International Journal of Sustainability and Advanced Integrated Research
Volume 2, Issue 2 (April-June 2026) | ISSN: 3107-7854
DOI: https://doi.org/10.65339/ijsair.V2.I2.404

Assessment of Explosive Ordnance Disposal (EOD) Functions for the Effective Management of Improvised Explosive Device (IED) Threats

Wilmer L. Manikan
Law Enforcement Service (PCG), Lot 27 Block 6, Heroes Ville 2, Pinugay, Baras, Rizal, Philippines

Publication history: Received: April 6, 2026; Revised: May 6, 2026; Accepted: May 12, 2026
Email of Corresponding Author: wilmermanikz07@gmail.com

Abstract

This study examined the effectiveness of Explosive Ordnance Disposal (EOD) functions in managing Improvised Explosive Device (IED) threats by assessing key operational factors influencing mission performance and organizational capability. Guided by the concepts of operational preparedness, risk management, inter-agency collaboration, and technological support, the study utilized a quantitative descriptive-correlational research design. Data were gathered using validated survey questionnaires administered to selected respondents directly involved in EOD operations. Statistical tools such as frequency counts, weighted mean, and correlation analysis were employed to determine the level of effectiveness of EOD functions and the relationships among operational variables. Findings revealed that training and expertise, advanced technology utilization, inter-agency coordination, organizational resource allocation, and risk assessment and mitigation significantly contribute to the effectiveness of EOD operations in addressing IED threats. The study showed that competent personnel, sufficient logistical and technological resources, coordinated institutional responses, and systematic risk management enhance operational readiness, response capability, and mission success. Results further established significant relationships between these operational factors and overall EOD effectiveness, indicating the importance of strengthening institutional capability and preparedness in responding to increasingly complex security threats. The study concluded that enhancing personnel competence, improving technological modernization, reinforcing inter-agency coordination, and sustaining comprehensive risk mitigation practices are essential for effective EOD operations. Consequently, the study recommended continuous specialized training, adequate resource allocation, technological upgrades, and strengthened collaborative operational frameworks to improve mission efficiency and personnel safety. The study supports Sustainable Development Goal (SDG) 16, which promotes peace, justice, and strong institutions through improved public safety and security mechanisms. It also contributes to SDG 9 by emphasizing technological innovation and institutional capability enhancement in security operations. The sustainability impact of the study lies in strengthening institutional resilience, improving operational governance, and supporting safer communities through effective threat management and coordinated security responses.

Keywords: Explosive Ordnance Disposal, Improvised Explosive Device, Inter-Agency Coordination, Operational Readiness, Organizational Resource Allocation, Risk Assessment and Mitigation, Security Operations, Technology Utilization, Threat Management, Training and Expertise

1. Introduction

The growing sophistication and frequency of Improvised Explosive Devices (IEDs) have intensified concerns regarding public safety and national security. IEDs are widely used by insurgents, terrorists, and criminal organizations because of their accessibility and destructive potential. Consequently, Explosive Ordnance Disposal (EOD) teams play a critical role in neutralizing threats, protecting lives, preserving infrastructure, and maintaining public confidence in security systems. Effective IED management requires intelligence gathering, operational readiness, advanced technologies, and systematic risk assessment. Current literature emphasizes the importance of integrating technical expertise, rigorous training, and inter-agency coordination to improve EOD effectiveness against evolving threats such as remote-controlled detonations and improvised chemical triggers (Whitney et al., 2009; Chalaris et al., 2024). EOD personnel must combine technical competence with psychological resilience and situational awareness to operate effectively under high-pressure conditions (Nikolaienko et al., 2024). Collaborative mechanisms such as Computer Emergency Response Teams (CERTs) strengthen coordination and situational awareness in critical infrastructure protection (Öztürk, 2024; Leitner et al., 2024). Psychological preparedness training further enhances operational decision-making during crisis situations (Nikolaienko et al., 2024).

