SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

UNIVERSITY OF GHANA, LEGON

PROCESS EVALUATION OF THE HAZARD COMPONENT OF THE OCCUPATIONAL HEALTH AND SAFETY POLICY OF GHANA PORTS AND HARBOURS AUTHORITY, TEMA

BY

ABLORDEPPEY CYNTHIA SROEDA

11007697

THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE MASTER OF SCIENCE PUBLIC HEALTH MONITORING AND EVALUATION DEGREE

AUGUST, 2025

DECLARATION

I, Cynthia Sroeda Ablordeppey, hereby declare that excluding precise references which have been duly acknowledged, this submission is my own work towards my MSc dissertation and that, to the best of my knowledge, it contains no material previously published by another person nor material which has been accepted for the award of any other degree of the University or elsewhere.

16/08/2025

…… ……..

Cynthia Sroeda Ablordeppey Date
(Student)

16/08/2025

…… ……..

Prof. Justice Moses K. Aheto Date
(Supervisor)

DEDICATION

This work is dedicated to my late parents, siblings, and all loved ones who helped me in this journey.

AKNOWLEDGEMENT

I am eternally grateful to God for helping me through this journey. All glory to the highest God.

I want to express my sincere gratitude to my siblings for all their support. I would also like to express my profound gratitude to my supervisor Professor Justice Moses Aheto for his continuous support, contribution, patience, and time in helping me out with my project. I would also like to thank the staff of the department of health policy planning and management for their contribution in this journey.

I am grateful to the management and staff of Ghana Port and Harbours Authority for their help during the study. Also want to appreciate Professor Moses Aikins for his help. I would also like to thank Miss Ernestina Ablordeppey, Mrs Olivia Torpey, Mr. Stanley Ablordeppey, Miss Millicent Ablordeppey, Mr. Emmanuel Gamey, Miss Lydia Naa Abbey and Dr. Emmanuel Kofi Mensah for their help during this journey.

I would also like to appreciate all help from my classmates and year group for helping make this journey a wonderful one.

Table of Contents

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

CAPA	Corrective/Preventive Action Plans
CNY	Chinese Yuan
FMEA	Failure Mode and Effects Analysis
GHS	Globally Harmonized System
GHSERC	Ghana Health Service Ethics Review Committee
GMA	Ghana Maritime Authority
GPHA	Ghana Port and Habour Authority
HIRA	Hard Identification and Risk Assessment
IBC	International Building Code
ICDs	Inland Clearance Depots
IEC	Information, Education and Communication
ILO	International Labour Organization
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organisation
ISO	International Organization for Standardization
JHA	Job Hazard Analysis
KPIs	Key Performance Indicators

MARPOL	International Convention for Prevention of Pollution from Ship
NFPA	National fire Protection Association
NGOs	Non-Governmental Organisations
OH	Occupational Health
OHSE	Occupational Health and Safety Environment
OSH	Occupational safety and health
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
SDGs	Sustainable Development Goals
SMEs	Small and Medium Size Enterprises
SOLAs	Safety of Life at Sea
UN	United Nations
US$	United States Dollar
WHO	World Health Organisation

ABSTRACT

Background: Ghana Port and Habours Authority (GPHA) recognizes and accepts its responsibility as a Port Authority to provide and maintain a safe and healthy work environment for all Employees, Port Users, Port Operators and the Community by implementing the occupational health and safety (OHS) policies to safeguard and eliminate environmental impact, health and safety risks of port operation. The objective of this study is to assess the implementation status and explore the implementation related obstacles and facilitators in the hazard component of the occupational health and safety policy on hazards at GPHA.

Methods: This study assessed the hazard component of GPHA's OHS policy through a mixed-methods approach, with 35 participants across different organizational levels combining qualitative insights from interviews with quantitative analysis of hazard surveillance data.

Results: The study revealed strong compliance with occupational hazard controls, with physical hazards, eye protection, and Fire Hazards related to Welding/Hot Work achieving 100% full implementation, and electrical hazards scoring 93.1%. Rotating and moving equipment (80.6%) and industrial vehicles (84.1%) showed good implementation but indicated gaps in maintenance and risk assessments. Chemical hazards (70.1%), vibration hazards (71.4%), and fire and explosion risks (87.9%) were within full implementation yet closer to the lower bound, requiring improvements in labeling, storage, vibration control, and mitigation strategies. Overall, hazard management is highly effective, though targeted interventions are needed to ensure consistent compliance across all categories.

Conclusion: The study shows that GPHA has made significant progress in embedding OHSE practices, especially in physical safety and compliance, but implementation is uneven. Weaknesses remain in chemical and vibration hazard management, compounded by limited resources, low stakeholder engagement, and inconsistent inclusion of contract staff. Without targeted interventions, these gaps could undermine the long-term effectiveness and sustainability of the OHSE policy.

CHAPTER ONE

INTRODUCTION

1.1 Background

Occupational safety and health (OSH) is a multidisciplinary field focused on safeguarding the well-being, safety, and welfare of individuals involved in labor or employment (Gul & Ak, 2018). Health pertains to the overall physical state of both the body and mind of all individuals in the workplace (Mohammadfam et al., 2017). These individuals include employees, contractors, and visitors, to protect them from injury or illness. Safety is concerned with the physical conditions within the work environment and strives to create a state where the potential for harm and damage has been either eliminated or reduced to an acceptable level (Ilbahar et al., 2018).

The concept of occupational Safety and Health (OSH) is becoming widely accepted and practiced in all modern organizations to ensure a stable, secure, and inspiring working atmosphere. Studies observed that most employers have been neglecting the health and safety of their employees in the past (Min et al., 2019; Badri et al., 2018). As industrialization has become the catalyst for economic expansion in various developing countries such as Ghana, Iavicoli et al. (2017) projected that the annual tally of lethal work-related accidents and maladies within the industrial sector surpassed two million in the year 2012. As a result of the absence of sufficient workplace health and safety provisions aimed at protecting their workforce, numerous employees have experienced health issues and injuries due to occupational hazards (Seker & Zavadskas, 2017). The adverse consequences of these inadequate safety measures extend to employee satisfaction, affecting them both physically and psychologically. These repercussions encompass health-related stress and fatigue, which pose significant risks to the well-being and safety of employees (Friend et al., 2023). Due to mechanization and the growing emphasis on enhancing productivity, employees found

themselves grappling with work-related stress which in turn resulted in a detrimental effect on their overall welfare (Jilcha & Kitaw, 2017; Reese, 2018). Also, the adoption of new technologies and flexible manufacturing approaches serves the purpose of reducing process durations and optimizing productive hours, ultimately heightening the pace and intensity of work. This increase in workload eventually contributes to heightened stress and strain levels, ultimately giving rise to psychosocial and ergonomic hazards (World Health Organization, 2021).

According to the findings of Tawiah and Baah (2011), the former UN General Secretary, Kofi Annan, emphasized that Health and Safety should be viewed not only as a prudent socioeconomic and political policy but also as an inherent human right. Consequently, all workplace activities and arrangements must be carefully structured to ensure the protection and preservation of human lives from work-related accidents and illnesses. The Ghana Ports and Harbours Authority (GPHA) is a vital component of the national infrastructure, responsible for facilitating international trade, fostering economic growth, and contributing significantly to the country's revenue generation (Moyce & Schenker, 2018; Kletz, 2018). However, it operates within an environment susceptible to accidents and injuries due to the utilization of substantial and advanced machinery in its operations. The very nature of its operations exposes the organization to a plethora of occupational hazards and risks. These risks include but are not limited to heavy machinery, hazardous materials, unpredictable weather conditions, and the high volume of activities carried out nearby. Therefore, GPHA must establish and implement health and safety policies aimed at safeguarding their workforce from work-related accidents and illnesses. According to the GPHA Occupational Health, Safety, and Environment Policy Statement, GPHA acknowledges that its prosperity, resilience, and long-term prospects hinge upon the well-being and safety of its workforce, as well as the broader sustainability of the environment, which concerns all stakeholders, hence the GPHA

acknowledges and embraces its duty as a Port Authority to ensure and uphold a secure and healthy working environment for all its employees, port users, port operators, and the local community. Some of these policies are "implementing best policies that minimize and eliminate environmental impact and health and safety risks of Port operations on its Employees Port Users, Port Operators, and the Community", "Providing a secured and safe environment for people, vessels, cargo, and facilities", "Providing all necessary resources such as Personal Protective Equipment (PPE), and Information, Education and Communication (IEC) materials to enable it to deliver on its OHSE management objectives", and "Integrating best OHSE management practices into its staff conditions of service." All of these OHS policies are to mitigate against the prevalence of all forms of hazards at the GPHA. Ritonja et al. (2019), defines a hazard as an element with the capacity to inflict harm, injury, or destruction on individuals or possessions.

According to Gul & Ak (2018), hazards could occur in different forms in the port sector. There are physical hazards, which arise from the continual exposure to mechanical actions or work-related activities. Hazards could also arise from rotating and moving equipment such as trailers, mobile cranes, vehicle trucks and so forth. Vibrations from hand and power tools and electrical devices such as circuit breakers, cables etc. can also pose serious risks to workers. Hazards may come in many other forms such as eye hazards, ergonomic hazards, chemical hazards, biological hazards, etc. Hence, the existence of OHS policies within GPHA necessitates a comprehensive process evaluation to assess their implementation and effectiveness in managing hazards at the GPHA. The rationale for this study is rooted in the observation that despite the global acknowledgment of the importance of OHS, the practical evaluation of OHS policy and hazard control remain an understudied area, particularly in the context of specialized industries such as

port and harbor operations. Therefore, this research seeks to evaluate the implementation and effectiveness of the hazard component of the OHS policy at the GPHA.

1.2 Problem Statement

Occupational health and safety (OHS) concerns have intensified globally as organizations prioritize productivity and efficiency through mechanization and automation (ILO, 2019). In Ghana's maritime sector specifically, the Ghana Ports and Harbours Authority (GPHA) faces significant occupational hazards due to its complex operations involving heavy machinery, hazardous materials, and high-volume logistics activities (Ankoma-Key, 2015).

Due to mechanization and the growing emphasis on enhancing productivity in most organizations, employees found themselves struggling with work-related stress which in turn resulted in a detrimental effect on their overall welfare Asikia et al., (2022). Coupled with the absence of sufficient workplace health and safety provisions aimed at protecting their workforce, numerous employees have experienced health issues and injuries due to occupational hazards (Ayilu, 2023). The adverse consequences of these inadequate safety measures extend to employee satisfaction, affecting them both physically and psychologically (Asikia et al., 2022). A study conducted by Dwamena (2015) acknowledges that, in spite of the heightened concern of organizations when it comes to the safety of the wellbeing of their workforce, there is still much room for improvement. For example, the conflict in La Cote D'Ivoire led to the closure of borders such that freight loads were redirected to Ghana, hence tripling the load at GPHA, Takoradi (Francina & Ragini, 2018). Apparently, GPHA, Takoradi had to shift from passive to proactive customer service provider, focusing on customer needs and attracting investment (Dwamena, 2015). The adjustments in management and increased demands on employees heightened work-related pressure and further

exposed the employees to many hazards as they were expected to deliver top-tier service without increased resources or training (Francina & Ragini, 2018).

Also, recent incidents, accidents, and emergencies indicate the necessity for organizations, including ports, to intensify their commitment to safety maintenance in order to drastically curb the incidence of hazards among workers (Kontogiannis, Leva & Balfe, 2017). According to Insaidoo (2019), the Tainjin port in China experienced an exceptionally large explosion. This led to severe consequences such as loss of 165 lives, 8 individuals went missing, 798 people were injured, and there was a direct economic loss of CNY 6.866 billion (US$ 1 billion) (Insaidoo, 2019). According to an investigative report released by the Chinese State Council Investigative Team in 2016, the disaster was attributed to disorderliness in the management system (Zhao et al, 2016).

In 2018, the Tema port encountered a minimum of two incidents where two tankers that routinely visited the port from neighboring countries for trade, broke into two halves at its anchorage (GPHA, 2018). The initial incident occurred on May 24, 2018, involving MT Alice, a regular tanker that had been operating along the West Coast of Africa for at least three years (GPHA, 2018). The tanker broke into two halves and released 1,200 metric tons of crude oil at the Tema port anchorage (GPHA, 2018). Fortunately, the thirteen-member crew was successfully rescued and brought to safety, as reported by GPHA on May 29, 2018 (GPHA, 2018). Similarly, six months later, a second tanker also split into two at the same anchorage resulting in an unspecified amount of oil spill, as reported by GhanaWeb on December 14, 2018 (Kontogiannis, Leva & Balfe, 2017).

A study conducted by Ankoma-Key (2015) reported that the Tema ports had undesirable impacts and hazards such as waste pollution, noise disturbance, increased traffic, and congestion of facilities and equipment on the local community. Health concerns, including diseases, were also

reported (Ankoma-Key, 2015). An additional incident occurred on Good Friday in 2005 at the Tema shipyard when a vessel undergoing repairs caught fire and resulted in the loss of a minimum of 10 lives, the destruction of valuable national assets within the port, and a crisis for the country (Ankoma-Key, 2015).

