Burns/scalds; large vessels and open flames	Physical/ Thermal	4	4	High	Thermal PPE; safe distance rules; burn first-aid protocol
Walk-In Cold Room	Cold stress; slip hazard from condensation	Physical	3	3	Medium	Thermal clothing; anti-slip footwear; limited cold exposure
Machinery Cleaning	Entanglement during cleaning of powered equipment	Mechanical	3	5	High	Mandatory LOTO procedure; signage; authorised operator list

Table 8 shows other departments findings at Resort B. Two (2) High-risk findings were detected. The first is electrical hazards in Engineering and Maintenance department. The resort is very big and workers have to

walk from building to building causing them to face with heat stress due to working in long shifts without proper and suitable schedule to monitor their heat exposure.

Table 8. HIRARC Summary for Other Departments, Resort B

Dept/Activity	Hazard Identified	Hazard Type	Prob.	Sev.	Risk	Recommended Control
Engineering/Maintenance	Electrical hazard during infrastructure repair	Physical/Electrical	3	5	High	Electrical competency certificate, LOTO for electrical systems
Grounds/Landscape	Heat stress from long outdoor work	Physical	4	3	High	Hydration stations, shade rest; heat monitoring
Front Office	Repetitive strain; psychosocial stress	Ergonomic/Psychosocial	3	2	Medium	Ergonomic assessment, breaks between shift, evacuation availability
Security	Physical harm risk from difficult guest incidents	Psychosocial/Physical	2	4	Medium	Training to control crowd, incident reporting, security protocols

3.3 Comparative Analysis

Referring to Figure 1, cross-department summary was presented in a heat-map table. The Kitchen Department showed the most consistent severe risk profile at both sites. This shows that hazards in resort's kitchen come from its overall setup, not from just one particular spot. Resort B site showed a higher risk profile in Other Departments due to

greater operational scale and infrastructure complexity. Chemical hazards were found in every department at both locations. This proof that there is the need for a resort-wide chemical management policy. The policy should cover how chemicals are bought, stored, and labeled. It should also include safety data sheets and proper protective equipment (PPE) for workers.

Department	Resort A			Resort B		
	High	Medium	Low	High	Medium	Low
Housekeeping	2	2	1	1	3	—
Kitchen	3	1	—	3	1	—
Other departments	1	2	1	2	2	—

■ High risk
 ■ Medium risk
 ■ Low risk
 — = none recorded

Figure 1. Comparative risk level summary for Resort A and Resort B

Three clear patterns can be seen from the data. First, the Kitchen Department had the highest number of High-risk findings at both resorts. This was found at Resort A and Resort B. This shows that the kitchen is the most dangerous area in resort operations, no matter what is the size or brand of the resort. Burns, cuts, and machine-related injuries are the

most common workplace hazards in food service. This is supported by previous studies in the hospitality industry (Sanni-Anibire et al., 2020).

Second, Resort B's Other Departments had more high-risk findings than Resort A. This was mainly because Resort B is larger and has more complex facilities. It was not because of

poor safety management. Third, Housekeeping Department showed different risk levels at both resorts. Resort A had more high-risk findings than Resort B. However, both resorts shared the same main risk which is physical strain from room cleaning. Both resorts also had chemical and biological hazards that need better control arrangement. Importantly, no department at either resort was found to have only low-risk findings. This means that safety improvements are needed across all departments, not just the most dangerous. Shapoval et al., (2022) confirmed that hotel housekeepers are easy to expose to a combination of hazards like ergonomic, chemical, and biological hazards, supporting the need for comprehensive safety improvements across all housekeeping operations.

5. Conclusion

This study evaluated occupational safety and health conditions across four operational departments namely Housekeeping, Kitchen, Engineering and Maintenance, and Front Office at two (2) coastal resort establishments situated along the Pahang coastline, Malaysia. The aim is to identify workplace hazards and evaluating the adequacy of existing risk control measures through the application of the HIRARC methodology.

The method used were site observations and HIRARC methodology. The findings confirm that occupational hazards in Malaysian coastal resort environments were present across all departments regardless of resort size or brand affiliation. Kitchen operations recorded the highest concentration of High-risk findings at both sites, driven by cut injuries, thermal burns, and machinery-related hazards due to the fact that there were no lockout/tagout procedures. Housekeeping departments at both resorts demonstrated consistent ergonomic and chemical exposure risks, while Engineering and Maintenance personnel faced High-risk conditions associated with falls from height, electrical hazards, and heat stress from prolonged

outdoor work in tropical conditions.

The presence of high-risk hazards at both sites indicates that occupational risks in resort operations are systemic, not site-specific. Chemical hazards were identified across all departments at both sites, shows the need for a resort-wide chemical management policy that includes procurement, storage, labelling, safety data sheet accessibility, and personal protective equipment (PPE) training. During observations, lifeguard coverage were not all the time, respiratory protection during chemical handling were poor, and permit-to-work procedures were lacking at both sites.

These findings add to the limited body of occupational safety research in tourism and hospitality settings, demonstrating that structured HIRARC assessments are practical and effective in complex, multi-department resort environments. The study addresses two gaps which is the lack of systematic risk assessment studies in hospitality workplaces, and the shortage of OSH evidence from Southeast Asian coastal resorts.

The department-level risk profiles generated through direct field observation offer a practical model that resort operators, safety practitioners, and regulators can apply to improve OSH standards across Malaysian coastal tourism destinations. From a practical standpoint, the findings support the need of risk management strategies across Malaysian resort operations. Resorts should include the implementation of mandatory lockout/tagout procedures for kitchen and maintenance equipment, ergonomic redesign of high-intensity housekeeping tasks, standard chemical handling training and PPE training. Besides that, technological advancements, particularly artificial intelligence (AI) based safety monitoring and wearable augmented reality applications, have demonstrated potential in enhancing occupational safety outcomes. Any possible hazard can be detected early and facilitating more efficient task management in workplace environments (Praveena et al., 2025) At organisational level, resort management should invest in

developing a good safety culture that prioritise occupational safety.

This study is subject to several limitations that should be acknowledged. The assessment was conducted at two resort sites within a single tourism region in Pahang, and the findings may not be fully generalisable to resort environments in other Malaysian states or to different categories of tourism accommodation. Additionally, hazard identification was conducted through direct observation during scheduled site visits, which may not have captured all non-routine or seasonal hazard conditions present at each site. Future research should extend the HIRARC assessment framework to a larger sample of resort properties across multiple

tourism regions in Malaysia, and should incorporate worker perception surveys and incident reporting data. Longitudinal assessments examining changes in risk levels following the implementation of recommended control measures would strengthen OSH improvement in Malaysian coastal tourism destinations.

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**Mohd Saiful Izwaan
Saadon**

Faculty of Maritime Studies,
Malaysian Maritime Logistic
and Transport Centre,
Terengganu, Malaysia
saiful.izwaan@umt.edu.my
ORCID 0000-0001-9328-3828

Mohd Rizal Ismail

Faculty of Maritime Studies,
Terengganu, Malaysia
irizal@umt.edu.my
ORCID 000-0001-5825-620X

**Dina Azleema Mohamed
Nor**

Faculty of Ocean Engineering
Technology,
Terengganu, Malaysia
dina.azleema@umt.edu.my
ORCID 0000-0002-1280-9929

**Wan Mariam Wan
Abdullah**

Faculty of Maritime Studies,
Terengganu, Malaysia
wmariam@umt.edu.my
ORCID 0000-0002-5145-3162

Herna Ziana Ismail

Faculty of Maritime Studies,
Terengganu, Malaysia
herna@gmail.com