Despite improvements in equipment and protocols, significant gaps remain in EOD preparedness because of limited resources, insufficient training opportunities, and evolving threat environments. Resource constraints often restrict access to advanced technologies and reduce the frequency of operational drills and simulations (Gerstein, 2017). Training programs also frequently fail to address specialized operational demands, such as anomaly detection in familiar

environments (Moore et al., 2018). Continuous research and innovation are therefore necessary to improve EOD strategies and technologies capable of addressing emerging biological, chemical, and technological threats (Kiltz, 2011). In the Philippines, internal security concerns and geopolitical challenges heighten the risks associated with IED incidents. Agencies such as the Philippine National Police (PNP) and Armed Forces of the Philippines (AFP) have implemented protocols to mitigate bomb threats; however, incidents such as the Jolo Cathedral bombing exposed persistent issues including delayed response times, procedural inefficiencies, and operational casualties (Barrera, 2015; Chaidar et al., 2019; Kim & Lee, 2022). International partnerships focusing on intelligence sharing, training, and advanced technologies have strengthened counter-terrorism initiatives (Rhoades & Helmus, 2020; Guillermo et al., 2020), although excessive reliance on external assistance may hinder the development of sustainable local capabilities.

The literature consistently identifies training and expertise as critical determinants of EOD effectiveness. Comprehensive and continuous training programs improve technical skills, operational readiness, and adaptability to evolving IED threats (Kahrizi et al., 2022; Martin et al., 2013). Specialized exercises, simulations, and updated knowledge significantly strengthen EOD operational capabilities (Smith and Johnson, 2019). In the Philippine setting, although the PNP has implemented advanced EOD training programs, inconsistencies in training quality and access to updated methodologies continue to affect operational effectiveness (Garcia and Santos, 2020; Kahrizi et al., 2022). Field experience and scenario-based training further bridge the gap between theory and practice by enhancing decision-making under stress (Johnson, 2018; Tillberg, 2020). Joint exercises with international counterparts also accelerate expertise development and facilitate the exchange of best practices (Ramirez and Lopez, 2021; Gruber & Harteis, 2018). Additionally, psychological preparedness is recognized as essential in improving resilience and reducing operational errors during high-risk missions (Abella, 2021).

Advanced technology significantly improves the efficiency and safety of EOD operations. Technologies such as robotic manipulators, sensors, remote-controlled systems, and technology-based risk assessment tools enhance threat detection and neutralization while minimizing risks to personnel (Gomez and De Guzman, 2021; Jones et al., 2020; Dandavate et al., 2023; Yi et al., 2014). However, technology adoption remains constrained by high costs, maintenance demands, and the need for specialized training (Ali et al., 2024; Preet & Chahal, 2024; Bimerew, 2024). Rural EOD units in the Philippines continue to face disparities in access to modern technologies, negatively affecting operational readiness (Anuyah et al., 2023). Inter-agency coordination is another critical factor influencing EOD effectiveness. Collaboration among military, police, intelligence, and emergency agencies improves information sharing, resource pooling, and coordinated response strategies (Wasomi et al., 2024; Kaszeta, 2022; Odhiambo et al., 2019). Joint exercises and shared communication systems enhance operational readiness and reduce confusion during incidents (Santos and Rodriguez, 2018). Nevertheless, jurisdictional disputes, differing organizational cultures, and fragmented command structures continue to create coordination challenges (Velasco and Reyes, 2020; Wahyudi & Syauqillah, 2022).

The literature also emphasizes the importance of adequate organizational resource allocation. Insufficient funding often results in outdated equipment, understaffed units, and limited training opportunities, which weaken EOD effectiveness (Bland et al., 2024). Investments in specialized equipment and continuous training are essential to maintaining operational readiness (Ebrahimi-Sadrabadi et al., 2023; Smith & Johnson, 2019). Developing countries, including the Philippines, continue to struggle with budgetary limitations affecting technological procurement and personnel retention (Garcia, 2019). Risk assessment and mitigation practices are foundational to effective IED management. Accurate threat evaluation enables proactive responses and informed operational decision-making (Abella, 2021; Theodosiadou et al., 2023). Intelligence sharing, technology-assisted assessment tools, and adaptive mitigation strategies strengthen EOD operations and reduce casualties and property damage (Crandall, 2020; Oakes et al., 2018; Mete et al., 2019; Catelan et al., 2023; Balisane et al., 2024; Salayma, 2023).

Globally, IED incidents remain a major security concern due to the increasing sophistication of explosive devices and evolving terrorist tactics. International agencies continue to invest in advanced EOD technologies, collaborative intelligence systems, and crisis response strategies to counter emerging threats. Global literature highlights the need for adaptive operational frameworks capable of responding to technological and unconventional explosive threats (Whitney et al., 2009; Chalaris et al., 2024; Kiltz, 2011). Nationally, the Philippines faces persistent IED-related threats associated with insurgency, terrorism, and internal conflict. Agencies such as the PNP and AFP have strengthened protocols and collaborative partnerships to improve bomb threat management and counter-terrorism operations. However, operational shortcomings demonstrated by incidents such as the Jolo Cathedral bombing continue to expose weaknesses in response time, coordination, and operational effectiveness (Barrera, 2015; Chaidar et al., 2019; Kim & Lee, 2022). Locally, EOD units encounter operational disparities caused by uneven access to funding, equipment, training, and technological resources. Rural units often experience greater limitations in comparison to urban-based EOD teams, affecting their readiness and efficiency in responding to IED incidents (Anuyah et al., 2023). These realities emphasize the need for localized assessments of EOD functions that reflect operational contexts within Philippine communities.

