

Development of a Digital First Aid Kit Inventory & First Aiders Management Checklist – ‘FirstAidPro’ with Microsoft Tools

Ishwaran Govindasamy¹, Ezrin Hani Sukadarin^{1*}, Mohd Akhir Ahmad¹,
Norhasrul Mohamad@Sulaiman², Nurul Nadia Abdul Rahim²

¹ Department of Chemical Engineering Technology, Faculty of Engineering Technology,
Universiti Tun Hussein Onn Malaysia, Hab Pendidikan Tinggi Pagoh,
KM1, Jalan Panchor, 84600, Muar, Johor, Malaysia

² Corporate Quality Health Safety Security & Environment (CQHSSE),
Malaysian Marine & Heavy Engineering Sdn. Bhd (MMHE) West Yard,
PLO 3, Jalan Pekeliling, P.O.BOX 7, 81700 Pasir Gudang,
Johor, Malaysia.

*Corresponding Author: akhir@uthm.edu.my
DOI: <https://doi.org/10.30880/peat.2026.07.01.085>

Article Info

Received: 12 January 2026
Accepted: 20 February 2026
Available online: 25 May 2026

Keywords

First Aid Management,
digitalisation, Microsoft 365,
power automate, occupational
safety and health, industrial
safety.

Abstract

High-risk industrial workplaces require continuous first aid readiness, which depends on regular inspection of first aid boxes, timely replenishment of supplies, and certified competent first aiders with valid Basic Occupational First Aid (BOFA) certification. At Malaysian Marine and Heavy Engineering (MMHE) West Yard, first aid management was previously handled through paper checklists and spreadsheet registers, limiting real-time visibility, delaying replenishment, and increasing the likelihood of missed BOFA renewal dates. To improve control and traceability, this study developed *FirstAidPro* system, a digital first aid kit inventory and first aider management system built entirely within the Microsoft 365 platform. Development was conducted in three phases: (1) creation of a First Aider Management checklist and an automated BOFA expiry reminder workflow using Power Automate; (2) digitalisation of the monthly First Aid Box checklist using Microsoft Forms integrated with Power Automate, supported by Microsoft Teams inspection reminders; and (3) pilot implementation and evaluation involving 40 first aiders using a 12-item Likert-scale questionnaire. The user feedback was analysed descriptively using positive agreement total of (agree and strongly agree) across four constructs, yielding 84% for usability, 86% for functionality and reminders, 78% for adaptability to the MHB environment, and 82% for implementation potential. Although the predefined $\geq 90\%$ satisfaction threshold was not achieved, results suggest that *FirstAidPro* system improves record traceability, reduces reliance on manual follow-up, and supports compliance with first aid inventory and competency requirements. Wider implementation is

recommended, supported by structured user training, formal integration into standard operating procedures, and enhanced analytics to guide continuous improvement and scaling within MMHE and comparable high-risk organisations.

1. Introduction

Shipyards, fabrication yards, and oil and gas facilities operate in high-risk conditions where workers may face falls from height, struck-by incidents, hot work, confined spaces, and exposure to hazardous substances (Islam et al., 2024). These hazards contribute to consistently elevated occupational injury and fatality rates, making effective safety management essential in heavy industrial environments (Raja & Iqbal, n.d.). Incidents can occur even in well-controlled workplaces; effective first aid provision remains a critical part of occupational safety and health (OSH). Prompt first aid during the “golden hour” can reduce injury severity, prevent complications, and improve survival outcomes (Pamerneckas et al., 2003). Beyond clinical outcomes, the presence of trained first aiders and well-stocked first aid kits can strengthen worker confidence in workplace safety systems and emergency preparedness (Anyanwu et al., n.d.).

In Malaysia, legal and regulatory expectations through the Occupational Safety and Health Act 1994 (OSHA 1994), as amended in 2022, and Department of Occupational Safety and Health (DOSH) guidance require employers to provide adequate first aid boxes, facilities, and trained first aiders. However, compliance depends not only on written procedures but also on practical systems that ensure inspections, restocking, and certification renewals are completed on time and consistently documented (Farhana Binti & Fadel, n.d.).