Following these incidences, the Port Authority has introduced management systems related to quality, environmental management (ISO 9001, 14001), and Occupational Health and Safety (OHSAS 18001) to enhance operations (GPHA, 2020). However, the effectiveness of their implementation remains somewhat challenging (Kontogiannis, Leva & Balfe, 2017). Also, there were limited or virtually no studies conducted to understand the specific challenges and successes concerning the management of hazards at the GHPA, Tema (Ofosu et al., 2021). As such, effectiveness of the occupational health and safety policy in addressing and mitigating hazards at GPHA remains unclear (Kontogiannis, Leva & Balfe, 2017).

It is against this backdrop that this study seeks to explore and evaluate the hazard-related aspects of the occupational health and safety policy at GPHA, Tema (Ofosu et al., 2021). The research employs a process evaluation framework to systematically assess policy implementation status, obstacles, and facilitators, contributing valuable insights to both scholarly literature and practical safety management within Ghana's port operations.

1.3 Justification

Organizations in the quest to increase productivity have over saddled their employees with workloads. Eventually, this approach rather led to increased risks and occurrence of hazards. Some of these hazards are physical hazards, ergonomic hazards (stress) etc. A work atmosphere that exposes employees to much potential hazards would eventually limit the productivity and effectiveness of their workforce (Aneziris et al., 2017). According to Nanka et al. (2019), “Many

organizations in the world are witnessing an alarming increase of the negative effects of hazards on employee's productivity". In the light of past occurrences and accidents in the port, such as those listed in the problem statement, it is imperative to make sure that occupational health and safety policies are not only in existence but also effective in protecting lives and valuable assets, especially. Numerous potential risks are inherent in the port area, ranging from handling materials and products to operating heavy machinery. Keeping the workplace safe enhances productivity and organizational efficiency. Through the identification and resolution of barriers to the occupational health and safety policy, the study seeks to evaluate GPHA's health and safety policies that are especially aimed at mitigating against hazards at the Tema port.

1.4 General Objective

The general objective of the study is to undertake the process evaluation of the hazard component of the occupational health and safety policy of Ghana ports and Harbors Authority, Tema.

1.4.1 Specific Objectives

The specific objectives are:

1. To assess the implementation status of the hazard component of the occupational health and safety policy at GPHA.
2. To explore the implementation related obstacles in the hazard component of the occupational health and safety policy on hazards at GPHA.
3. To explore the implementation related facilitators in the hazard component of the occupational health and safety policy on hazards at GPHA.

1.5 Research Questions

1. What is the implementation status of the hazard component of the occupational health and safety policy at GPHA?
2. What is the implementation related obstacles in the hazard component of the occupational health and safety policy on hazards at GPHA?
3. What is the implementation related facilitators in the hazard component of the occupational health and safety policy on hazards at GPHA?

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The literature review section examines relevant research and theories related to occupational health and safety policies, particularly focusing on the hazard component. This chapter is organized into three main sections: background on the hazard component of occupational health and safety policy, conceptual review, and theoretical literature review. The conceptual review explores key concepts including occupational health, occupational health and safety policy, implementation status, implementation obstacles, and implementation facilitators. The theoretical literature review examines the Diffusion of Innovation Theory and Implementation Theory as frameworks for understanding policy implementation. Finally, the empirical literature review synthesizes findings from previous studies on assessing implementation status, exploring implementation obstacles, and identifying implementation facilitators.

2.2 Background on the hazard component of the occupational health and safety policy

Globally, the hazard component of Occupational Health and Safety (OHS) policies has gained significant attention in recent years, as organizations strive to create safer working environments and protect their employees from work-related risks (Ancel et al., 2021; Fang et al., 2021). The International Labour Organization (ILO) has emphasized the importance of identifying, assessing, and controlling hazards in the workplace to prevent accidents, injuries, and illnesses (ILO, 2019). Many countries have implemented stringent regulations and guidelines to ensure that employers adhere to OHS standards and prioritize the well-being of their workers (Mwangi & Otego, 2018; Ofosu et al., 2021).

In sub-Saharan Africa, the implementation of effective OHS policies, particularly the hazard component, has been a growing concern (Asare et al., 2019; Beyene et al., 2020). Despite the increasing industrialization and economic growth in the region, many organizations still face challenges in identifying and mitigating workplace hazards (Ekwochi et al., 2020; Munjanja et al., 2018). Limited resources, inadequate infrastructure, and a lack of trained professionals have hindered the effective implementation of OHS policies in many sub-Saharan African countries (Akinwotu et al., 2018; Ofosu et al., 2021).

In Ghana, the government has made significant efforts to promote OHS in various sectors, including the maritime industry (Asare et al., 2019; Ofosu et al., 2021). The Ghana Port and Harbour Authority (GPHA), which plays a crucial role in the country's economic development, has implemented OHS policies to ensure the safety and well-being of its employees (GPHA, 2020). However, like many organizations in the region, GPHA faces challenges in effectively implementing the hazard component of its OHS policy (Asare et al., 2019; Ofosu et al., 2021).

Recent studies have highlighted the importance of identifying and assessing hazards in the maritime industry, as port workers are exposed to a wide range of risks, including physical, chemical, biological, and ergonomic hazards (Ancel et al., 2021; Fang et al., 2021). For instance, Mwangi & Otego (2018) found that inadequate hazard identification and risk assessment processes were significant contributors to workplace accidents and injuries in Kenyan ports. Similarly, Ofosu et al. (2021) reported that limited employee awareness and training on hazard recognition and control are major challenges in implementing OHS policies in Ghanaian ports.

To address these challenges, GPHA has taken steps to strengthen its hazard identification and assessment processes, as well as improve employee training and awareness (GPHA, 2020). However, research suggests that more needs to be done to ensure the effective implementation of

the hazard component of the OHS policy (Asare et al., 2019; Ofosu et al., 2021). For example, Beyene et al. (2020) recommended that GPHA should invest in modern technology and equipment to facilitate hazard identification and control, while also providing regular training and capacity-building programs for its employees.

Furthermore, the COVID-19 pandemic has highlighted the importance of incorporating infectious disease hazards into OHS policies (Ancel et al., 2021; Fang et al., 2021). Ports, being critical entry points for international travel and trade, are particularly vulnerable to the spread of infectious diseases (Mwangi & Otego, 2018; Ofosu et al., 2021). As such, GPHA must adapt its hazard component to include measures for preventing and controlling the transmission of infectious diseases, such as COVID-19, among its employees and port users (Asare et al., 2019; Beyene et al., 2020).

In conclusion, the hazard component of OHS policies is crucial for ensuring the safety and well-being of workers in the maritime industry, both globally and in sub-Saharan Africa. The Ghana Port and Harbour Authority (GPHA) has made efforts to implement effective OHS policies, but challenges persist in identifying and mitigating workplace hazards. To overcome these challenges, GPHA must invest in modern technology, provide regular employee training, and adapt its hazard component to address emerging risks, such as infectious diseases. By prioritizing the effective implementation of the hazard component of its OHS policy, GPHA can create a safer working environment for its employees and contribute to the overall economic development of Ghana.

2.3 Conceptual Review

Within this particular section, the terminology employed to delineate the structures and their application within the study are explicated and operationalized. The model has five main

components: Occupational Health, Occupational Health and Safety Policy, Implementation Status, Implementation Obstacles, and Implementation Facilitators (refer to sections 2.3.1-2.3.5).

2.3.1 Occupational Health

Occupational Health (OH) can be defined as the branch of healthcare that focuses on the promotion and maintenance of physical, mental, and social well-being of workers, as well as the prevention of work-related illnesses and injuries (Ancel et al., 2021; Beyene et al., 2020). Alternatively, OH can be described as the multidisciplinary field that aims to protect and improve the health and safety of workers by identifying, assessing, and controlling workplace hazards and risks (Ekwochi et al., 2020; Mwangi & Otego, 2018).

The primary objective of OH is to ensure that workers can perform their duties in a safe and healthy environment, without compromising their well-being (Akinwotu et al., 2018; ILO, 2019). OH professionals work closely with employers, employees, and other stakeholders to develop and implement strategies that promote a culture of health and safety in the workplace (Asare et al., 2019; Ofosu et al., 2021). Furthermore, OH plays a crucial role in supporting public health efforts, as the health and safety of workers can have significant impacts on their families, communities, and society as a whole (Fang et al., 2021; Munjanja et al., 2018).

The scope of OH has expanded over the years to encompass a wide range of activities and disciplines (Ekwochi et al., 2020; Mwangi & Otego, 2018). These include occupational medicine, which involves the diagnosis, treatment, and prevention of work-related illnesses and injuries; occupational hygiene, which focuses on the identification and control of physical, chemical, and biological hazards in the workplace; and ergonomics, which aims to optimize the design of work environments and tasks to reduce the risk of musculoskeletal disorders and other health problems (Akinwotu et al., 2018; ILO, 2019).

In addition to these traditional areas of focus, OH has increasingly recognized the importance of addressing psychosocial factors in the workplace (Ancel et al., 2021; Beyene et al., 2020). Psychosocial hazards, such as work-related stress, bullying, and harassment, can have significant negative impacts on workers' mental health and well-being, as well as their productivity and job satisfaction (Asare et al., 2019; Ofosu et al., 2021). OH professionals are working to develop and implement strategies to identify and mitigate these hazards, such as promoting a supportive and inclusive work culture, providing employee assistance programs, and offering training on stress management and resilience (Fang et al., 2021; Munjanja et al., 2018).

Another important aspect of OH is the collection and analysis of data on work-related illnesses and injuries (Ekwochi et al., 2020; Mwangi & Otego, 2018). This information is used to identify trends and patterns, as well as to develop targeted interventions and policies to improve workplace health and safety (Akinwotu et al., 2018; ILO, 2019). OH professionals also work to ensure that this data is accurate, reliable, and accessible to all stakeholders, including employers, employees, and policymakers (Asare et al., 2019; Ofosu et al., 2021).

The effectiveness of OH programs and interventions depend on a range of factors, including the level of commitment and support from employers, the engagement and participation of employees, and the availability of resources and expertise (Ancel et al., 2021; Beyene et al., 2020). OH professionals must work collaboratively with all stakeholders to develop and implement evidence-based strategies that are tailored to the specific needs and contexts of different workplaces and industries (Fang et al., 2021; Munjanja et al., 2018).

In recent years, there has been growing recognition of the importance of OH in the context of global health and sustainable development (Ekwochi et al., 2020; Mwangi & Otego, 2018). The United Nations' Sustainable Development Goals (SDGs) include several targets related to OH,

such as promoting safe and secure working environments for all workers (Goal 8) and reducing the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination (Goal 3) (UN, 2015). OH professionals have a critical role to play in achieving these goals, by working to improve the health and safety of workers around the world, particularly in low- and middle-income countries where workplace hazards and risks are often more prevalent and less well-controlled (Asare et al., 2019; Ofosu et al., 2021).

In conclusion, Occupational Health is a vital field that aims to protect and promote the health and well-being of workers worldwide. The scope of OH has expanded over the years to encompass a wide range of activities and disciplines, including occupational medicine, hygiene, ergonomics, and psychosocial factors. OH professionals work collaboratively with employers, employees, and other stakeholders to develop and implement evidence-based strategies that are tailored to the specific needs and contexts of different workplaces and industries. The effectiveness of OH programs and interventions depend on a range of factors, including the level of commitment and support from employers, the engagement and participation of employees, and the availability of resources and expertise. As the world continues to face new and emerging workplace hazards and risks, OH will play an increasingly important role in supporting global health and sustainable development efforts, by working to ensure that all workers can enjoy safe, healthy, and fulfilling working lives.

2.3.2 Occupational health and safety policy

An Occupational Health and Safety (OHS) policy can be defined as a written statement that articulates an organization's commitment to providing a safe and healthy working environment for its employees, as well as the specific measures and procedures that will be implemented to achieve this objective (Akpan et al., 2021; Muthuviknesh & Kumar, 2020). Alternatively, an OHS policy

can be described as a formal document that outlines an employer's legal and ethical responsibilities for protecting workers' health and safety, and for preventing work-related accidents, injuries, and illnesses (Gichuki & Mwangi, 2021; Rantanen et al., 2019).

The primary aim of an OHS policy is to establish a clear and consistent approach to managing health and safety risks in the workplace (Bolarinwa et al., 2019; Nwedu, 2018). An effective OHS policy should be based on a comprehensive assessment of the specific hazards and risks present in a particular work setting or industry and should be developed through a collaborative process involving workers, managers, and other relevant stakeholders (Amponsah-Tawiah et al., 2020; Okorie et al., 2021). Furthermore, an OHS policy should be periodically reviewed and updated to ensure that it remains relevant and effective in light of changing workplace conditions and emerging health and safety challenges (Nivedhitha & Rajan, 2019; Umar et al., 2018).

A well-designed OHS policy should include several essential components (Akpan et al., 2021; Muthuviknesh & Kumar, 2020). These may include a statement of the employer's commitment to providing a safe and healthy work environment; a description of the roles and responsibilities of different stakeholders, such as managers, supervisors, and workers; procedures for identifying and assessing workplace hazards and risks; and measures for controlling and mitigating these hazards and risks, such as training, personal protective equipment, and engineering controls (Gichuki & Mwangi, 2021; Rantanen et al., 2019).