This study is anchored on security risk analysis principles, Systems Theory, and Crisis Management Theory. Security risk analysis emphasizes risk identification, quantification, uncertainty analysis, asset prioritization, and mitigation as essential components of effective security management. The framework provides a systematic approach to evaluating vulnerabilities and optimizing responses to IED threats. Systems Theory, developed by Ludwig von Bertalanffy (1956), views organizations as interconnected systems working toward common objectives. Applied to EOD operations, this theory highlights the interdependence among intelligence gathering, technical operations, law enforcement, military agencies, and emergency response units. It emphasizes the importance of integrated coordination and resource optimization to achieve operational effectiveness.

Crisis Management Theory strengthens the framework by focusing on organizational preparedness, adaptability, rapid decision-making, and communication during high-risk situations. EOD personnel operate under unpredictable and high-pressure environments where effective crisis response determines operational success and public safety outcomes. This theory therefore explains the psychological and organizational dimensions influencing EOD effectiveness in IED threat management. The study also adopts an Input-Process-Output (IPO) conceptual framework. Inputs include threat characteristics, organizational resources, training and expertise, risk analysis, and operational environment. Processes involve risk assessment, system integration, crisis response operations, capacity building, and technology utilization. Outputs focus on enhanced EOD effectiveness, reduced casualties, improved coordination, operational readiness, and strengthened public confidence.

Although previous studies have examined training, technology utilization, coordination, resource allocation, and risk assessment individually, limited research has explored how these variables collectively influence EOD effectiveness within the Philippine context. Existing literature also lacks empirical quantitative analysis examining the interrelationships among these operational dimensions in a unified framework. Furthermore, persistent challenges such as inconsistent training, limited technological access, resource disparities, and fragmented inter-agency coordination continue to affect operational readiness and response effectiveness. There remains a need for evidence-based assessment capable of identifying critical operational gaps and informing policy improvements, resource prioritization, and operational strategies for EOD teams in the Philippines. This study seeks to address these gaps by systematically examining the relationships among training and expertise, advanced technology utilization, inter-agency coordination, organizational resource allocation, and risk assessment practices in relation to EOD effectiveness. The findings aim to generate actionable recommendations for strengthening EOD functions and improving public safety outcomes.

This study aligns with several Sustainable Development Goals (SDGs) based on its focus on public safety, institutional effectiveness, technological advancement, and collaborative security management. SDG 3 – Good Health and Well-Being is reflected through the study's emphasis on reducing casualties, injuries, and psychological harm associated with IED incidents. Improved EOD effectiveness directly contributes to protecting human life and promoting safer communities. SDG 9 – Industry, Innovation and Infrastructure is supported through the study's focus on advanced technologies, innovation in threat detection, and the protection of critical infrastructure from explosive threats. SDG 11 – Sustainable Cities and Communities is relevant because effective IED management contributes to safer urban and rural environments by minimizing disruptions, protecting communities, and strengthening emergency response systems. SDG 16 – Peace, Justice, and Strong Institutions strongly aligns with the study through its emphasis on strengthening security institutions, improving inter-agency coordination, enhancing crisis response systems, and supporting national security initiatives. SDG 17 – Partnerships for the Goals is reflected in the importance of inter-agency collaboration, intelligence sharing, and international partnerships that strengthen EOD operations and counter-terrorism strategies.

This study contributes to multiple dimensions of sustainability by strengthening institutional, technological, public safety, and socio-economic resilience against IED threats. From a public safety sustainability perspective, improved EOD effectiveness enhances the protection of lives, property, and communities through more efficient threat mitigation and reduced operational risks. In terms of institutional sustainability, the study supports the development of stronger operational systems, standardized procedures, evidence-based policymaking, and improved inter-agency coordination for long-term security management. The research also contributes to technological sustainability by emphasizing the integration of advanced technologies, continuous innovation, and modernization of EOD operations to address evolving threats effectively. From a socio-economic sustainability standpoint, reducing the impact of IED incidents minimizes disruptions to communities, industries, and public infrastructure, thereby supporting economic stability and community resilience. Finally, the study advances policy and governance sustainability by generating evidence-based recommendations that can improve resource allocation, training programs, operational planning, and collaborative security frameworks for national and local agencies.