Digital solutions in safety and health management have been shown to improve data quality, timeliness, and traceability, enabling more proactive monitoring and decision-making (Kemi Atobatele et al., 2019). Despite these advantages, many organisations still rely on manual inspection forms and fragmented spreadsheet-based tracking for first aid resources, which can slow follow-up and weaken visibility of readiness status (Domeshek, 2008).

At MMHE West Yard, first aid box inspections were recorded using paper forms, while first aider records were maintained in stand-alone spreadsheets methods that can lead to incomplete documentation, delayed compilation, and difficulty identifying boxes with missing or expired items (Islam et al., 2024). BOFA certification expiry dates were also monitored manually, increasing the risk of lapsed competency and potential non-compliance with DOSH expectations. Although prior studies highlight the value of digital inspection systems, applied evidence on low-cost, Microsoft 365-based solutions for first aid kit and first aider management in heavy industrial settings remains limited (Abed & Al-Dulaimi, n.d.). Accordingly, this study aimed to digitalise the First Aid Box Checklist using Microsoft Forms, develop a First Aider Management checklist to monitor certification and renewals, and implement and evaluate the *FirstAidPro* system at MMHE West Yard to assess whether it could achieve high >80% user satisfaction in usability, functionality, adaptability, and implementation potential.

2. Methodology

This study adopted an applied developmental research design, combining the development of the *FirstAidPro* system with a quantitative cross-sectional survey to assess user perceptions after implementation. *FirstAidPro* system was built entirely within the existing MMHE Microsoft 365 environment using Microsoft Forms for the First Aider Management and First Aid Box Inspection checklists, Microsoft Forms and SharePoint as the central repository for captured data, and Microsoft Power Automate to run automated workflows triggered by form submissions. Microsoft Teams and Outlook were used to deliver reminder notifications, while Microsoft Power BI supported visualisation of survey findings and system usage trends.

2.1 System Development

The system was built in three phases using Microsoft 365 tools as per shown in Figure 1. In Phase 1, the team reviewed existing BOFA records and internal templates to decide what information needed to be tracked for each first aider. This included basic details such as name, employee ID, department, email, BOFA training provider, and the certificate issue and expiry dates. A Microsoft Form was then created so records could be added or updated in a consistent way. After each submission, a Power Automate workflow saved the information in a central list and automatically scheduled reminder emails at 45, 30 and 15 days before the BOFA expiry date to help prevent certifications from lapsing.

In Phase 2, the paper-based first aid box checklist was converted into a digital inspection form. The content was checked against the required items for first aid box Types A, B, and C to make sure nothing important was missed. The Microsoft Form captured key inspection details such as the box ID, location, inspector name, inspection date, and item-by-item checks including availability, quantity, and expiry dates. A second Power Automate workflow stored each inspection record and sent a Microsoft Teams reminder one month after the inspection to prompt the next monthly check. In Phase 3, *FirstAidPro* system was piloted with first aiders at MMHE

West Yard for several inspection cycles, and users later completed a feedback form to share their experience with the system and its readiness for wider use.