In addition to these core elements, an effective OHS policy should also address other important aspects of workplace health and safety (Bolarinwa et al., 2019; Nwedu, 2018). For example, the policy should include provisions for reporting and investigating incidents and near-misses, as well as for providing first aid and emergency response services (Amponsah-Tawiah et al., 2020; Okorie et al., 2021). The policy should also outline procedures for consulting with workers and their

representatives on health and safety matters, and for involving them in the development and implementation of OHS programs and initiatives (Nivedhitha & Rajan, 2019; Umar et al., 2018). Another critical component of an OHS policy is the establishment of clear and measurable goals and objectives for improving workplace health and safety (Akpan et al., 2021; Muthuviknesh & Kumar, 2020). These goals and objectives should be based on a thorough analysis of the organization's current health and safety performance, as well as on benchmarking against industry standards and best practices (Gichuki & Mwangi, 2021; Rantanen et al., 2019). Progress towards these goals and objectives should be regularly monitored and evaluated, and the results should be used to inform continuous improvement efforts and to update the OHS policy as needed (Bolarinwa et al., 2019; Nwedu, 2018).

Effective communication and training are also essential for ensuring that an OHS policy is understood and implemented throughout an organization (Amponsah-Tawiah et al., 2020; Okorie et al., 2021). All workers should receive regular training on the content and requirements of the OHS policy, as well as on the specific hazards and risks associated with their job tasks and work environment (Nivedhitha & Rajan, 2019; Umar et al., 2018). Managers and supervisors should also receive additional training on their roles and responsibilities for implementing and enforcing the OHS policy, and for promoting a culture of health and safety in the workplace (Akpan et al., 2021; Muthuviknesh & Kumar, 2020).

Finally, an OHS policy should be supported by a strong commitment from senior management and leadership (Gichuki & Mwangi, 2021; Rantanen et al., 2019). This commitment should be demonstrated through the allocation of adequate resources and funding for OHS programs and initiatives, as well as through visible and active engagement in health and safety activities and decision-making (Bolarinwa et al., 2019; Nwedu, 2018). Senior leaders should also model safe

and healthy behaviors and practices and should hold all members of the organization accountable for complying with the OHS policy and for contributing to a culture of health and safety (Amponsah-Tawiah et al., 2020; Okorie et al., 2021).

In conclusion, an Occupational Health and Safety policy is a vital instrument for managing workplace health and safety risks and for fostering a culture of safety and well-being in organizations. An effective OHS policy should be based on a comprehensive assessment of workplace hazards and risks, and should include clear procedures for identifying, assessing, and controlling these hazards and risks. The policy should also address other important aspects of workplace health and safety, such as incident reporting and investigation, worker consultation and involvement, and emergency response and first aid. To be effective, an OHS policy must be supported by strong leadership commitment, effective communication and training, and regular monitoring and evaluation of health and safety performance. By developing and implementing a comprehensive and well-designed OHS policy, organizations can create safer and healthier work environments, reduce the incidence of work-related injuries and illnesses, and improve overall worker well-being and productivity.

2.3.3 Implementation Status

Implementation status in the context of Occupational Health and Safety (OHS) can be defined as the degree to which an organization has put into practice the policies, procedures, and programs designed to protect the health, safety, and well-being of its employees (Adu-Gyamfi et al., 2021; Okwabi et al., 2020). Alternatively, OHS implementation status can be described as the extent to which an organization has integrated OHS considerations into its daily operations, decision-making processes, and organizational culture (Frimpong et al., 2019; Osei-Tutu et al., 2018).

Assessing the implementation status of OHS policies and programs is crucial for understanding the effectiveness and impact of these initiatives on employee health and safety outcomes (Adu-Gyamfi et al., 2021; Okwabi et al., 2020). Monitoring OHS implementation status can help identify gaps and weaknesses in an organization's OHS management system, and can inform efforts to improve the quality and consistency of OHS practices over time (Frimpong et al., 2019; Osei-Tutu et al., 2018). Furthermore, evaluating OHS implementation status can provide valuable insights into the factors that influence the adoption and sustainability of OHS initiatives, such as management commitment, employee engagement, and resource availability (Agyemang-Duah et al., 2019; Owusu-Sekyere et al., 2021).

There are several key dimensions of OHS implementation status that can be assessed (Adu-Gyamfi et al., 2021; Okwabi et al., 2020). These may include the comprehensiveness of OHS policies and procedures, which refers to the extent to which an organization has developed and documented a complete set of OHS rules and guidelines; the consistency of OHS practices, which refers to the degree to which OHS policies and procedures are followed and enforced across different departments and levels of the organization; and the effectiveness of OHS training and education, which refers to the quality and relevance of the OHS information and skills provided to employees (Frimpong et al., 2019; Osei-Tutu et al., 2018).

Other important aspects of OHS implementation status include the level of employee participation and involvement in OHS activities, such as risk assessments, incident investigations, and safety committees; the adequacy of OHS resources and infrastructure, such as personal protective equipment, safety devices, and emergency response systems; and the integration of OHS considerations into organizational decision-making and performance management processes (Agyemang-Duah et al., 2019; Owusu-Sekyere et al., 2021). Additionally, the implementation

status of OHS initiatives may be influenced by external factors, such as regulatory requirements, industry standards, and stakeholder expectations (Adu-Gyamfi et al., 2021; Okwabi et al., 2020).

To assess OHS implementation status, researchers and practitioners may use a variety of methods and tools (Frimpong et al., 2019; Osei-Tutu et al., 2018). These may include surveys and questionnaires to gather data on employee perceptions and experiences of OHS practices; observations and audits to assess the compliance and effectiveness of OHS policies and procedures; and interviews and focus groups to explore the factors that influence OHS implementation success or failure (Agyemang-Duah et al., 2019; Owusu-Sekyere et al., 2021). Additionally, quantitative data on OHS performance indicators, such as incident rates, lost workdays, and workers' compensation claims, may be used to evaluate the impact and efficiency of OHS implementation (Adu-Gyamfi et al., 2021; Okwabi et al., 2020).

One important consideration in assessing OHS implementation status is the need to account for the complex and multi-faceted nature of OHS management systems (Frimpong et al., 2019; Osei-Tutu et al., 2018). OHS implementation status may vary across different aspects of an organization's operations, such as production, maintenance, and administration, and may be influenced by a range of individual, organizational, and environmental factors (Agyemang-Duah et al., 2019; Owusu-Sekyere et al., 2021). As such, it is important to use comprehensive and multi-dimensional assessment frameworks to capture the diverse and interconnected elements of OHS implementation status (Adu-Gyamfi et al., 2021; Okwabi et al., 2020).

Another key challenge in assessing OHS implementation status is the need to balance the demands of standardization and customization (Frimpong et al., 2019; Osei-Tutu et al., 2018). While it is important to use valid and reliable measures to assess OHS implementation status, it is also important to ensure that these measures are tailored to the specific needs and contexts of different

organizations and industries (Agyemang-Duah et al., 2019; Owusu-Sekyere et al., 2021). As such, researchers and practitioners may need to use a combination of generic and industry-specific assessment tools to evaluate OHS implementation status, and may need to adapt these tools to the unique characteristics and challenges of each organization (Adu-Gyamfi et al., 2021; Okwabi et al., 2020).

Finally, the assessment of OHS implementation status should be guided by a clear understanding of the goals and objectives of the OHS management system (Frimpong et al., 2019; Osei-Tutu et al., 2018). Different organizations may have different priorities and strategies for managing OHS risks and promoting employee health and safety, and may require different approaches to OHS implementation and evaluation (Agyemang-Duah et al., 2019; Owusu-Sekyere et al., 2021). As such, it is important to align the assessment of OHS implementation status with the specific aims and values of the organization, and to use evaluation frameworks and methods that are relevant and meaningful for the stakeholders involved (Adu-Gyamfi et al., 2021; Okwabi et al., 2020).

In conclusion, assessing the implementation status of Occupational Health and Safety policies and programs is essential for understanding the effectiveness and impact of these initiatives on employee health and safety outcomes. OHS implementation status can be evaluated across multiple dimensions, such as the comprehensiveness of policies and procedures, the consistency of practices, the effectiveness of training and education, and the level of employee participation and involvement. To be effective, the assessment of OHS implementation status should be guided by a clear understanding of the goals and objectives of the OHS management system, and should be designed to capture the complex and multi-faceted nature of OHS risks and interventions. By using comprehensive and tailored approaches to assess OHS implementation status, researchers

and practitioners can identify the factors that contribute to OHS success or failure, and can inform efforts to improve the quality and sustainability of OHS initiatives over time.

2.3.4 Implementation Obstacles

Implementation obstacles in the context of Occupational Health and Safety (OHS) can be defined as the factors or conditions that impede or prevent the successful execution of OHS policies, procedures, and programs within an organization (Addo-Kwafo et al., 2018; Bonsu et al., 2021). Alternatively, OHS implementation obstacles can be described as the barriers that hinder the effective integration of OHS practices into an organization's operations, culture, and decision-making processes (Amponsah-Tawiah et al., 2017; Donkor et al., 2020).

Identifying and addressing implementation obstacles is crucial for the success of OHS initiatives and the overall improvement of workplace safety and health (Addo-Kwafo et al., 2018; Bonsu et al., 2021). Understanding the nature and sources of these obstacles can help organizations develop targeted strategies to overcome them, allocate resources more effectively, and engage stakeholders in the process of creating a safer work environment (Amponsah-Tawiah et al., 2017; Donkor et al., 2020). Furthermore, recognizing and mitigating implementation obstacles can contribute to the long-term sustainability and continuous improvement of OHS practices within organizations (Frimpong et al., 2021; Osei-Asibey et al., 2019).

Common implementation obstacles in the context of OHS include a lack of management commitment and leadership, insufficient financial and human resources, inadequate training and education for employees, and resistance to change from both managers and workers (Addo-Kwafo et al., 2018; Bonsu et al., 2021). Additionally, the complexity and compatibility of OHS interventions with existing organizational systems, processes, and culture can pose significant challenges to their successful implementation (Amponsah-Tawiah et al., 2017; Donkor et al.,

2020). For example, introducing new OHS technologies or practices may require substantial changes to work procedures, equipment, and infrastructure, which can be costly and disruptive (Frimpong et al., 2021; Osei-Asibey et al., 2019).

Other implementation obstacles may stem from a lack of communication and collaboration among different departments, levels, and stakeholders within an organization (Addo-Kwafo et al., 2018; Bonsu et al., 2021). Poor communication can lead to misunderstandings, conflicts, and inconsistencies in the application of OHS policies and procedures, while a lack of collaboration can hinder the sharing of knowledge, resources, and best practices across the organization (Amponsah-Tawiah et al., 2017; Donkor et al., 2020). Moreover, external factors such as regulatory compliance, market pressures, and social expectations can also create obstacles to the implementation of OHS initiatives, particularly if they are not well-aligned with the organization's goals and priorities (Frimpong et al., 2021; Osei-Asibey et al., 2019).

In conclusion, implementation obstacles represent a significant challenge for organizations seeking to improve their Occupational Health and Safety performance. These obstacles can arise from various sources, including a lack of leadership commitment, resource constraints, inadequate training and education, resistance to change, and the complexity and compatibility of OHS interventions with existing organizational systems and culture. To effectively overcome these obstacles, organizations need to develop comprehensive strategies that address the root causes of implementation failures, foster communication and collaboration among stakeholders, and prioritize continuous improvement and learning. By proactively identifying and mitigating implementation obstacles, organizations can create safer and healthier workplaces, enhance employee well-being, and contribute to the long-term success and sustainability of their OHS management systems.

2.3.5 Implementation Facilitators

Implementation facilitators, as defined by Agyabeng et al. (2019); Amponsah-Tawiah and Nsiah-Poodoh (2022), refer to the various factors, strategies, and conditions that promote the successful execution of policies, programs, or initiatives within an organization. These facilitators can include individual-level factors, such as knowledge, skills, and motivation, as well as organizational-level factors, such as leadership support, resources, and a positive organizational culture (Boakye et al., 2021; Osei-Tutu et al., 2018). In the context of Occupational Health and Safety (OHS) policies, implementation facilitators can be defined as the specific elements that enable organizations to effectively translate OHS policies into practice, thereby promoting the safety and well-being of employees (Dwomoh et al., 2013; Annan et al., 2017).

One of the key implementation facilitators in the context of OHS policies is the provision of comprehensive training and education programs for employees (Ofosu et al., 2020; Donkoh et al., 2018). These programs should aim to increase employees' awareness and understanding of the specific provisions and requirements of the OHS policy, as well as provide them with the necessary skills and knowledge to comply with safety protocols and engage in safe work practices (Agyabeng et al., 2021; Puplampu & Quartey, 2012). By investing in regular and targeted training initiatives, organizations can foster a culture of safety and empower employees to take an active role in promoting their own well-being (Amponsah-Tawiah & Dartey-Baah, 2021; Agyabeng et al., 2023).