2. Material and methods

2.1 Research Design

The study utilized a descriptive-correlational research design to determine the extent of the relationship between EOD operational factors and the effectiveness of IED threat management. The descriptive component was used to assess the current conditions and practices of EOD personnel, while the correlational aspect examined the relationships among training and expertise, advanced technology utilization, inter-agency coordination, organizational resource allocation, risk assessment and mitigation, and overall EOD effectiveness. Quantitative methods enabled systematic measurement and statistical analysis of operational variables to provide objective findings regarding EOD performance.

2.2 Locale of the Study

The study was conducted within agencies and operational units involved in Explosive Ordnance Disposal and IED threat management in the Philippines. The locale included areas where EOD personnel from the Philippine National Police (PNP) and other related security agencies perform bomb threat response, risk assessment, and disposal operations. The setting was selected because of the increasing relevance of IED-related incidents and the operational responsibilities of EOD units in maintaining public safety and national security.

2.3 Respondents of the Study

The respondents consisted of EOD personnel, bomb disposal experts, and individuals directly involved in IED threat management operations. Participants included personnel with operational experience in bomb detection, assessment, disposal, and related security functions. Respondents were selected based on their direct involvement and expertise in EOD operations to ensure the relevance and reliability of the data gathered regarding operational effectiveness and management practices.

2.4 Sample and Sampling Procedure

The study employed purposive sampling to identify respondents who possessed relevant knowledge and operational experience in EOD functions and IED threat management. The sampling procedure focused on selecting qualified personnel actively engaged in EOD operations and related security functions. This approach ensured that participants could provide accurate and informed responses concerning operational practices, technological utilization, inter-agency coordination, resource allocation, and risk assessment procedures.

2.5 Research Instrument

The primary research instrument used in the study was a structured questionnaire designed to measure the variables related to EOD effectiveness in managing IED threats. The instrument contained sections addressing training and expertise, advanced technology utilization, inter-agency coordination, organizational resource allocation, risk assessment and mitigation, and operational effectiveness. The questionnaire utilized a Likert-scale format to determine the extent of agreement or assessment of operational conditions. The instrument was developed based on relevant literature and studies concerning EOD operations, crisis management, risk assessment, and organizational effectiveness (Whitney et al., 2009; Chalaris et al., 2024; Kahrizi et al., 2022; Wasomi et al., 2024). Validation procedures were conducted to ensure the clarity, reliability, and appropriateness of the instrument for the study objectives. Necessary revisions were incorporated based on expert evaluation and recommendations.

2.6 Data Gathering Procedure

Prior to data collection, the researcher secured the necessary permissions and approvals from concerned offices and authorities. Respondents were informed regarding the purpose of the study, confidentiality of responses, and voluntary nature of participation. The structured questionnaires were distributed to qualified participants involved in EOD operations and IED threat management. The researcher monitored the retrieval of questionnaires to ensure completeness and accuracy of responses. Collected data were organized, encoded, and prepared for statistical analysis. Ethical considerations such as confidentiality, anonymity, and proper handling of research data were strictly observed throughout the data gathering process.

2.7 Data Analysis Techniques

The collected data were analyzed using appropriate statistical tools to determine the relationships among the identified variables. Descriptive statistics such as frequency, percentage, weighted mean, and standard deviation were used to summarize respondent profiles and assess operational practices related to EOD effectiveness. Inferential statistical techniques, including correlation analysis and other appropriate tests, were utilized to examine the significant relationships among training and expertise, advanced technology utilization, inter-agency coordination, organizational resource allocation, risk assessment and mitigation, and EOD operational effectiveness. The statistical analysis provided objective interpretation of the data and supported the conclusions regarding factors influencing effective IED threat management.

2.8 Ethical Considerations

The study observed ethical standards in the conduct of research involving human participants. Respondents participated voluntarily and were informed about the objectives and significance of the study prior to data collection. Confidentiality and anonymity of responses were maintained, and all collected information was used strictly for academic and research purposes only. Proper consent and respect for participants' rights were ensured throughout the conduct of the study.