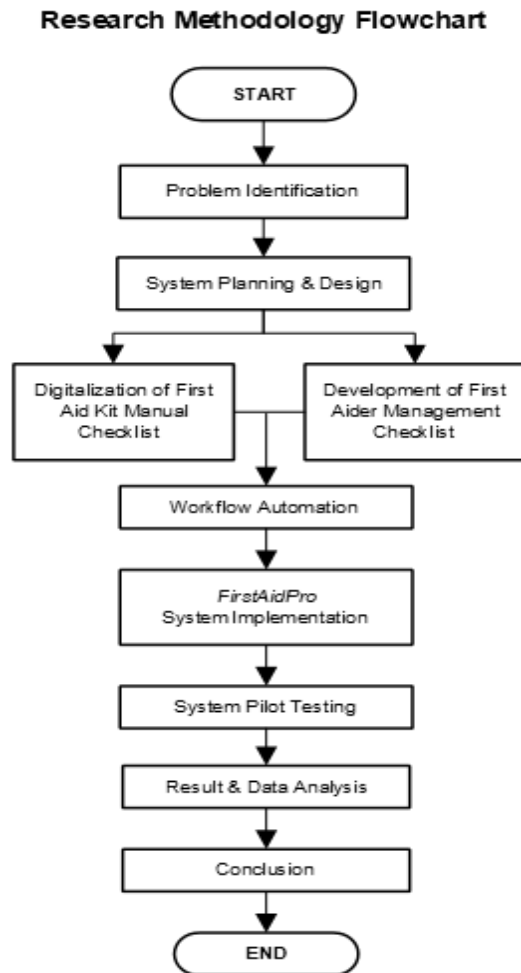


Fig.1. *FirstAidPro system development methodology flowchart*

2.2 Characterisation

The pilot deployment was used to confirm that *FirstAidPro* system performed correctly in practice by ensuring Microsoft Forms submissions triggered the intended Power Automate workflows, reminder notifications were delivered through Teams/Outlook at the planned intervals, and inspection and Basic Occupational First Aidet (BOFA) certificates records were stored and could be retrieved for review; any technical issues such as errors or delays were monitored informally through user feedback and supervisor checks during the pilot period.

2.3 Data Analytic Strategy

The evaluation involved officially appointed first aiders at MMHE West Yard, using a purposive sample of 40 users who participated in the pilot, and feedback was collected through a 12-item questionnaire rated on a 5-point Likert scale and grouped into four constructs (usability, functionality, reminders, application, adaptability to the MHB environment, and implementation potential); responses were exported descriptive analysis, where positive agreement was calculated as the percentage selecting agree and strongly agree for each construct, and Power BI was used to generate bar and stacked bar charts to visualise response distributions.

3.0 Results

3.1 System Usability

The Figure 2 illustrates system usability items assessed ease of navigation, task performance without extensive guidance, clarity of BOFA renewal submission, convenience of monthly checklist completion, and overall layout. Across the five items, 84% of responses indicated positive agreement (Agree and Strongly Agree), 10% were Neutral, and 6% were negative (Disagree and Strongly Disagree). The highest agreement 87% was recorded for statements on simple layout and clear processes, suggesting that users found the interface intuitive.