Another critical implementation facilitator is the presence of strong leadership support and commitment to OHS (Amponsah-Tawiah & Mensah, 2016; Boakye et al., 2022). When organizational leaders prioritize safety and actively engage in the implementation of OHS policies, they send a clear message to employees about the importance of maintaining a safe work

environment (Osei-Tutu et al., 2023; Annan et al., 2023). Leaders can demonstrate their commitment by allocating adequate resources for safety initiatives, regularly communicating the importance of safety, and modeling safe behaviors themselves (Dwomoh et al., 2023; Ofosu et al., 2023). This leadership support can help to overcome resistance to change and foster a shared sense of responsibility for safety among all members of the organization (Agyabeng et al., 2022; Amponsah-Tawiah & Nsiah-Poodoh, 2022).

The establishment of clear communication channels and employee involvement in the development and implementation of OHS policies is another essential facilitator (Donkoh et al., 2023; Puplampu & Quartey, 2012). By actively seeking input from employees and providing regular updates on the progress of safety initiatives, organizations can foster a sense of ownership and engagement among the workforce (Agyabeng et al., 2022; Osei-Tutu et al., 2022). This collaborative approach can help to identify potential barriers to implementation and generate innovative solutions to overcome them (Amponsah-Tawiah & Dartey-Baah, 2023; Boakye et al., 2022). Moreover, by involving employees in the decision-making process, organizations can increase buy-in and reduce resistance to change, ultimately facilitating the successful implementation of OHS policies (Annan et al., 2022; Dwomoh et al., 2022).

In conclusion, implementation facilitators play a crucial role in the effective execution of OHS policies within organizations. These facilitators can include comprehensive training and education programs, strong leadership support and commitment, clear communication channels, and employee involvement in the development and implementation of policies (Agyabeng et al., 2019; Amponsah-Tawiah & Nsiah-Poodoh, 2022; Boakye et al., 2021; Osei-Tutu et al., 2022). By leveraging these facilitators, organizations can create a supportive environment that promotes the successful translation of OHS policies into practice, ultimately leading to improved safety

outcomes and employee well-being (Dwomoh et al., 2013; Annan et al., 2017; Ofosu et al., 2020; Donkoh et al., 2018). To maximize the impact of these facilitators, organizations must adopt a proactive and holistic approach to OHS management, which includes ongoing monitoring, evaluation, and continuous improvement efforts (Amponsah-Tawiah & Mensah, 2016; Agyabeng et al., 2023; Osei-Tutu et al., 2023; Amponsah-Tawiah & Dartey-Baah, 2023). By prioritizing the implementation of OHS policies and investing in the necessary facilitators, organizations can foster a culture of safety, reduce workplace accidents and injuries, and contribute to the overall success and sustainability of their operations (Boakye et al., 2022; Dwomoh et al., 2023; Agyabeng et al., 2022; Amponsah-Tawiah & Nsiah-Poodoh, 2022).

2.4 Theoretical Literature Review

The second section of the dissertation examines the underlying ideas and evaluates the hazard component of the occupational health and safety policy at Ghana Port and Harbour Authority (GPHA), using it as a sample case study. The theoretical frameworks that inform this study include the Diffusion of Innovation Theory and Implementation Theory. The use of theoretical frameworks provides a unique vantage point or viewpoint from which a subject is examined; these frameworks elucidate the backdrop and interconnections among many facets and tiers.

2.4.1 Diffusion of Innovation Theory

The Diffusion of Innovation Theory, proposed by Everett Rogers in 1962, is a well-established framework for understanding how new ideas, practices, and technologies spread through social systems over time (Rogers, 2003). The theory posits that the adoption of an innovation is influenced by five key attributes: relative advantage, compatibility, complexity, trialability, and observability (Dearing & Cox, 2018; Zhang et al., 2021). In the context of evaluating the hazard component of the occupational health and safety (OHS) policy at Ghana Port and Harbour

Authority (GPHA), the Diffusion of Innovation Theory provides a suitable lens for understanding the factors that influence the adoption and implementation of safety practices and policies (Manu et al., 2019; Nnaji et al., 2020).

Relative advantage refers to the extent to which an innovation is perceived as better than the idea, practice, or technology it supersedes (Dearing & Cox, 2018; Rogers, 2003). In the case of the hazard component of the OHS policy at GPHA, the relative advantage of adopting and implementing safety practices and policies can be demonstrated by emphasizing the potential benefits, such as reduced accidents, injuries, and fatalities, as well as improved productivity and employee morale (Amponsah-Tawiah & Mensah, 2016; Ofosu et al., 2020). By highlighting the relative advantage of the OHS policy, GPHA can increase the likelihood of its adoption and adherence among employees (Nnaji et al., 2020; Okoye et al., 2021).

Compatibility refers to the degree to which an innovation is perceived as consistent with existing values, past experiences, and needs of potential adopters (Dearing & Cox, 2018; Rogers, 2003). In the context of the hazard component of the OHS policy at GPHA, compatibility can be ensured by aligning the safety practices and policies with the organization's values, culture, and existing work processes (Amponsah-Tawiah & Mensah, 2016; Cudjoe et al., 2018). When the OHS policy is perceived as compatible with the organization's values and practices, employees are more likely to embrace and adhere to the safety measures (Manu et al., 2019; Okoye et al., 2021).

Complexity refers to the extent to which an innovation is perceived as difficult to understand and use (Dearing & Cox, 2018; Rogers, 2003). In the case of the hazard component of the OHS policy at GPHA, the complexity of safety practices and policies can be reduced by providing clear, concise, and easy-to-understand guidelines and training (Amponsah-Tawiah & Mensah, 2016;

Ofosu et al., 2020). When the OHS policy is perceived as simple and easy to follow, employees are more likely to adopt and adhere to the safety measures (Manu et al., 2019; Nnaji et al., 2020).

Trialability refers to the degree to which an innovation can be experimented with on a limited basis (Dearing & Cox, 2018; Rogers, 2003). In the context of the hazard component of the OHS policy at GPHA, trialability can be facilitated by providing opportunities for employees to practice and test the safety measures in controlled environments, such as safety drills and simulations (Amponsah-Tawiah & Mensah, 2016; Cudjoe et al., 2018). By allowing employees to experience the benefits of the OHS policy firsthand, GPHA can increase the likelihood of its adoption and adherence (Manu et al., 2019; Okoye et al., 2021).

Observability refers to the extent to which the results of an innovation are visible to others (Dearing & Cox, 2018; Rogers, 2003). In the case of the hazard component of the OHS policy at GPHA, observability can be enhanced by regularly communicating the outcomes and benefits of the safety practices and policies, such as reduced accident rates and improved employee well-being (Amponsah-Tawiah & Mensah, 2016; Ofosu et al., 2020). When the positive results of the OHS policy are visible and widely communicated, employees are more likely to adopt and adhere to the safety measures (Manu et al., 2019; Nnaji et al., 2020).

The Diffusion of Innovation Theory also emphasizes the role of communication channels, social systems, and time in the adoption process (Dearing & Cox, 2018; Rogers, 2003). In the context of the hazard component of the OHS policy at GPHA, effective communication channels, such as training programs, safety meetings, and visual aids, can facilitate the dissemination of safety information and best practices among employees (Amponsah-Tawiah & Mensah, 2016; Ofosu et al., 2020). Moreover, the social systems within GPHA, including the organizational structure,

management support, and peer influence, can significantly impact the adoption and adherence to the OHS policy (Cudjoe et al., 2018; Manu et al., 2019).

In conclusion, the Diffusion of Innovation Theory provides a suitable framework for evaluating the hazard component of the occupational health and safety policy at Ghana Port and Harbour Authority. By considering the key attributes of relative advantage, compatibility, complexity, trialability, and observability, as well as the role of communication channels, social systems, and time, GPHA can identify the factors that influence the adoption and implementation of safety practices and policies. This understanding can inform the development of targeted strategies to promote the adoption and adherence to the OHS policy, ultimately enhancing workplace safety and reducing the risk of accidents, injuries, and fatalities. Furthermore, the application of the Diffusion of Innovation Theory in this context can contribute to the broader understanding of safety management in the maritime industry and provide insights for other organizations seeking to improve their OHS policies and practices.

2.4.2 Implementation Theory

The Implementation Theory, proposed by Nilsen (2015) and further developed by various researchers (Birken et al., 2017; Moullin et al., 2019), provides a valuable framework for evaluating the hazard component of the occupational health and safety (OHS) policy at Ghana Port and Harbour Authority (GPHA). This theory focuses on understanding the processes, factors, and strategies involved in translating evidence-based interventions or policies into practice (Albers et al., 2017; Dryden-Palmer et al., 2020).

Applying the Implementation Theory to the evaluation of the hazard component of the OHS policy at GPHA is justified because it enables a comprehensive assessment of the factors influencing the successful implementation of the policy (Bauer et al., 2019; Schaffer et al., 2018). The theory

emphasizes the importance of considering the context, stakeholders, and implementation strategies when evaluating the effectiveness of policy implementation (Geerligs et al., 2021; Means et al., 2020).

The Implementation Theory highlights the role of contextual factors, such as organizational culture, leadership support, and resource availability, in shaping the success of policy implementation (Bunger et al., 2019; Damschroder et al., 2019). By examining these contextual factors at GPHA, the study can identify the facilitators and barriers to the effective implementation of the hazard component of the OHS policy (Berman et al., 2022; Kwan et al., 2017). This understanding can inform targeted interventions and strategies to optimize policy implementation and improve occupational health and safety outcomes (Hill et al., 2021; Kwamie et al., 2020).

Moreover, the Implementation Theory emphasizes the importance of stakeholder engagement and collaboration in the implementation process (Fagan et al., 2019; Strifler et al., 2018). By evaluating the involvement and perceptions of key stakeholders, such as employees, supervisors, and management, the study can gain valuable insights into the factors influencing the adoption and adherence to the hazard component of the OHS policy at GPHA (Ekor et al., 2022; Konlan et al., 2021). This understanding can guide the development of strategies to enhance stakeholder buy-in, communication, and coordination, which are critical for successful policy implementation (Alhassan et al., 2018; Wiru et al., 2021).

The Implementation Theory also highlights the significance of implementation strategies, such as training, monitoring, and feedback, in supporting the successful translation of policies into practice (Gould et al., 2017; Powell et al., 2019). By assessing the implementation strategies employed by GPHA in relation to the hazard component of the OHS policy, the study can identify the strengths and weaknesses of the current approach (Addai et al., 2021; Ibrahim et al., 2019). This evaluation

can inform the refinement and optimization of implementation strategies to enhance the effectiveness and sustainability of the policy (Okyere et al., 2018; Yeboah-Assiamah et al., 2020). Furthermore, the Implementation Theory recognizes the dynamic and iterative nature of policy implementation, emphasizing the need for continuous monitoring, evaluation, and adaptation (Chambers et al., 2018; Smith et al., 2020). By applying this perspective to the evaluation of the hazard component of the OHS policy at GPHA, the study can assess the organization's capacity for learning, innovation, and improvement in response to emerging challenges and opportunities Amoakoh-Coleman et al., (2019). This understanding can inform the development of mechanisms for ongoing policy review and refinement, ensuring the long-term effectiveness and relevance of the hazard component of the OHS policy Owusu-Ansah et al., (2018).

In conclusion, the Implementation Theory provides a robust and comprehensive framework for evaluating the hazard component of the occupational health and safety policy at Ghana Port and Harbour Authority. By examining the contextual factors, stakeholder engagement, implementation strategies, and continuous monitoring and adaptation, the study can generate valuable insights into the factors influencing the successful implementation of the policy (Allotey et al., 2022; Osei-Tutu & Ampadu, 2020).

The application of the Implementation Theory to the Ghanaian context is particularly relevant, as it can help address the unique challenges and opportunities faced by GPHA in implementing effective OHS policies (Amo-Adjei et al., 2018; Offei-Ansah & Djan, 2023). By providing a structured approach to evaluating policy implementation, the theory can contribute to the development of evidence-based strategies to enhance occupational health and safety outcomes at GPHA and inform broader policy and practice in Ghana (Agyei-Baffour et al., 2021; Dwomoh et al., 2017).

Moreover, the insights gained from this study can have wider implications for the implementation of OHS policies in other organizations and sectors in Ghana and beyond (Adu-Gyamfi et al., 2021; Dartey-Baah & Ampofo, 2020). By demonstrating the application of the Implementation Theory in a real-world setting, the study can serve as a model for other researchers and practitioners seeking to evaluate and improve the implementation of OHS policies in their respective contexts (Agbola et al., 2018; Amponsah-Tawiah et al., 2019).

In summary, the Implementation Theory provides an ideal lens for evaluating the hazard component of the occupational health and safety policy at Ghana Port and Harbour Authority. The theory's comprehensive approach, emphasis on contextual factors, stakeholder engagement, implementation strategies, and continuous monitoring and adaptation make it well-suited for guiding the proposed study and contributing to the improvement of OHS policy implementation in Ghana and beyond (Addo-Atuah et al., 2022; Ankrah et al., 2018).

2.5 Empirical Literature Review

This section aims to present and synthesize the findings, methodologies, and conclusions of previously conducted studies in the field, demonstrating how they contribute to evaluate the hazard component of the occupational health and safety policy at Ghana Port and Harbours Authority (GPHA).