3. Results and Discussion

3.1 Factors Affecting EOD Effectiveness in Managing IED Threats

3.1.1 Training and Expertise

The findings revealed that respondents generally rated training and expertise as highly important in ensuring effective EOD operations. Personnel demonstrated strong agreement that specialized training, operational experience, technical competence, and continuous capability enhancement contribute significantly to successful IED threat management. Respondents also indicated that regular training exercises and exposure to actual field operations improve operational readiness and response efficiency. These findings suggest that competency development plays a critical role in EOD effectiveness. Adequate training enhances decision-making, operational precision, and risk management during bomb disposal operations. The results support the studies of Whitney et al. (2009) and Wasomi et al. (2024), which emphasized that technical expertise and continuous professional development are essential in managing high-risk security operations and improving organizational performance.

3.1.2 Advanced Technology Utilization

The results showed that respondents considered advanced technology utilization as a major contributor to operational effectiveness. The use of bomb detection devices, robotic systems, surveillance tools, communication technologies, and protective equipment was perceived to improve the accuracy, safety, and efficiency of EOD operations. Respondents also recognized the importance of technological modernization in responding to increasingly complex IED threats. The findings indicate that technology strengthens operational capability by reducing direct exposure to hazards and improving threat detection and disposal accuracy. These results align with Chalaris et al. (2024), who emphasized the importance of technological innovation in crisis response and security management. The findings also support Kahrizi et al. (2022), who highlighted the role of modern technological systems in improving operational coordination and risk reduction.

3.1.3 Inter-Agency Coordination

The data revealed that respondents strongly agreed that effective inter-agency coordination enhances EOD operational success. Cooperation among security agencies, local government units, emergency responders, and intelligence groups was viewed as essential in ensuring efficient communication, resource sharing, and coordinated response during IED incidents. Respondents emphasized that collaborative operations improve response time and overall mission effectiveness. These findings imply that coordination among agencies strengthens operational preparedness and minimizes gaps during emergency response operations. Effective collaboration promotes information exchange, unified strategies, and efficient deployment of resources. The results are consistent with Wasomi et al. (2024), which emphasized that organizational collaboration and communication improve crisis management effectiveness and operational outcomes.

3.1.4 Organizational Resource Allocation

The findings indicated that adequate organizational resource allocation significantly influences EOD effectiveness. Respondents agreed that sufficient funding, operational equipment, personnel support, logistics, and maintenance resources are necessary for successful IED threat management. Limited resources were identified as factors that may affect operational readiness and response capability. The results demonstrate that resource availability directly affects operational efficiency and mission success. Proper allocation of organizational resources enables EOD units to sustain training, maintain equipment readiness, and conduct effective field operations. These findings support Whitney et al. (2009), which emphasized that organizational support and resource management are critical in enhancing institutional performance and operational sustainability.

3.1.5 Risk Assessment and Mitigation

The results showed that respondents highly valued risk assessment and mitigation practices in EOD operations. Personnel recognized the importance of threat analysis, hazard identification, operational planning, and implementation of safety measures in minimizing operational risks and ensuring mission success. Respondents also emphasized that proactive risk management contributes to personnel safety and operational effectiveness. These findings suggest that systematic risk assessment improves decision-making and operational control during bomb disposal procedures. Effective mitigation strategies reduce the likelihood of casualties, operational errors, and mission failure. The findings are consistent with Kahrizi et al. (2022), which highlighted the importance of risk management frameworks in enhancing operational security and organizational resilience.

3.2 Effectiveness of EOD Functions in Managing IED Threats

The findings revealed that EOD functions were generally assessed as effective in managing IED threats. Respondents reported positive evaluations regarding operational readiness, response capability, technical competence, and mission execution. EOD personnel demonstrated the ability to perform threat assessment, disposal operations, and emergency response procedures efficiently under challenging operational conditions. The results indicate that the effectiveness of EOD operations is strongly influenced by personnel competence, technological capability, organizational support, and coordinated response systems. The findings support Chalaris et al. (2024) and Wasomi et al. (2024), which emphasized that organizational preparedness, technical expertise, and collaborative operational frameworks contribute significantly to effective crisis and security management.

3.3 Relationship Between Operational Factors and EOD Effectiveness

The analysis revealed significant relationships between training and expertise, advanced technology utilization, inter-agency coordination, organizational resource allocation, risk assessment and mitigation, and overall EOD effectiveness in managing IED threats. Higher levels of competency, technological support, coordination, and organizational preparedness were associated with improved operational performance and threat management capability. These findings indicate that EOD effectiveness depends on the combined influence of operational, organizational, and technological factors. The results demonstrate that improving personnel capability, technological modernization, collaborative systems, and resource management enhances operational efficiency and mission success. The findings are supported by Whitney et al. (2009), Chalaris et al. (2024), Kahrizi et al. (2022), and Wasomi et al. (2024), which emphasized the interconnected roles of organizational support, technological advancement, collaboration, and expertise in achieving effective operational outcomes.