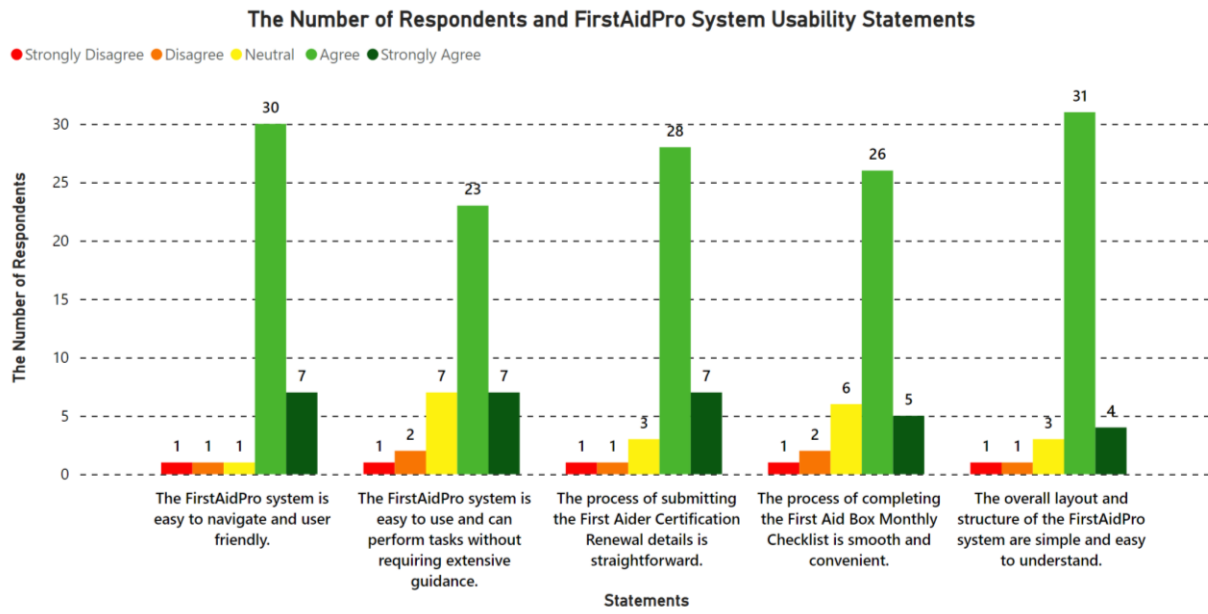


Fig.2. Number of respondents by response category for FirstAidPro system usability items.

3.2 System functionality, reminders and application

The Figure 3 illustrates three items examined perceptions of notification timeliness, system reliability and support for first aider responsibilities. Positive agreement reached 86%, with only 5% negative responses. Most respondents agreed that email and Teams reminders were timely and useful, and that the system worked efficiently with minimal technical issues. Respondents also indicated that *FirstAidPro* system helped them perform monthly inspections and manage BOFA renewals more effectively.

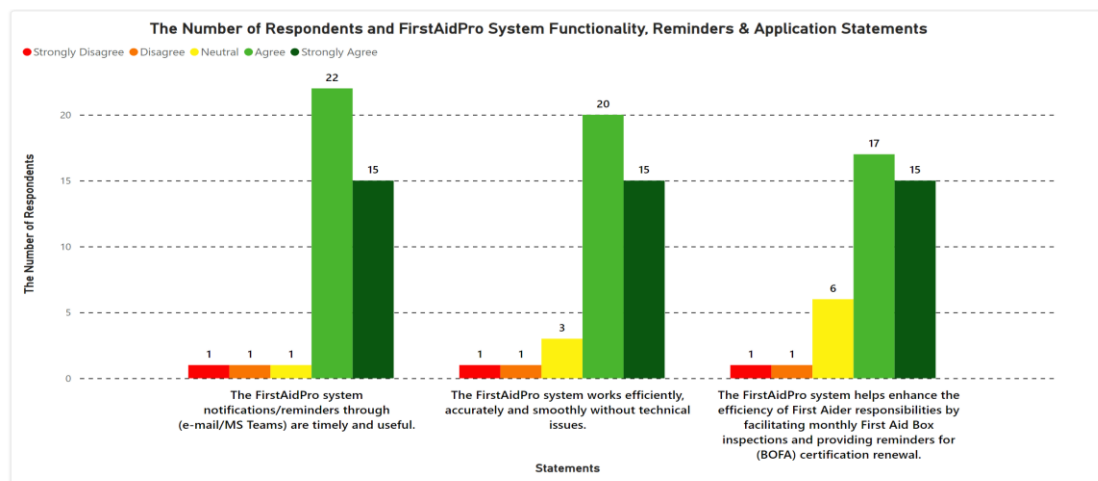


Fig.3. Number of respondents by response category for FirstAidPro system functionality, reminders and application items.

3.3 Adaptability to MHB Environment

Adaptability items assessed perceived fit with existing workflows and the ease of organisation wide adoption as per shown in Figure 4. Positive agreement for this construct was 78%, with 15% Neutral, 2% Disagree and 3% Strongly Disagree. Respondents generally felt that *FirstAidPro* system aligned with current processes and could be adopted across departments, though the relatively higher proportion of neutral responses suggests that some users may need longer exposure before giving a strong endorsement.