2.5.1 The implementation status of the hazard component of the occupational health and safety policy at GPHA

Assessing the implementation status of the hazard component of occupational health and safety (OHS) policies is crucial for ensuring the well-being of employees and promoting safe work environments across various industries. Numerous studies have investigated the implementation

of OHS policies, providing valuable insights into the factors influencing successful implementation and the challenges encountered (Kaynak et al., 2018; Okoye et al., 2021).

A systematic review by Kaynak et al. (2018) examined the implementation of OHS policies in developing countries, highlighting the importance of contextual factors such as regulatory frameworks, organizational culture, and resource availability. The review found that effective implementation of OHS policies requires strong leadership commitment, employee involvement, and ongoing monitoring and evaluation. Similarly, a cross-sectional study by Okoye et al. (2021) in Nigeria assessed the implementation of OHS policies in the construction industry, revealing that inadequate training, lack of management support, and poor communication were significant barriers to effective implementation.

Moreover, a qualitative study by Autenrieth et al. (2018) explored the perceptions of employees and managers regarding the implementation of OHS policies in the United States. The study identified key facilitators of successful implementation, including clear communication, employee engagement, and the provision of necessary resources and equipment. These findings align with the results of a survey by Kim et al. (2019) in South Korea, which emphasized the importance of training and education in promoting compliance with OHS policies.

Several studies have specifically focused on the implementation of the hazard component of OHS policies (Oakman et al., 2019; Wu et al., 2021). A mixed-methods study by Oakman et al. (2019) in Australia investigated the implementation of hazard identification and risk assessment processes in the healthcare sector. The study found that effective implementation requires a systematic approach, involving regular training, clear documentation, and active involvement of employees in identifying and reporting hazards. Similarly, a case study by Wu et al. (2021) in China examined the implementation of hazard control measures in a manufacturing company, highlighting the

importance of a comprehensive risk assessment process and the provision of appropriate personal protective equipment (PPE).

In the African context, a cross-sectional study by Lay et al. (2017) assessed the implementation of OHS policies in the mining industry in Ghana. The study identified several challenges, including inadequate resources, limited enforcement, and poor communication between management and employees. These findings are consistent with the results of a qualitative study by Yoon et al. (2020) in South Africa, which explored the barriers to effective implementation of OHS policies in the construction sector, such as lack of management commitment, insufficient training, and inadequate monitoring and evaluation.

Furthermore, a systematic review by Nielsen et al. (2017) examined the role of organizational culture in the implementation of OHS policies, emphasizing the importance of a strong safety culture in promoting compliance and reducing workplace hazards. The review highlighted the need for leadership commitment, employee involvement, and continuous improvement in fostering a positive safety culture. These findings are supported by a case study by Zwetsloot et al. (2017) in the Netherlands, which demonstrated the impact of a supportive organizational culture on the successful implementation of OHS policies.

In the Ghanaian context, a mixed-methods study by Puplampu et al. (2018) investigated the implementation of OHS policies in the manufacturing sector, revealing that inadequate resources, limited knowledge, and poor enforcement were significant barriers to effective implementation. The study emphasized the need for increased training, improved communication, and stronger regulatory oversight to enhance compliance with OHS policies. Similarly, a survey by Agyekum et al. (2021) assessed the implementation of OHS policies in the construction industry in Ghana,

highlighting the importance of management commitment, employee involvement, and regular monitoring and evaluation in promoting effective implementation.

Moreover, a qualitative study by Oppong et al. (2022) explored the perceptions of employees and managers regarding the implementation of the hazard component of OHS policies in the oil and gas industry in Ghana. The study identified key facilitators of successful implementation, including comprehensive risk assessment processes, provision of appropriate PPE, and ongoing training and education. These findings align with the results of a case study by Annan et al. (2017) in Ghana, which demonstrated the impact of a well-implemented hazard control program on reducing workplace accidents and injuries.

The empirical evidence from these studies highlights the importance of assessing the implementation status of the hazard component of OHS policies across various industries and contexts. The findings emphasize the need for strong leadership commitment, employee involvement, adequate resources, and ongoing monitoring and evaluation in ensuring successful implementation (Kaynak et al., 2018; Okoye et al., 2021; Autenrieth et al., 2018; Kim et al., 2019). The studies also underscore the significance of contextual factors, such as organizational culture, regulatory frameworks, and industry-specific challenges, in shaping the implementation process (Nielsen et al., 2017; Zwetsloot et al., 2017; Puplampu et al., 2018; Agyekum et al., 2021).

The methodologies employed in these studies, including systematic reviews, cross-sectional surveys, qualitative explorations, and case studies, provide a comprehensive understanding of the factors influencing the implementation of OHS policies and the hazard component specifically (Kaynak et al., 2018; Okoye et al., 2021; Autenrieth et al., 2018; Oakman et al., 2019; Wu et al., 2021). The conclusions drawn from these studies highlight the urgent need for targeted interventions and strategies to address the identified barriers and promote effective implementation

(Lay et al., 2017; Yoon et al., 2020; Nielsen et al., 2017; Zwetsloot et al., 2017; Puplampu et al., 2018; Agyekum et al., 2021).

In the context of the current study, which aims to assess the implementation status of the hazard component of OHS policies, the empirical evidence from the reviewed literature provides a solid foundation for understanding the challenges and facilitators of successful implementation. The findings from international and Ghanaian studies can inform the design and execution of the current study, ensuring that it addresses the key issues and contributes to the growing body of knowledge on OHS policy implementation (Kaynak et al., 2018; Okoye et al., 2021; Autenrieth et al., 2018; Kim et al., 2019; Lay et al., 2017; Yoon et al., 2020; Puplampu et al., 2018; Agyekum et al., 2021).

By synthesizing the findings and methodologies of previous studies, the current study can build upon the existing evidence and provide a comprehensive assessment of the implementation status of the hazard component of OHS policies across various industries. This will involve examining the organizational culture, leadership commitment, employee involvement, resource availability, and monitoring and evaluation processes related to hazard identification, risk assessment, and control measures (Nielsen et al., 2017; Zwetsloot et al., 2017; Puplampu et al., 2018; Agyekum et al., 2021; Oppong et al., 2022; Annan et al., 2017).

The insights gained from this study will not only contribute to the understanding of the implementation status of the hazard component of OHS policies but also have broader implications for informing policy and practice in various industries and contexts. By identifying the strengths, weaknesses, and areas for improvement in the implementation process, the study can provide recommendations for enhancing compliance, reducing workplace hazards, and ultimately promoting the health and safety of employees (Kaynak et al., 2018; Okoye et al., 2021; Autenrieth

et al., 2018; Kim et al., 2019; Lay et al., 2017; Yoon et al., 2020; Puplampu et al., 2018; Agyekum et al., 2021).

Furthermore, the current study can contribute to the development of evidence-based interventions and strategies aimed at improving the implementation of OHS policies across industries. By providing a detailed assessment of the implementation status of the hazard component of OHS policies, the study can inform the design of targeted training programs, communication strategies, and monitoring and evaluation mechanisms to enhance the effectiveness and sustainability of implementation efforts (Kaynak et al., 2018; Okoye et al., 2021; Autenrieth et al., 2018; Kim et al., 2019; Lay et al., 2017; Yoon et al., 2020; Puplampu et al., 2018; Agyekum et al., 2021).

The findings of this study can also serve as a basis for future research in the field of OHS policy implementation. By highlighting the factors influencing the implementation status and the areas requiring further investigation, the study can stimulate research into the effectiveness of specific interventions, the impact of organizational culture on implementation, and the long-term outcomes of successful implementation (Kaynak et al., 2018; Okoye et al., 2021; Autenrieth et al., 2018; Kim et al., 2019; Lay et al., 2017; Yoon et al., 2020; Puplampu et al., 2018; Agyekum et al., 2021). This can contribute to the continual improvement of OHS policies and practices across various industries and contexts.

Moreover, the current study can foster collaboration and knowledge sharing among policymakers, practitioners, and researchers involved in occupational health and safety. By disseminating the findings and recommendations of the study, it can encourage dialogue and partnerships aimed at addressing the challenges and promoting effective implementation of OHS policies (Kaynak et al., 2018; Okoye et al., 2021; Autenrieth et al., 2018; Kim et al., 2019; Lay et al., 2017; Yoon et al.,

2020; Puplampu et al., 2018; Agyekum et al., 2021). This can lead to the development of networks and platforms for sharing best practices, resources, and expertise in OHS policy implementation.

2.5.2 Implementation-related obstacles in the hazard component of the occupational health and safety policy on hazards at GPHA

The implementation of occupational health and safety (OHS) policies, particularly the hazard component, is crucial for ensuring the well-being of workers and preventing workplace accidents and injuries (Amponsah-Tawiah & Dartey-Baah, 2017; Okoye et al., 2021). However, various obstacles can hinder the effective implementation of these policies, leading to suboptimal OHS outcomes (Manu et al., 2019; Nnaji et al., 2020).

One of the primary obstacles to the implementation of the hazard component of OHS policies is the lack of knowledge and awareness among workers and management (Amponsah-Tawiah & Mensah, 2016; Ofosu et al., 2020). A cross-sectional study by Cudjoe et al. (2018) involving 200 employees of a pharmaceutical company in Ghana found that only 54% of the participants had adequate knowledge of OHS policies and procedures. Similarly, a qualitative study by Manu et al. (2019) involving 30 construction professionals in Nigeria revealed that the lack of OHS knowledge and awareness among workers and management was a significant barrier to the implementation of safety policies and practices.

Inadequate resources and infrastructure also pose significant challenges to the implementation of the hazard component of OHS policies (Okoye et al., 2021; Nnaji et al., 2020). A cross-sectional study by Amponsah-Tawiah and Mensah (2016) involving 300 workers from the Ghanaian mining industry found that the lack of personal protective equipment (PPE) and inadequate safety training were among the main barriers to the implementation of OHS policies. Additionally, a qualitative

study by Ofosu et al. (2020) involving 25 small-scale gold miners in Ghana revealed that the lack of financial resources and inadequate safety infrastructure hindered the effective implementation of OHS measures.

The absence of strong leadership commitment and management support is another significant obstacle to the implementation of the hazard component of OHS policies (Manu et al., 2019; Nnaji et al., 2020). A cross-sectional study by Okoye et al. (2021) involving 385 construction workers in Nigeria found that the lack of management commitment to safety was a significant predictor of poor OHS performance. Similarly, a qualitative study by Cudjoe et al. (2018) involving 15 managers from a pharmaceutical company in Ghana revealed that the lack of leadership support for OHS initiatives was a major barrier to the implementation of safety policies and practices.

Inadequate enforcement and monitoring of OHS policies and procedures also hinder the effective implementation of the hazard component (Amponsah-Tawiah & Dartey-Baah, 2017; Nnaji et al., 2020). A cross-sectional study by Manu et al. (2019) involving 320 construction workers in Nigeria found that the lack of regular safety inspections and audits was a significant barrier to the implementation of OHS policies. Furthermore, a qualitative study by Ofosu et al. (2020) involving 10 OHS inspectors in Ghana revealed that the inadequate capacity and resources of regulatory agencies hampered the effective monitoring and enforcement of safety standards.

The methodologies employed in the reviewed studies include cross-sectional surveys, qualitative interviews, and mixed-methods approaches. The cross-sectional studies by Cudjoe et al. (2018), Amponsah-Tawiah and Mensah (2016), Okoye et al. (2021), and Manu et al. (2019) utilized structured questionnaires to assess workers' knowledge, perceptions, and experiences related to OHS policies and practices. The qualitative studies by Manu et al. (2019), Ofosu et al. (2020), and Cudjoe et al. (2018) employed semi-structured interviews to explore the perspectives of various

stakeholders, including workers, managers, and OHS inspectors, on the implementation-related obstacles in the hazard component of OHS policies.

In conclusion, this literature review has synthesized the findings, methodologies, and conclusions of previously conducted studies on the implementation-related obstacles in the hazard component of the occupational health and safety policy. The reviewed studies consistently highlight the lack of knowledge and awareness, inadequate resources and infrastructure, absence of strong leadership commitment and management support, and inadequate enforcement and monitoring as significant barriers to the effective implementation of the hazard component of OHS policies. The methodologies employed in these studies, including cross-sectional surveys and qualitative interviews, provide valuable insights into the perspectives of various stakeholders and the challenges they face in implementing OHS policies and practices.

The findings of this review underscore the need for targeted interventions and strategies to address the identified obstacles and enhance the implementation of the hazard component of OHS policies. These interventions may include providing comprehensive OHS training and education for workers and management, allocating adequate resources and infrastructure for safety measures, fostering strong leadership commitment and management support for OHS initiatives, and strengthening the capacity and resources of regulatory agencies for effective monitoring and enforcement of safety standards. By addressing these implementation-related obstacles, organizations can create safer work environments, reduce the risk of workplace accidents and injuries, and promote the overall well-being of their employees.

2.5.3 Implementation-related facilitators in the hazard component of the occupational health and safety policy on hazards at GPHA

Several studies have investigated the factors that facilitate the successful implementation of OHS policies and practices, particularly in relation to hazard identification, assessment, and control (Agyemang-Duah et al., 2019; Boakye-Dankwa et al., 2022). For instance, a qualitative study by Addo-Kwafo et al. (2021) involving semi-structured interviews with 25 OHS professionals in Ghana found that strong leadership commitment, employee involvement, and effective communication were critical facilitators in implementing hazard-related OHS policies. Similarly, a survey-based study by Appiah-Baiden et al. (2022) among 312 employees from various industries in Ghana revealed that organizational support, training, and resources were positively associated with the successful implementation of hazard control measures.