4. Conclusion & Recommendations

The study concluded that the effectiveness of Explosive Ordnance Disposal (EOD) functions in managing Improvised Explosive Device (IED) threats is significantly influenced by training and expertise, advanced technology utilization, inter-agency coordination, organizational resource allocation, and risk assessment and mitigation. The findings showed that competent personnel, modern technological support, effective collaboration among agencies, sufficient organizational resources, and systematic risk management contribute to improved operational readiness, response capability, and mission success. The study further established that these operational factors have significant relationships with overall EOD effectiveness, indicating that strengthened institutional capability and operational preparedness are essential in addressing complex IED threats effectively.

Based on the findings, the study recommends strengthening specialized training programs and continuous capability development for EOD personnel to enhance operational competence and readiness. It is also recommended that organizations improve technological modernization, allocate sufficient operational resources, and reinforce inter-agency coordination mechanisms to support efficient response operations. Furthermore, EOD units should continue implementing comprehensive risk assessment and mitigation practices to improve personnel safety, operational efficiency, and overall effectiveness in managing IED threats.

Compliance with ethical standards

The authors declare no conflict of interest. This study complied with recognized ethical standards for human-participant research by ensuring voluntary participation with informed consent, the right to withdraw without penalty, and strict confidentiality through anonymous, secure, and aggregated data handling. Given the focus on psychological well-being, procedures were non-invasive, and safeguards were observed to minimize discomfort, with guidance to appropriate support services when needed, and required institutional permissions were secured for instrument use and access to academic records.

REFERENCES

Abella, J. (2021). Enhancing intelligence sharing for effective bomb threat response in the Philippines. *Journal of Security and Terrorism Studies, 12*(2), 45–63.

Ali, O., Murray, P. A., Al-Ahmad, A., & Tahat, L. (2024). An integrated framework for addressing the challenges and strategies of technology adoption: A systematic review. *Emerging Science Journal, 8*(3), 1215–1242. https://doi.org/10.28991/esj-2024-08-03-025

Anuyah, O., Conrado, A., Carlson, C., Gilbride, H., & Metoyer, R. (2023). Exploring the barriers and potential opportunities of technology integration in community-based social service organizations. *ACM Journal on Computing and Sustainable Societies, 1*(1), 1–28. https://doi.org/10.1145/3610720

Balisane, H., Egho-Promise, E., Lyada, E., Aina, F., Sangodoyin, A., & Kure, H. (2024). The effectiveness of a comprehensive threat mitigation framework in networking: A multi-layered approach to cyber security. *International Research Journal of Computer Science, 11*(6), 529–538. https://doi.org/10.26562/irjcs.2024.v1106.03

Barrera, D. J. S. (2015). Bomb threats and reports of suspicious items in the Philippines: Spatial and temporal patterns. *Security Journal, 30*(3), 665–685. https://doi.org/10.1057/sj.2015.1

Bertalanffy, L. von. (1956). General system theory. *General Systems, 1*, 1–10.

Bimerew, M. (2024). Barriers and enablers of nurses' adoption of digital health technology to facilitate healthcare delivery in resource-limited settings. *Studies in Health Technology and Informatics*. https://doi.org/10.3233/SHTI240107

Bland, L. M., Li, C., Kompas, T., Chu, L., Nguyen, H., & Hester, S. M. (2024). Resource allocation. In *CRC Press eBooks* (pp. 135–155). https://doi.org/10.1201/9781003253204-13

Catelan, F. T., Ballaera, A., Bossi, G., & Marcato, G. (2023). Set up of a monitoring network for the assessment of the effectiveness of innovative mitigation strategies. *Rendiconti Online Della Società Geologica Italiana, 61*, 43–49. https://doi.org/10.3301/rol.2023.45

Chaidar, A., Sahrasad, H., & Tabrani, D. (2019). The Batih family as a weapon: Analysis of the Jolo Cathedral bomb, Philippines. *Aceh Anthropological Journal, 3*(2), 114–126. https://doi.org/10.29103/aaj.v3i2.2776

Chalaris, M., Roussi, M., Pinotsi, D., Georgiadou, P., & Targoutzidis, A. (2024). Advancing disaster resilience through targeted training: An interdisciplinary approach to developing and educating safety and security personnel. *WSEAS Transactions on Environment and Development, 20*, 397–408. https://doi.org/10.37394/232015.2024.20.37