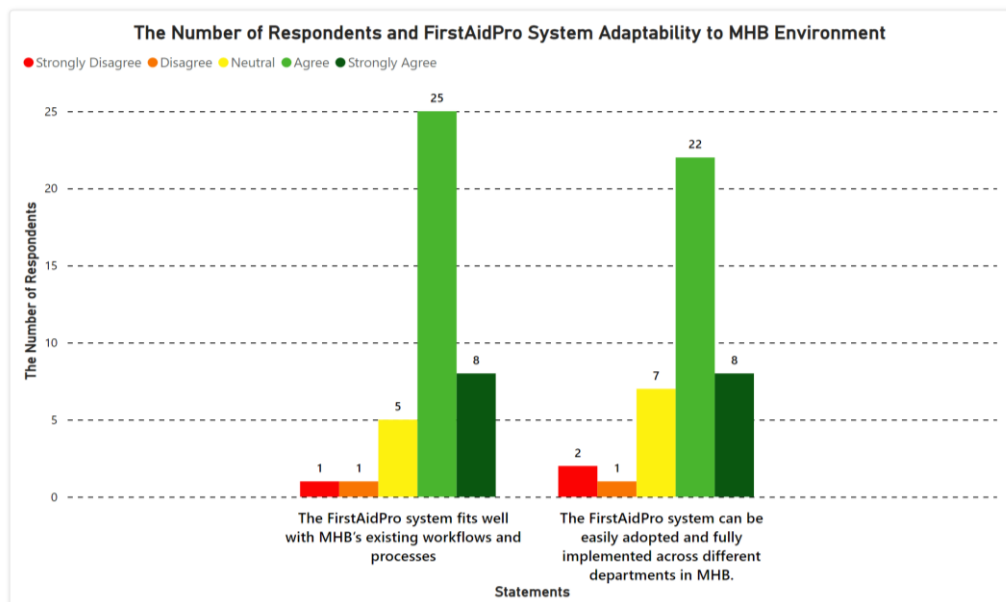


Fig 4. Number of respondents by response category for *FirstAidPro* system adaptability to MHB environment items.

3.4 Implementation potential in MHB

As illustrated in Figure 5, two items focused on comparative effectiveness versus the manual process and overall satisfaction. Positive agreement was 82%, with 12% Neutral and 6% negative responses. Respondents broadly agreed that the digital system was more effective and convenient than the manual approach and were satisfied with their experience using *FirstAidPro* system

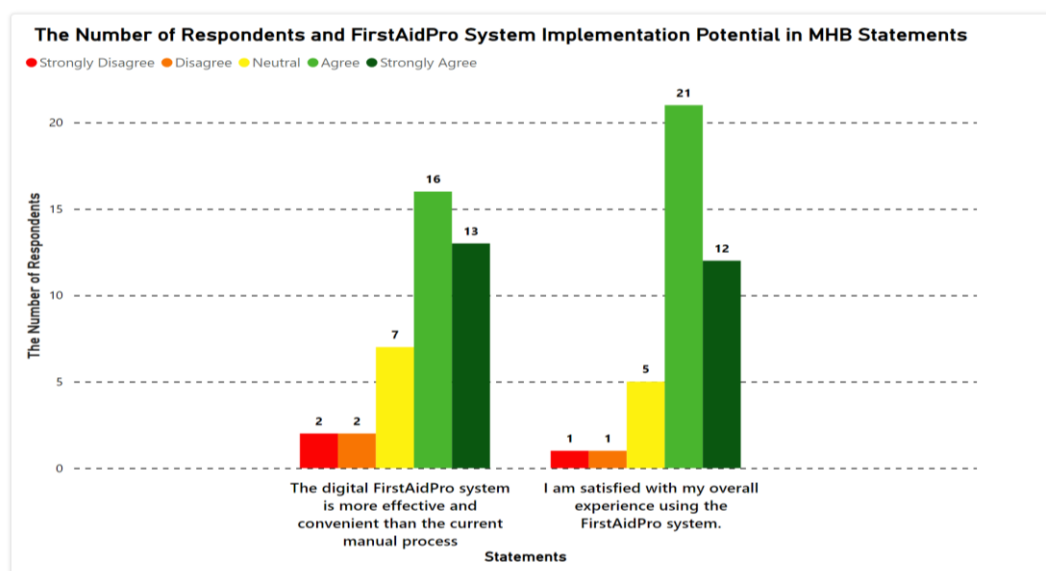


Fig. 5. Number of respondents by response category for *FirstAidPro* system implementation potential in MHB items.