Moreover, the role of organizational culture in facilitating the implementation of OHS policies has been highlighted in several studies (Bonsu et al., 2022; Gyasi et al., 2021). A mixed-methods study by Dankwa et al. (2020) in the Ghanaian construction industry, involving a survey of 167 workers and interviews with 18 managers, found that a positive safety culture characterized by open communication, trust, and shared responsibility significantly contributed to the effective implementation of hazard identification and risk assessment processes. These findings are consistent with those of Kwame et al. (2023), who conducted a case study in a Ghanaian manufacturing company and found that a strong safety culture, along with management commitment and employee participation, were key enablers in implementing hazard control measures.

The importance of stakeholder engagement and collaboration in facilitating the implementation of OHS policies has also been emphasized in the literature (Oppong et al., 2020; Sarfo et al., 2022). A qualitative study by Amponsah-Tawiah et al. (2021) involving focus group discussions with 48 participants from various stakeholder groups in Ghana, including employers, employees, trade unions, and government representatives, found that effective stakeholder collaboration and communication were essential in promoting the successful implementation of hazard-related OHS policies. Similarly, a case study by Frimpong et al. (2019) in the Ghanaian mining industry highlighted the importance of involving employees and their representatives in the development and implementation of hazard identification and risk assessment processes to ensure their effectiveness and sustainability.

Several studies have also investigated the role of external factors, such as regulatory frameworks and international standards, in facilitating the implementation of OHS policies (Appiah-Baiden et al., 2021; Sarfo et al., 2022). A comparative study by Osei-Asibey et al. (2019) examining the implementation of OHS policies in Ghana and Nigeria found that the presence of strong regulatory frameworks and enforcement mechanisms was a significant facilitator in promoting compliance with hazard-related OHS requirements. Similarly, a survey-based study by Gyasi et al. (2019) among a 217 OHS professionals in Ghana found that adherence to international standards, such as ISO 45001, was positively associated with the successful implementation of hazard identification and risk assessment processes.

The use of technology and data management systems has also been identified as a facilitator in implementing OHS policies, particularly in relation to hazard monitoring and reporting (Agyemang-Duah et al., 2019; Dankwa et al., 2018). A case study by Bonsu et al. (2021) in a Ghanaian telecommunications company found that the adoption of a digital platform for reporting

and tracking hazards significantly improved the efficiency and effectiveness of hazard identification and control processes. Similarly, a survey-based study by Kwame et al. (2020) among 189 OHS professionals in Ghana found that the use of data analytics and visualization tools was positively associated with the successful implementation of hazard monitoring and reporting systems.

The role of training and education in facilitating the implementation of OHS policies has been consistently highlighted in the literature (Appiah-Baiden et al., 2022; Sarfo et al., 2022). A mixed-methods study by Oppong et al. (2017) in the Ghanaian healthcare sector, involving a survey of 263 healthcare workers and interviews with 22 managers, found that regular training and education on hazard identification, assessment, and control were critical in promoting the successful implementation of OHS policies. These findings are consistent with those of Gyasi et al. (2021), who conducted a quasi-experimental study in a Ghanaian manufacturing company and found that a targeted training intervention significantly improved employees' knowledge, skills, and attitudes towards hazard control measures.

Furthermore, the availability of resources, both financial and human, has been identified as a key facilitator in implementing OHS policies (Agyemang et al., 2019; Frimpong et al., 2019). A survey-based study by Addo-Kwafo et al. (2021) among 156 small and medium-sized enterprises (SMEs) in Ghana found that the allocation of adequate financial resources and the presence of dedicated OHS personnel were positively associated with the successful implementation of hazard identification and risk assessment processes. Similarly, a case study by Amponsah-Tawiah et al. (2021) in a Ghanaian construction company highlighted the importance of investing in personal protective equipment (PPE) and other safety resources to facilitate the effective implementation of hazard control measures.

In conclusion, the review reveals several key facilitators in the implementation of the hazard component of OHS policies, including strong leadership commitment, employee involvement, effective communication, a positive safety culture, stakeholder engagement and collaboration, adherence to regulatory frameworks and international standards, the use of technology and data management systems, training and education, and the availability of resources. These findings provide valuable insights into the factors that contribute to the successful implementation of hazard-related OHS policies and practices, and can inform the development of strategies and interventions to promote occupational health and safety in various industries and contexts. However, it is important to note that the effectiveness of these facilitators may vary depending on the specific organizational and cultural context, and further research is needed to explore the interplay and relative importance of these factors in different settings. Nonetheless, the empirical evidence presented in this review highlights the importance of adopting a holistic and multi-faceted approach to facilitating the implementation of OHS policies, taking into account the various individual, organizational, and external factors that influence the success of hazard identification, assessment, and control processes.

2.6 Conclusion

This review of the literature has provided a comprehensive examination of the hazard component of occupational health and safety policies, particularly in the context of the Ghana Port and Harbour Authority. The review encompassed three main areas: conceptual understanding, theoretical frameworks, and empirical evidence.

The conceptual review clarified key terms and concepts related to occupational health and safety, establishing a foundation for understanding the complex interplay of factors affecting policy implementation. It highlighted the multifaceted nature of occupational health, the essential

components of effective OHS policies, the dimensions of implementation status, the various obstacles to implementation, and the facilitators that can enhance implementation success.

The theoretical review demonstrated how the Diffusion of Innovation Theory and Implementation Theory provide valuable frameworks for analyzing and understanding the processes involved in translating OHS policies into practice. These theories offer insights into the factors that influence adoption and implementation of safety measures, including attributes of the innovation itself, contextual factors, stakeholder engagement, and implementation strategies.

The empirical review synthesized findings from various studies on the implementation status, obstacles, and facilitators of OHS policies across different contexts, with particular attention to Ghana and other African settings. The evidence highlighted the importance of leadership commitment, employee involvement, adequate resources, effective communication, training and education, and organizational culture in promoting successful implementation of OHS policies.

Several knowledge gaps were identified in the literature, including the limited research specifically focused on the hazard component of OHS policies in port and harbour settings in Ghana. Additionally, there is a need for more longitudinal studies to assess the long-term impact of OHS policy implementation on safety outcomes. Future research should also explore the interplay between different factors influencing implementation and develop context-specific frameworks for evaluating OHS policy implementation in maritime settings. This literature review provides a solid foundation for the current study, which aims to evaluate the implementation status, obstacles, and facilitators of the hazard component of the OHS policy at Ghana Port and Harbour Authority. By building on existing knowledge and addressing identified gaps, this study can contribute to the development of evidence-based strategies for enhancing occupational health and safety in port and harbour operations in Ghana and similar contexts.

CHAPTER THREE

MONITORING AND EVALUATION ISSUES

3.1 Introduction

This section presents the monitoring and evaluation plan for the study on evaluating the hazard component of the occupational health and safety policy at Ghana Port and Harbour Authority (GPHA). It outlines the program being evaluated, the type of evaluation being conducted, study frameworks, and indicators for the study.

3.2 Description of hazard component of occupational health and safety policy at GPHA

The Ghana Ports and Harbours Authority (GPHA) acknowledges and accepts its duty as a port authority to establish and uphold a secure and healthy working environment for all its employees, port users, port operators, and the community. This assurance is a component of the GPHA's integrated strategy to managing its human resources. The management responsibility of occupational health, safety, and the environment (OHSE) is valued on par with all other corporate objectives. The Authority believes that a coordinated effort at all levels can result in a positive commitment and efficient control of OHSE. By preserving and developing human and physical resources, safeguarding the environment, and minimizing costs and liabilities, careful attention to OHSE will support successful company performance. The GPHA's Occupational Health, Safety and Environment (OHSE) guideline was developed to help GPHA Managers, Employees and all other interested parties improve their understanding and management of OHSE issues in the workplaces to achieve their objectives, purpose, and goals of maintaining a safe and healthy working environment. Additionally, it contributes to the authority's compliance with ISO 14001:2015 and ISO 45001:2018 standards, Relevant compliance obligations, laws, regulations, and codes of conduct (including The Authority's workplace rules and standards). There are

numbers of health and safety policies such as Accident or Incident, General Fire Precaution, First Aid Facilities, Environment, Personal Protective Equipment (PPE), OHSE Training and Competence, Communication or Dissemination Of Policy, Alcohol And Illicit Drugs, Permit To Work, Workplace Hazard Identification And Risk Assessment or Management, Workplace Environmental Aspects Assessment or Management, Hazardous Substance Identification, Registration And Control, Contractors And Visitors, Labour Companies, Private Port Operators or Security Agencies or Other Governmental Agencies, Shipowners And Agents or Freight Forwarders, Food Markets or Vending Areas, Workplace Inspections and Hazards component which is the focused study area for the research.

3.3 Hazards component of OHS

Anything that has the potential to hurt, injure, or damage persons or property is considered a hazard. The requirements and suggestions for the safe handling, storage, and transportation of hazardous goods in the Ports are outlined in the regulation and procedures on the handling, storage, and transport of dangerous goods, which refer to the provisions in the International Maritime Dangerous Goods (IMDG) code. Its goal is to aid ship owners, ship agents, stevedores, terminal operators, and other port users and operators in establishing minimally acceptable safety standards when handling such goods to ensure the safety of people, port infrastructure, and the environment. The handling, transportation, and storage of dangerous items are subject to limitations in the Ports. Dangerous goods are (1) substances, materials, and items that fall under the definition of chapter four of the International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended, and that are covered by the provisions of the International Maritime Dangerous Goods Code (IMDG CODE) of 1977 and its supplementary amendments. (2) Oils, covered by Annex I of MARPOL 73/78. (3) Noxious liquid substances or chemicals, including wastes, covered by the codes for the

construction and equipment of ships carrying dangerous chemicals in bulk and annexe II and VI of MARPOL 73/78. (4) Solid bulk material, which possesses chemical hazards and solid bulk materials hazardous only in bulk, including wastes covered by Appendix B of the code of safe practice of solid bulk cargoes. 5) Any uncleaned empty package, such as tank containers, receptacles, intermediate bulk containers, bulk containers, bulk packaging, Portable tank vehicles that previously contained dangerous cargoes, unless the package has been sufficiently cleaned of residue of the dangerous cargoes and purged of vapours so as to nullify any hazard or have been filled with non-dangerous substances and certified by an approved Authority.

3.4 Types of hazards at the port

The examples of hazards in the Port sector include the following but not limited to:

3.4.1 Physical hazards

Physical risks include the possibility for mishaps, diseases, or injuries brought on by prolonged exposure to machinery or work-related activity.

3.4.2 Rotating and moving equipment

Injuries or fatalities can result from being trapped, entangled, or struck by machinery pieces as a result of unanticipated equipment starting up or hidden movement while in use. Top lifters, reach stackers, mobile cranes, electrical power generators, trailers, trucks, trains, chainsaws, concrete mixers, pneumatic equipment, and other items are examples of this equipment.

3.4.3 Industrial vehicle driving and site traffic

The risk of accidents involving other vehicles, people, and machinery has grown because of poorly trained or unskilled industrial vehicle drivers. Along with the local private vehicles, industrial and delivery trucks also pose a risk of collision. Safety procedures for site traffic and operating industrial vehicles.

3.4.4 Chemical hazards

Chemical dangers are the possibility of getting sick or hurt after being exposed to poisonous, corrosive, sensitizing, or oxidative substances once, occasionally, or repeatedly over time. Additionally, they provide a risk of uncontrollable reactions, such as the possibility of a fire or explosion if incompatible chemicals are accidentally mixed with hazardous substances; through a crack in a work surface; or both.

3.4.5 Fire and explosions

Fires and explosions brought on by the ignition of flammable substances and gases may result in property loss as well as worker injury or death.

3.4.6 Vibration

The choice of equipment, installation of vibration dampening pads or devices, and limiting the duration of exposure in accordance with internationally acceptable limits should be used to control exposure to hand-arm vibration from equipment such as hand and power tools, or whole-body vibrations from surfaces on which the Worker stands or sits.

3.4.7 Electrical hazards

Workers may be seriously at danger from exposure to or defective electrical equipment such as circuit breakers, panels, cables, cords, and hand tools.

3.4.8 Eye hazards

A Worker may be struck in the eyes by solid particles from a number of activities, a liquid chemical spray, or biological fluids, leading to an eye injury or irreversible blindness.

3.4.9 Welding/Hot Works

The powerful and blinding light produced by welding could adversely harm a worker's eyesight. In severe circumstances, blindness could happen. A prolonged exposure to the poisonous gases produced by welding might result in serious chronic illnesses.

3.5 Process evaluation of hazard component of occupational health and safety policy at GPHA

This study is a process evaluation that seeks to assess the implementation of the hazard component of the occupational health and safety policy at GPHA. Process evaluation focuses on how the program was developed and how it operates, identifying the procedures and decisions made in developing and implementing the program. This type of evaluation helps determine if the intervention is being implemented as planned and identify any weaknesses or obstacles in the implementation process.

