Public Health in Practice 9 (2025) 100598

Contents lists available at ScienceDirect

Public Health in Practice

journal homepage: www.sciencedirect.com/journal/public-health-in-practice

An analysis of systemic incident investigation methodologies applied in serious injury or fatality events: A rapid systematic review

Joanne E. Porter [a,*], Elissa Dabkowski [b], Warren Smith [c], Alex Fernando [c], Liz Seaward [d]

[a] Director of the Collaborative Evaluation and Research Centre (CERC) Federation University Australia, Gippsland, Victoria, Australia
[b] Research Fellow Collaborative Evaluation and Research Centre (CERC) Federation University Australia, Gippsland, Victoria, Australia
[c] Incident Analytics® Pty Ltd, Australia
[d] Collaborative Evaluation and Research Centre (CERC) Federation University Australia, Gippsland, Victoria, Australia

ARTICLE INFO

Keywords:
Fatalities
Causation factors
Safety
Serious injury and fatality potential

ABSTRACT

Objective: This rapid review examines studies that have applied an accident causation analysis method building upon the seminal systematic review conducted by Hulme et al. (2019).
Study design: A rapid review of the literature.
Methods: The following databases, Scopus, EBSCO, Academic Search Compete, CINAHL Complete, MEDLINE, APA PsycArticles, APA PyscINFO, Business Source Ultimate, Business Source Complete, Web of Science and Science Direct were searched for articles that were published from 2019 to June 2023. Eligible studies applied accident analysis modelling to serious injury and fatalities across a variety of industries.
Results: A total of five papers met the inclusion criteria of the rapid review. The studies applied a variety of accident causation models from single large-scale accidents to multiple accident analysis originating predominately from manufacturing industries. The data continued to support the evidence of accident causation analysis models focus on errors, malfunctions, and deficiencies rather than a whole of systems approach and remained complex and difficult to interpret. Based upon the core elements of existing models and following the rapid review of the literature, a novel accident causation analysis approach called the SCALE® Process Model was introduced.
Conclusion: There is need to further explore research-based incident analysis reporting systems that can be applied across a variety of industries and disciplines. The SCALE® Process Model uses systemic techniques to provide a deeper understanding of how multiple factors contribute to the severity of an event aiding in reducing the incidence of serious injuries and fatalities.

1. Introduction

Accident causation and incident investigation methodologies vary from linear approaches through to contemporary systems approaches, developed to better address the increasingly complex work environment. The foremost contemporary methodologies continue to include AcciMap [2], STAMP (Systems Theoretic Accident Model and Process) [3], FRAM [4] (Functional Resonance Analysis Model) and HFACS [5] (Human Factor Analysis and Classification System). These methodologies apply a systems view of accident causation and have been applied in many contexts including mining, aviation, health and transport [1]. While these methodologies continue to be at the forefront of safety investigation, it is important to note that they are often difficult and complex to apply and may need to be evaluated for their continued efficacy with emerging hazards and technologies.

Traditionally alarm-based approaches have been used to alert the operator to a risk or potential danger. This approach relies on the reaction and capability of the operator to respond to the alarm and then act to reduce or eliminate the risk, returning operations to a state of safety [21]. With advances in technology and the introduction of Remote Operation Centres (ROC's), as seen in offshore industries such as gas and wind, operators are required to develop an enhanced situation awareness and capabilities for early interventions to prevent unwanted events and incidents [21]. It is imperative that operators are provided with comprehensive knowledge and awareness of early sense-making of deviations. It is therefore important to combine suitable technologies,

* Corresponding author.
E-mail address: joanne.porter@federation.edu.au (J.E. Porter).

https://doi.org/10.1016/j.puhip.2025.100598
Received 25 April 2024; Received in revised form 9 January 2025; Accepted 10 January 2025
Available online 19 February 2025