3.5 Overall positive agreement by construct

The stacked bar chart as per in Figure 6 summarised positive agreement across all four constructs. Adaptability recorded 78% positive agreement, system usability 84 %, implementation potential 82%, and system functionality/reminders 86%. All constructs exceeded 75% positive agreement but fell short of the predefined $\geq 90\%$ satisfaction target.

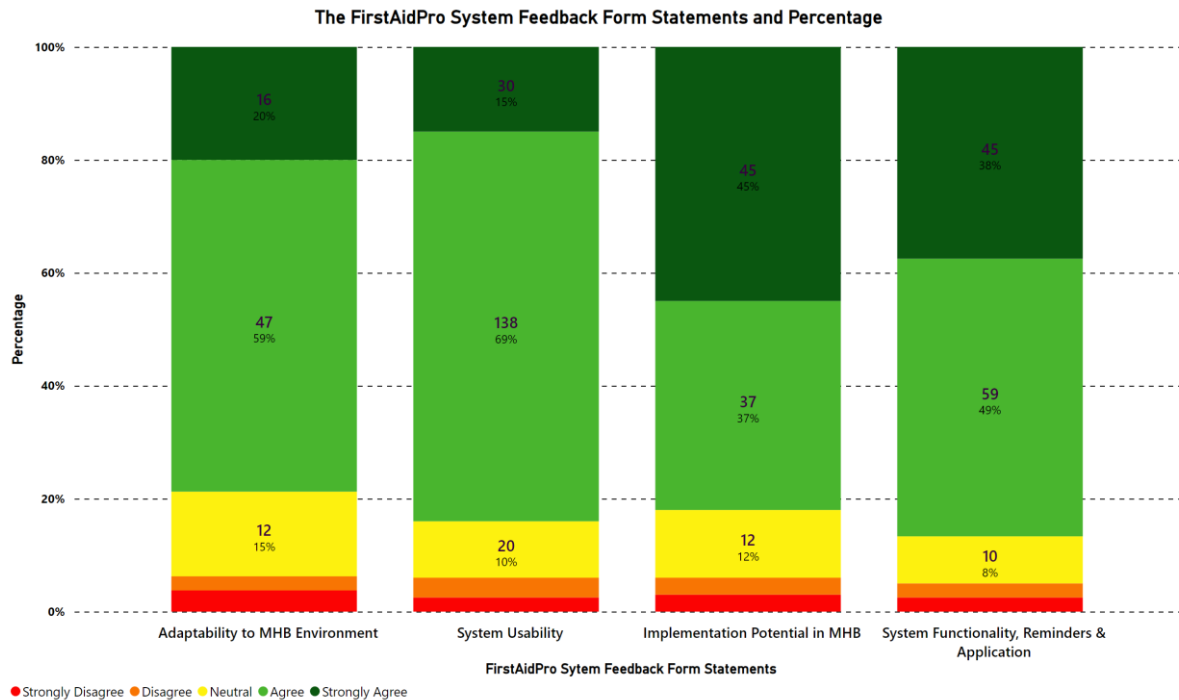


Fig. 6. Positive agreement (%) for system usability, functionality/reminders, adaptability and implementation potential.

4.0 Discussion

The digital First Aid Box Monthly Checklist converted a paper-based activity into a standardised and repeatable workflow that produces clear, traceable inspection records. Using consistent fields and mandatory inputs reduces missing data and variation between inspectors, which are common weaknesses of manual systems (Hussamadin et al., 2023). Monthly compliance is further supported through automated Microsoft Teams reminders, reducing dependence on personal calendars or informal follow-up (Morrison et al., 2024). High usability results indicate that first aiders found the checklist practical and easy to complete, which is important because time consuming or complex routines are more likely to be skipped in busy industrial settings (Al-Hiyari & Abdullah, 2021). The digital records also provide audit-ready evidence of inspection dates and findings, supporting documentation requirements expected by DOSH (Aher et al., 2025).