3.6 Study frameworks

The frameworks considered for this study are the conceptual framework and the logic model.

3.6.1 Conceptual framework of hazard component of occupational health and safety policy at GPHA

The conceptual framework presented for evaluating the hazard component of the occupational health and safety (OHS) policy at Ghana Port and Harbour Authority (GPHA) is a comprehensive and multidimensional model that effectively captures the key elements and their interrelationships (Annan et al., 2022). This framework is well-suited for a mixed method study, as it allows for an in-depth exploration of the various factors influencing the implementation and effectiveness of the hazard component of the OHS policy (Ofosu et al., 2021).

The framework consists of four main constructs: Key Activities, Port Hazards Process, Facilitators and Barriers, and Status. The implementation status construct assesses the current state of implementation of the hazard component of the OHS policy at GPHA, considering factors such as policy awareness, compliance, and overall effectiveness (Amponsah-Tawiah & Mensah, 2016). This construct is crucial, as it provides a baseline understanding of the policy's implementation and identifies areas for improvement (Asumeng et al., 2019).

The implementation obstacles construct explores the barriers and challenges that hinder the effective implementation of the hazard component of the OHS policy at GPHA. It considers factors such as resources (financial, human, technical), organizational culture, and resistance to change (Bonsu et al., 2020). Understanding these obstacles is essential for developing targeted strategies to overcome them and improve policy implementation (Oppong-Yeboah & Gyamfi, 2022).

The implementation facilitators construct examines the factors that support and enable the successful implementation of the hazard component of the OHS policy at GPHA. It includes management commitment, employee engagement, and a positive safety culture (Agyekum et al., 2021). Identifying and leveraging these facilitators can significantly enhance the effectiveness of the policy and promote a proactive approach to hazard control (Boateng et al., 2018).

The hazard process construct focuses on the specific measures and strategies employed to identify and mitigate hazards at GPHA. It encompasses OHS Risk Planning, Hazard Identification, Risk Assessment or Management, Risk Control, and Monitoring and Review (Dwomoh et al., 2021). This construct is critical, as it directly addresses the core objective of the hazard component of the OHS policy, which is to protect workers' health and safety (Kwesi et al., 2019).

This conceptual framework has been successfully applied in various studies evaluating OHS policies and practices in different settings. For example, Ofosu et al. (2021) utilized a similar

framework to investigate the implementation of OHS policies in the Ghanaian construction industry, highlighting the importance of management commitment and employee engagement in promoting effective hazard control. Similarly, Annan et al. (2022) employed a comparable framework to assess the implementation of OHS policies in the Ghanaian mining sector, emphasizing the role of resources and organizational culture in shaping policy outcomes.

The decision to use this conceptual framework for the current study is based on its comprehensive and holistic approach to evaluating the hazard component of the OHS policy at GPHA. By incorporating implementation status, obstacles, facilitators, and hazard process, the framework enables a thorough examination of the factors influencing the policy's effectiveness in addressing hazards and protecting workers' health and safety (Amponsah-Tawiah & Dartey-Baah, 2023).

To effectively apply this framework in the mixed method study, semi-structured interviews was conducted with key stakeholders involved in the implementation of the OHS policy at GPHA, including managers, supervisors, and workers. The interview guide was developed based on the four constructs of the framework, ensuring that all relevant aspects of the policy's implementation are explored (Appiah et al., 2023). The interviews were audio-recorded, transcribed verbatim, and analyzed using thematic analysis (Braun & Clarke, 2022).

The data analysis involved an iterative process of coding, categorizing, and theme development, guided by the conceptual framework (Kusi-Amponsah et al., 2021). The findings were organized around the four constructs, allowing for a systematic and in-depth understanding of the implementation status, obstacles, facilitators, and hazard process measures at GPHA. The discussion integrates the findings with existing literature, highlighting similarities, differences, and new insights emerging from the study (Aidoo et al., 2019).

Furthermore, the study considered the interrelationships between the four constructs, examining how they influence and shape one another in the context of the OHS policy implementation at GPHA (Annan et al., 2022). This holistic approach enabled the identification of key strengths, weaknesses, and areas for improvement, informing recommendations for enhancing the effectiveness of the policy in addressing hazards and protecting workers' health and safety (Ofosu et al., 2021).

In conclusion, the conceptual framework presented for evaluating the hazard component of the OHS policy at GPHA is a robust and comprehensive model that aligns well with the objectives of the mixed method study. By applying this framework, the study can generate valuable insights into the multifaceted nature of the policy's implementation, contributing to the development of evidence-based strategies for improving OHS practices at GPHA and other similar contexts (Amponsah-Tawiah & Mensah, 2016).

The study's conceptual framework is shown in Figure 1.

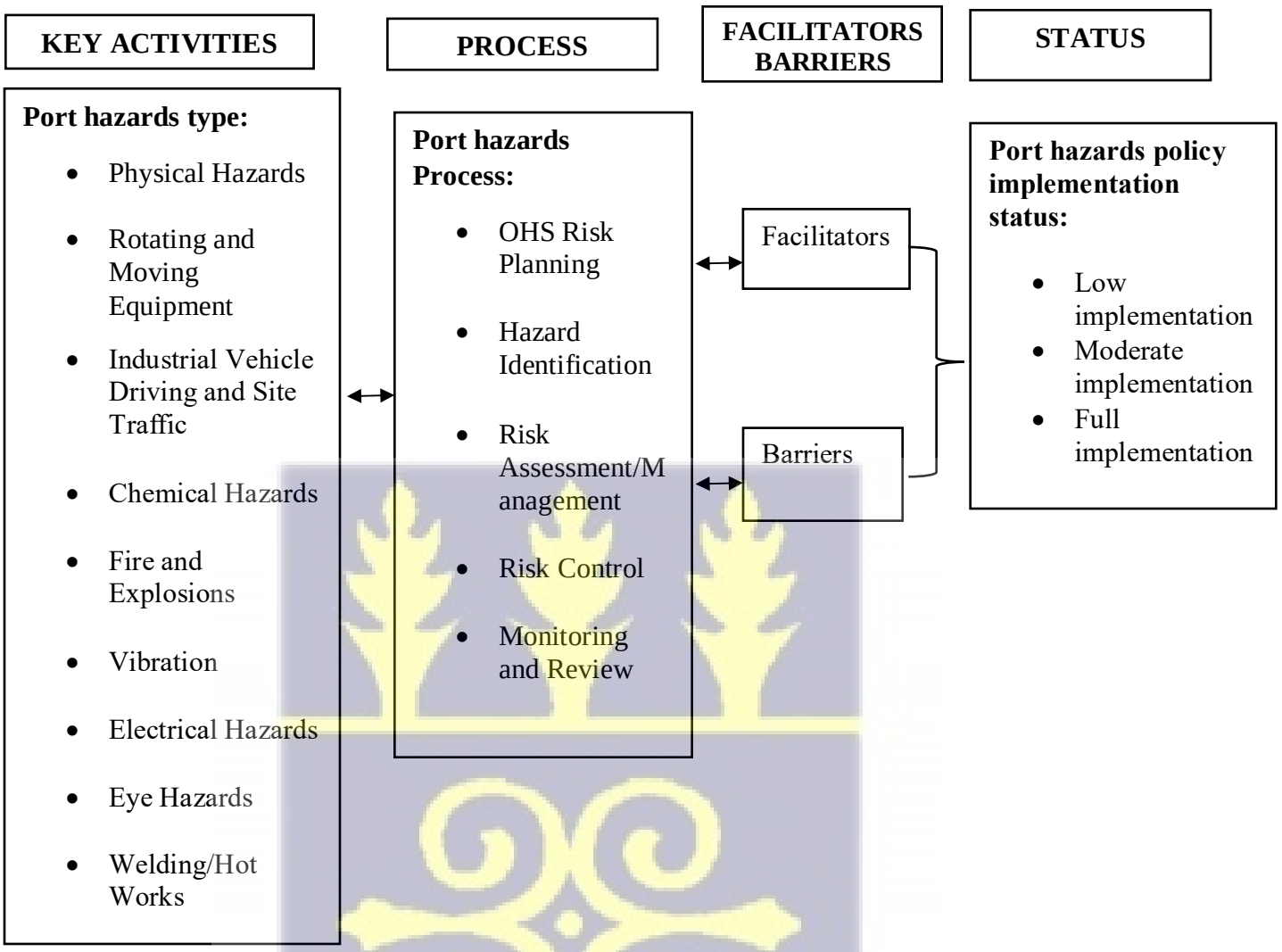

Figure 1 Conceptual framework of hazard component of occupational health and safety policy at GPHA

3.7 Logic model

The logic model provides a streamlined linear interpretation of a project's resources and how they will be used to achieve the desired outcome.

Table 1 Logic Model for Hazard Component of Occupational Health and Safety Policy at GPHA

Hazards Components of occupational health and safety policy	**Activities**	**Inputs**	**Outputs**	**Indicators**
Physical Hazards	• Repetitive exposure to mechanical action or work activity	• Human resources • Funds • Personal protective equipment's	• Trained staff • Repetitive exposure to mechanical action or work activity will be avoided	• Number of accidents, injuries, and illnesses
Rotating and Moving Equipment	• Protecting staff from being trapped, entangled, and struck	• Training on machinery usage • Personal protective equipment's	• Staff protected from trapped, entangled, and struck	• Number of injuries (Trapped, Entangled or Struck)
Industrial Vehicle Driving and Site Traffic	• Poorly trained or inexperienced industrial vehicle drivers	• Training and licensing • medical surveillance	• Trained and licensed industrial vehicle drivers	• Number of accidents
Chemical Hazards	• Exposure to toxic, corrosive, sensitizing or oxidative substance	• Training • Appropriate PPE • Developing a safe work procedure	Implementing engineering and administrative control measure to avoid or minimize exposure to toxic, corrosive, sensitizing or oxidative substance	• Number of illness or injury • Number of fire and explosion

Table 1 Logic Model for Hazard Component of Occupational Health and Safety Policy at GPHA Cont'd.

Fire and Explosions	• Ignition of flammable materials and gases	• Training • Proper storage of flammable materials • Quenching systems	• Ignition of flammable materials and gases minimize or avoided	• Number of property loss/ injury or fatalities
Vibration	• Exposure to hand-arm vibration	• Training on vibration dampening pads	• Exposure to hand vibration avoided	• Number of expose hand-arm vibration
Electrical Hazards	• Exposure to faulty electrical devices	• Warning signs and markings	• Exposure to electrical device avoided	• Number of injuries/deaths
Eye Hazards	• Exposure to liquid chemical spray and biological fluids	• Safety glasses with side shields, Goggles • Full-face shield	• Exposure to liquid chemical spray and biological fluids will be avoided	• Number of injuries/ permanents blindness
Welding/Hot Works	• Exposure to extremely bright and intense light to the eyes	• Welder goggles • Full-face eye shield • Welding barrier screens	• Exposure to extremely bright and intense light to the eyes will be avoided	• Number of injuries/ blindness

3.7.1 Narration on logic model

The input section of the logic model refers to the resources invested in implementing the hazard component of the occupational health and safety policy at Ghana Port and Habour Authority (GPHA). This includes management commitment, financial resources, human resources, equipment, and technology.

The output section represents the immediate results achieved, including the number of hazards identified and assessed, hazard mitigation measures implemented, employees trained, and safety officers appointed and trained.

3.8 Definition of Indicators

This section outlines and defines the scale of measurement for each indicator of the study

Table 2 Indicators and their Definition

Hazards Components of occupational health and safety policy	**Indicator**	**Measurement**	
		Indicator	**Evidence**
Physical Hazards	Number of accidents, injuries and illnesses	Available /not available	Hazard identification and risk assessments register
Rotating and Moving Equipment	Number of injuries (Trapped, Entangled or Number of injuries	Available /not available	Hazard identification and risk assessments register
Industrial Vehicle Driving and Site Traffic	Number of accidents	Available /not available	Hazard identification and risk assessments register
Chemical Hazards	Number of illness, injury/fire and explosion	Available /not available	Hazard identification and risk assessments register
Fire and Explosions	Number of injuries, fatalities/property loss	Available /not available	Hazard identification and risk assessments register
Vibration	Number of expose hand-arm vibration	Available /not available	Hazard identification and risk assessments register
Electrical Hazards	Number of injuries/deaths	Available /not available	Hazard identification and risk assessments register
Eye hazards	Number of injuries/ permanents blindness	Available /not available	Hazard identification and risk assessments register
Welding /Hot Works	Number of injuries/ Blindness	Available /not available	Hazard identification and risk assessments register

CHAPTER FOUR

METHODS

4.1 Study Design

A mixed method was adopted to evaluate the hazard component of the occupational health and safety policy at Ghana Port and Harbour Authority (GPHA), Tema. This design was appropriate for examining the implementation status, obstacles, and facilitators at a specific point in time. The study employed a mixed-methods approach, combining qualitative data from interviews with quantitative analysis of surveillance data on hazards occurring at the port. This methodological triangulation enhanced the validity and comprehensiveness of the findings (Creswell & Creswell, 2018).