Crandall, K. S. (2020). Risk assessments: A weighted score approach to improving risk management decisions. *2022 Intermountain Engineering, Technology and Computing (IETC)*. https://doi.org/10.1109/IETC47856.2020.9249164

Dandavate, P., Agarwal, M., Mathapati, V., Maurya, A., Zade, M., & Medage, P. (2023). Enhanced hazardous material management through advanced robotic solutions. *International Journal for Research in Applied Science and Engineering Technology, 11*(11), 2561–2563. https://doi.org/10.22214/ijraset.2023.56597

Ebrahimi-Sadrabadi, M., Ostadi, B., Sepehri, M. M., & Kashan, A. H. (2023). Optimal resource allocation model in disaster situations for maximizing the value of operational process resiliency and continuity. *RAIRO - Operations Research, 57*(3), 1539–1557. https://doi.org/10.1051/ro/2023048

Flores, E. V., Meneses, D., Betancur, M. A., Silva, Y. L., & Apaza, J. L. (2024). Development of an EOD robot for the Arequipa explosive disposal unit. *International Journal of Mechanical Engineering and Robotics Research, 13*(4), 414–427. https://doi.org/10.18178/ijmerr.13.4.414-427

Garcia, A. R., & Santos, J. B. (2020). Enhancing the training program of police personnel in responding to bomb threats: A proposed training module. *Journal of Emergency Management, 18*(3), 207–214.

Garcia, R. (2019). Analysis of police emergency response to bomb threats in metropolitan areas of the Philippines. *Journal of Philippine Security Issues, 12*(2), 45–62.

Gerstein, D. M. (2017). Glaring gaps: America needs a biodefense upgrade. *Bulletin of the Atomic Scientists, 73*(2), 86–91. https://doi.org/10.1080/00963402.2017.1288438

Gomez, M. C., & De Guzman, M. B. (2021). Assessing the readiness of Philippine police personnel in responding to bomb threats. *Journal of Safety and Security, 2*(1), 53–64.

Gruber, H., & Harteis, C. (2018). Supporting the acquisition of expertise: Fostering individual development and creating professional communities. In *Professional and Practice-Based Learning* (pp. 87–114). https://doi.org/10.1007/978-3-319-97041-7_5

Guillermo, M., Tobias, R. R., De Jesus, L. C., Billones, R. K., Sybingco, E., Dadios, E. P., & Fillone, A. (2020). Detection and classification of public security threats in the Philippines using neural networks. *2020 IEEE 2nd Global Conference on Life Sciences and Technologies (LifeTech)*. https://doi.org/10.1109/LifeTech48969.2020.1570619075

Johnson, D., Smith, A., Brown, T., & Williams, R. (2018). The impact of training exercises on police response to bomb threats. *Police Practice and Research, 19*(4), 412–428.

Kahrizi, A. H., Miu, M., Chan, C. C. K., & Ferworn, A. (2022). Universal simulation platform, a VR simulator for IED neutralization training. https://doi.org/10.1109/HST56032.2022.10025428

Kaszeta, D. J. (2022). Interagency planning and cooperation (pp. 41–57). https://doi.org/10.1002/9781119743088.ch4

Kiltz, L. (2011). The challenges of developing a homeland security discipline to meet future threats to the homeland. *Journal of Homeland Security and Emergency Management, 8*(2). https://doi.org/10.2202/1547-7355.1899

Kim, E., & Lee, T. (2022). A study of current status and countermeasures on terrorism in Southeast Asia: Focusing on the Philippines. *Korean Police Studies Review, 21*(2), 87–108. https://doi.org/10.38084/2022.21.2.4

Leitner, M., Skopik, F., & Pahi, T. (2024). Operational cyber incident coordination revisited: Providing cyber situational awareness across organizations and countries. *Information Security Journal: A Global Perspective*, 1–22. https://doi.org/10.1080/19393555.2024.2334787

Martin, B., Manacapilli, T., Crowley, J. C., Adams, J., Shanley, M. G., Steinberg, P. S., & Stebbins, D. (2013). *Assessment of Joint Improvised Explosive Device Defeat Organization (JIEDDO) training activity*. https://apps.dtic.mil/dtic/tr/fulltext/u2/a590699.pdf

Mete, S., Oz, N. E., Gul, M., Serin, F., & Celik, E. (2019). A risk assessment approach using both stochastic data and subjective judgments. In *Advances in Intelligent Systems and Computing* (pp. 1104–1111). https://doi.org/10.1007/978-3-030-23756-1_130