The First Aider Management module improves BOFA certification monitoring by combining structured record capture with automated renewal reminders. This approach is important because first aid competence can decline over time and typically requires periodic refreshers, often on a three-year cycle (McKENNA & GLENDON, 1985). *FirstAidPro* supports proactive renewal planning by issuing reminders at 45, 30, and 15 days before expiry, rather than relying on last minute manual checks. Users reported that the renewal update process was straightforward and that reminders were helpful and timely, forming a closed-loop process that keeps records current and reduces the likelihood of lapsed certification, thereby supporting compliance with OSHA 1994 as amended 2022 and DOSH requirements for sufficient trained first aiders (DOSHS, MOE MALAYSIA 1996 A Guide To First-Aid Facilities In The Workplace, n.d.). Overall positive agreement across usability, functionality, adaptability, and implementation potential 78.75 % to 86.67 % indicates strong acceptance and general readiness for wider rollout, with functionality and reminders rated highest due to reduced administrative effort. The slightly lower adaptability score suggests that some departments may still be aligning the system with existing routines, and sustained

adoption will likely depend on leadership support, structured training, and clear governance(A3.1.2.2016_Governance_structures_web, n.d.). The MMHE and similar high-risk organisations, *FirstAidPro* demonstrates that Microsoft 365 tools can be assembled into a practical OSH support system without customized development, improving compliance monitoring, access to inspection and training data, and preparedness for audits and emergency response (Lymmy Ogbidi & Benneth Oteh, 2024).

5.0 Recommendation

Based on the findings, *FirstAidPro* system should be strengthened in three practical ways. First, provide structured user training through short orientation sessions, quick reference guides, and brief demo videos placed in Teams or SharePoint, focusing on completing monthly inspections, updating BOFA details, and understanding reminders. Moreover, formally embed the workflows into standard operating procedures and emergency response plans, clearly assigning roles for inspections, restocking, renewals, and escalation when reminders are ignored. Furthermore, expand analytics using Power BI dashboards to monitor completion rates, overdue actions, repeat shortages, and renewal lead times, and review key indicators in CQHSSE meetings to support continuous improvement.

6.0 Limitation

This study has several limitations. It was conducted at a single industrial site and involved a relatively small sample of 40 first aiders, which may limit how well the findings apply to other organisations, sectors, or larger workforces. In addition, the evaluation relied mainly on self-reported user perceptions, rather than objective operational indicators such as inspection completion times, trends in non-conformities, replenishment turnaround, or BOFA renewal lead times. Future research should strengthen the evidence base by incorporating measurable performance data and conducting a cost-benefit analysis to quantify administrative time saved, potential reductions in non-compliance risk, and improvements in emergency readiness. Moreover, future work could explore mobile-optimised interfaces or Power Apps to support inspections in low-connectivity areas and to extend digital first aid management to contractors, remote sites, and multi-site operations.

7.0 Conclusion

This study designed and tested *FirstAidPro* system , a digital first aid kit and first aider management system built using Microsoft 365 for MMHE West Yard. The monthly First Aid Box Checklist turned into a digital process and by adding automated reminders for BOFA certification expiry, the system solves several problems seen in the old paper-based method including incomplete or inconsistent records, slow restocking, and the need to manually track renewal dates. Feedback from 40 first aiders showed strong positive responses, with 84% agreement for usability, 86% for functionality and reminders, 78% for adaptability to the workplace environment, and 82% for implementation potential. Although the study did not reach the target of 90% satisfaction, the results still suggest that *FirstAidPro* system improves tracking, reduces manual chasing, and helps MMHE maintain better compliance with first aid inventory and competency requirements. The proper training, inclusion in standard operating procedures, and ongoing improvements based on user feedback and data, *FirstAidPro* system can be expanded across MMHE and could also guide other high-risk organisations looking for a practical, low-cost digital OSH solution.