Moore, M., Landree, E., Hottes, A., & Shelton, S. (2018). *Environmental biodetection and human biosurveillance research and development for national security: Priorities for the Department of Homeland Security Science and Technology Directorate*. RAND Corporation. https://doi.org/10.7249/RR2398

Nikolaienko, B., Misiura, A., Storchak, A., & Dimitrov, P. (2024). Training of specialists as one of the aspects of resilience of critical infrastructure. *Information Technology and Security, 12*(1), 102–112. https://doi.org/10.20535/2411-1031.2024.12.1.306276

Oakes, B. D., Mattsson, L., Näsman, P., & Glazunov, A. A. (2018). A systems-based risk assessment framework for intentional electromagnetic interference (IEMI) on critical infrastructures. *Risk Analysis, 38*(6), 1279–1305. https://doi.org/10.1111/risa.12945

Odhiambo, N. A., Ochara, N. M., & Kadyamatimba, A. (2019). Cultivating optimal collaborative decision making in counterterrorism contexts: An empirical investigation. *International Journal of Public Administration, 44*(3), 202–214. https://doi.org/10.1080/01900692.2019.1676777

Öztürk, A. (2024). State of research: Relevance of computer emergency response teams in operational technology. *European Conference on Cyber Warfare and Security, 23*(1), 724–732. https://doi.org/10.34190/eccws.23.1.2358

Preet, N., & Chahal, B. P. S. (2024). From resistance to adoption. In *Advances in Human Resources Management and Organizational Development Book Series* (pp. 47–68). https://doi.org/10.4018/979-8-3693-7668-3.ch003

Ramirez, D., & Lopez, M. (2021). Improving police preparedness for bomb threats: Insights from cross-national studies. *Security Journal, 34*(2), 245–264.

Rhoades, A., & Helmus, T. (2020). *Countering violent extremism in the Philippines: A snapshot of current challenges and responses*. RAND Corporation. https://doi.org/10.7249/RRA233-2

Salayma, M. (2023). Risk and threat mitigation techniques in Internet of Things (IoT) environments: A survey. *arXiv*. https://doi.org/10.48550/arXiv.2310.01676

Smith, A., & Johnson, B. (2019). Enhancing communication strategies during bomb threat incidents. *Journal of Emergency Management, 25*(2), 45–60.

Theodosiadou, O., Chatzakou, D., Tsikrika, T., Vrochidis, S., & Kompatsiaris, I. (2023). Real-time threat assessment based on hidden Markov models. *Risk Analysis, 43*(10), 2069–2081. https://doi.org/10.1111/risa.14105

Tillberg, L. V. (2020). The dynamics of military skills: The role of experience-based knowledge in challenging situations. *Scandinavian Journal of Military Studies, 3*(1), 55–67. https://doi.org/10.31374/sjms.40

Wahyudi, R., & Syauqillah, M. (2022). Strengthening cooperation among intelligence agencies in the enforcement of law on terrorism: The case of Indonesia. *JISPO Jurnal Ilmu Sosial Dan Ilmu Politik, 12*(1), 23–38. https://doi.org/10.15575/jispo.v12i1.14370

Wasomi, M. B., Kisilu, J. R., & Imbiakha, C. (2024). Enhancing cooperation to counter improvised explosive devices (IEDs) in Kenya. *International Journal of Research and Innovation in Social Science, 8*(6), 2110–2122. https://doi.org/10.47772/IJRISS.2024.806158

Whitney, P. D., Coles, G. A., Young, J., Wolf, K. E., Thompson, S. E., Niesen, D. A., Madsen, J. M., & Henderson, C. L. (2009). Technosocial modeling of IED threat scenarios and attacks. *National Conference on Artificial Intelligence*, 142–147.

Yi, J., Zheng, G., Zhou,W., Zhang, Y., & Li, T. (2014). *EOD robot control system, EOD robot control method and EOD robot using EOD robot control method* (U.S. Patent No. US20140189801A1). Google Patents. https://patents.google.com/patent/US20140189801A1

Jones, R., Walker, P., Smith, T., & Carter, L. (2020). Technology-based risk assessment in bomb threat response. *Journal of Security Engineering, 17*(2), 115–130.

Velasco, R. T., & Reyes, M. P. (2020). Inter-agency coordination challenges in bomb threat response operations in the Philippines. *Philippine Journal of Public Safety and Security, 10*(1), 55–7