Acknowledgement

The authors would also like to thank all member of the Faculty of Engineering Technology, Universiti Tun Hussien Onn Malaysia and staff of Malaysian Marine and Heavy Engineering (MMHE) Sdn.Bhd. West Yard for its support.

References

Abed, J., & Al-Dulaimi, E. (n.d.). *IoT SYSTEM ENGINEERING APPROACH USING AI FOR MANAGING SAFETY PRODUCTS IN HEALTHCARE AND WORKPLACES DOCTOR OF PHILOSOPHY.*

Aher, S. N., Sonawane, G. B., Sonawane, V. N., Gunjal, P. A., & Bacchav, J. B. (2025). DIGITAL DOCUMENTATION IN MODERN PHARMACEUTICAL QUALITY ASSURANCE: A STRATEGIC REVIEW World Journal of Pharmaceutical Research. *Certified Journal* | 58 World Journal of Pharmaceutical Research Wwww.Wjpr.Net |, 14, 59. <https://doi.org/10.5281/zenodo.17614902>

- Al-Hiyari, N., & Abdullah, K. (2021). *FIRST AID TRAINING USING VIRTUAL REALITY: AN APPLICATION AND USER EXPERIENCE STUDY*.
- Anyanwu, P. O., Valek, L., & Knott, T. (n.d.). *NARRATIVE STUDY ON DISASTER MANAGEMENT: HEALTHCARE WORKERS' EXPERIENCES*.
- Domeshek. (2008). *TITLE: Medical Emergency Team Tutored Learning Environment PRINCIPAL INVESTIGATOR: Eric A.*
- Farhana Binti, N., & Fadel, H. (n.d.). *FIRST AID KIT MANAGEMENT IN SELECTED TERTIARY INSTITUTIONS IN MALAYSIA*.
- Hussamadin, R., Jansson, G., & Mukkavaara, J. (2023). Digital Quality Control System—A Tool for Reliable On-Site Inspection and Documentation. *Buildings*, 13(2). <https://doi.org/10.3390/buildings13020358>
- Islam, A. H. M. R., Sarah, U. T., Zakaria, N. M. G., & Begum, S. (2024). Assessment and Management of Occupational and Health Risks Associated with the Shipbuilding Industry in Bangladesh - Review. *MIST INTERNATIONAL JOURNAL OF SCIENCE AND TECHNOLOGY*, 12, 29–38. [https://doi.org/10.47981/j.mijst.12\(02\)2024.483\(29-38\)](https://doi.org/10.47981/j.mijst.12(02)2024.483(29-38))
- Kemi Atobatele, O., Hungbo, A. Q., & Adeyemi, C. (2019). *Digital Health Technologies and Real-Time Surveillance Systems: Transforming Public Health Emergency Preparedness Through Data-Driven Decision Making*.
- Lymmy Ogbidi, & Benneth Oteh. (2024). Advances in Hybrid Machine Learning and Physics-Based Models for Enhanced Reservoir Simulation. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, 10(6), 2533–2543. <https://doi.org/10.32628/IJSRCSEIT>
- McKENNA, S. P., & GLENDON, A. I. (1985). Occupational first aid training: Decay in cardiopulmonary resuscitation (CPR) skills. *Journal of Occupational Psychology*, 58(2), 109–117. <https://doi.org/10.1111/j.2044-8325.1985.tb00186.x>
- Morrison, K., Iqbal, S. T., & Horvitz, E. (2024). AI-Powered Reminders for Collaborative Tasks: Experiences and Futures. *Proceedings of the ACM on Human-Computer Interaction*, 8(CSCW1). <https://doi.org/10.1145/3653701>
- Pamerneckas, A., Macas, A., Vaitkaitis, D., Vaitkaitis, A., & Gudėnienė, R. (2003). Golden hour – early postinjury period. In *MEDICINA* (Vol. 39, Number 9). <http://medicina.kmu.lt>
- Raja, U., & Iqbal, N. (n.d.). *Ensuring Worker Safety in Lahore's Large Industries: A Study on Occupational Health, Safety, and Risk Management* (Vol. 2, Number 4).