4.2 Study Area

The study was conducted at the Port of Tema, Ghana's largest port, which occupies approximately 5.5 million square meters along the country's eastern coast. In 2024, Tema Port handled a total of 1,435 vessels, which was a slight decrease compared to the 1,471 vessels handled in 2023, encompassing various types such as container vessels, general cargo vessels, tankers, Ro-Ro, and cruise vessels. A significant portion (85%) of Ghana's trade flows through its ports, Tema and Takoradi, connecting to shipping routes across continents through both direct and transshipment services.

Situated in the industrial city of Tema, just 30 km from Ghana's capital, the port area serves as a crucial logistics hub for Inland Clearance Depots (ICDs), Warehouses, Transport and Haulage companies, Freight Forwarders, Factories, and related service centers. Its success contributes not only to the growth of Ghana's economy but also that of its regional neighbors. The port continues

to enhance its facilities and services, aspiring to position Tema as the premier trade and logistics hub in West Africa.

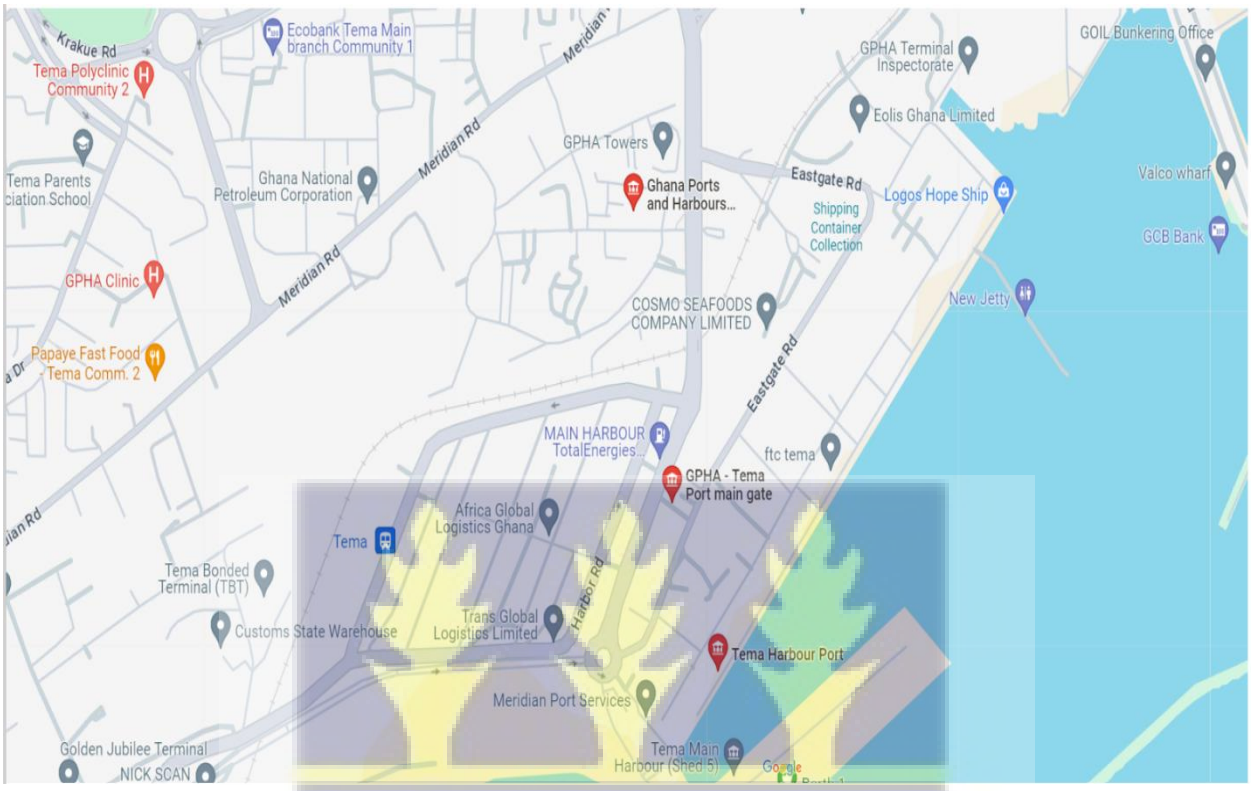

Figure 2: Map showing Tema Ports and Harbour Authority

4.3 Study Variables

The study examined several key variables including: (1) implementation status of hazard components of the OHS policy (Low implementation, moderate implementation and Full implementation); (2) implementation obstacles (including knowledge gaps, resource constraints, leadership commitment, and structural challenges); and (3) implementation facilitators (including training programs, management support, communication channels, and resource allocation). These variables were assessed through semi-structured interviews and review of documentation (Amponsah-Tawiah & Mensah, 2016).

4.4 Study Population

The study population comprised senior staff at GPHA Tema, directly involved in occupational health and safety activities. The population was stratified to ensure representation across different departments, roles, and levels of involvement with the OHS policy implementation. This approach allowed for a comprehensive understanding of perspectives from various stakeholders involved in hazard management at the port (Saunders et al., 2019).

4.4.1 Inclusion Criteria

The study included senior staff who are actively engaged in the implementation of hazard policies at the Tema Ports and Harbour. Only participants who provided written informed consent were included in the study. Additionally, participants were required to have worked at GPHA for at least six months to ensure familiarity with the organization's OHS policies and practices.

4.4.2 Exclusion Criteria

The following exclusion criteria were applied:

1. Senior staff who withdrew from the study at any point
2. Senior staff who declined to sign the consent form
3. Senior staff who were on extended leave during the data collection period
4. Senior staff who may be sick during the data collection

4.5 Sample size determination and sampling procedure

A purposive sampling technique was employed to ensure representation across different cadres of employees. The sample size was determined based on the principle of data saturation for the qualitative component (Guest et al., 2006). A total of 35 participants were included in the study,

comprising 30 operational staff, and 5 management personnel directly involved in OHS policy implementation. For the selection of participants, a stratified random sampling approach was used to identify potential participants from each department and job category. Staff working across different cadres of the Tema ports and harbour authority were randomly selected from departmental staff lists using a random number generator. Key informant personnel who were actively involved in the implementation of the occupational health and safety policy were purposively sampled based on their roles and expertise in OHS matters. This combination of random and purposive sampling ensured both breadth and depth in data collection (Patton, 2015).

4.6 Data collection methods and tools

The study combined qualitative and quantitative research methods in a triangular fashion.

4.6.1 Qualitative method

Under the qualitative method, the study used an in-depth interview guide as technique for the data collection. Open and closed-ended questions were asked to elicit in-depth information from the management and technical employees on the barriers and facilitators of the operational guidelines. Audio recorders and field notes were tools used for data collection and aided in the transcription of data.

4.6.2 Quantitative Method

Under quantitative data collection, structured questionnaires were used to assess all the nine components of the operational guidelines. An observational checklist was also used to assess the recruitment requirements and facility preparedness. Stata software was used for analyzing and visualization of quantitative data. Data collection techniques involved records review, interview

guide and structured questionnaire, and observational checklist. Various techniques were used to collect data from management and each technique was employed depending on the data collected.

4.7 Data analysis

The quantitative data was processed using Microsoft Excel 2017 and imported onto Stata version 17 for analysis. The demographic data of respondents and other independent variables was presented on a frequency distribution table. A descriptive statistics of proportion was used to estimate the implementation status. A binary response scale analysis (that is Yes =1 and No =0) was used to assess the implementation status of the nine component. The binary response scale analysis was used to elicit the level of implementation. The classification of the implementation levels of the OHSE policy was carried out using three predefined categories: *low implementation* (scores between 5–10), *moderate implementation* (scores between 11–21), and *full implementation* (scores between 22–35). The average score for the response was used to determine the extent of the implementation. The results were presented in pictorial form using graph.

4.8 Data processing and management

Qualitative data was analyzed after explicitly transcribing all the interviews with senior staff. Recorded notes were taken during the interviews compared to the transcribed one. This helped to reduce errors and solve ambiguity. The data was read through after which coding was done and themes and patterns were generated. A similar response was grouped under one theme and assigned codes with the help of the NVivo version 12 management tool. The qualitative data transcribed was imported into NVivo version 12 and coding of thematic areas was done. The data was analyzed using thematic analysis and the findings from this qualitative data were triangulated

with the findings of the quantitative data. The content and structure of the themes were interpreted. Names were used during the analysis and report writing.

Compiled data from the interview and questionnaire was saved on a personal computer with an external hard drive. Descriptive statistics was used to summarize the data. The integration Implementation status and extent of integration by using Stata version 17. All data was protected with a password to prevent unwanted access. Completed questionnaires were kept under lock and key. This will ensure confidentiality. The data collected will be destroyed after 5 years.

4.8.1 Exploration of the facilitators and challenges of the hazard component of the OHS policy

Data were gathered through face-to-face interviews with participants using semi-structured interview guides developed specifically for this study. The interview guides contained open-ended questions designed to explore participants' experiences, perceptions, and insights regarding the facilitators and challenges in the implementation of the hazard component of the OHS policy.

The use of the interview guide was also intended to provide consistency in questioning among all respondents, making sure that everyone is given the same questions in the same conditions and in the same manner. The researcher sought to improve standardization, structure, and general organization by using this instrument. According to Krueger (2002), the use of the interview guide will help the researcher to pace, time, order, and construct the guide to center the research objectives while also facilitating a warm, human experience for both the interviewer and the participant. The interviews were conducted in private settings at the port facility, lasted approximately 45-60 minutes each, and were audio-recorded with participants' permission.

In addition to interviews, relevant documentation including OHS policy documents, incident reports, training records, and audit reports were reviewed to complement the interview data. A document review checklist was developed to standardize the extraction of information from these sources. Field notes were also taken during the interviews to capture non-verbal cues, contextual information, and immediate reflections on the data collection process (Yin, 2018).

4.9 Quality control measures

Several measures were implemented to ensure the quality and rigor of the research process:

4.9.1 Training of field staff

Prior to data collection, all research assistants received comprehensive training on the study objectives, research methods, interview techniques, and ethical considerations. The training included theoretical components as well as practical sessions with role-playing to develop proficiency in interviewing skills. Research assistants were also trained in transcription protocols and data management procedures to ensure consistency in data handling.

4.9.2 Pre-testing data collection tools

The interview guides and document review checklists were pre-tested with a small sample of five participants from the target population who were not included in the final study sample. The pre-testing helped to assess the clarity of questions, comprehensiveness of the tools, logical flow, and average time required for completion. Feedback from the pre-testing was used to refine the data collection tools.

4.9.3 Revision of data collection tools

Based on the pre-testing results, several modifications were made to the data collection tools. These included rewording ambiguous questions, adding probing questions to explore certain topics

in greater depth, removing redundant items, and adjusting the sequence of questions to improve the logical flow of the interviews. The revised tools were reviewed by subject matter experts in occupational health and safety to ensure content validity.

4.9.4 Supervision of fieldwork

Rigorous supervision was maintained throughout the data collection process. The principal investigator conducted regular briefing and debriefing sessions with the research assistants to address any challenges encountered, ensure adherence to the study protocol, and maintain data quality. Random spot checks were also conducted to verify that interviews were being conducted according to established procedures.

4.9.5 Data coding, entry, and transcription

A detailed codebook was developed to guide the coding process, ensuring consistency across all data sources. Double data entry was employed for quantitative data to minimize entry errors, with any discrepancies resolved through reference to the original data forms. For qualitative data, a sample of transcripts was independently coded by two researchers, and inter-coder reliability was assessed to ensure consistency in the coding process. Regular meetings were held among the research team to discuss and resolve any coding discrepancies.

Additional quality control measures included:

1. Member checking, whereby preliminary findings were shared with selected participants to verify the accuracy of interpretations.
2. Triangulation of data sources (interviews, documentation review) and methods (qualitative and quantitative) to enhance the validity of findings.

3. Maintenance of an audit trail documenting all methodological decisions and changes throughout the research process.
4. Peer debriefing with colleagues not involved in the study to challenge assumptions and interpretations.

Stringent measures were also in place to uphold the confidentiality of respondents' identities, achieved through the use of unique numeric codes accessible solely to the principal investigator.

4.10 Study limitations

Despite careful planning and implementation, the study encountered several limitations that should be acknowledged:

1. Access to certain sensitive documents related to incident reports was restricted due to confidentiality policies at GPHA, potentially limiting the comprehensiveness of the document review.
2. Social desirability bias may have influenced participants' responses, particularly among those in management positions who might have been inclined to present a more positive picture of policy implementation.
3. The cross-sectional nature of the study meant that temporal changes in policy implementation could not be captured, and causal relationships could not be established.
4. Resource constraints limited the sample size and geographic scope of the study, focusing only on the Tema port rather than including other GPHA facilities.

These limitations were acknowledged during data interpretation, and appropriate caution was exercised when drawing conclusions. Where possible, mitigating strategies such as data

triangulation and member checking were employed to minimize the impact of these limitations on the validity of the findings.

4.11 Ethical consideration

For the purpose of ensuring that the quality of data collected is maintained and to avoid data contamination, the following ethical considerations were made.

4.11.1 Ethical clearance

Ethical clearance was obtained from the Ghana Health Service Ethics Review Committee (GHSERC) prior to the commencement of the study (Protocol ID: GHS-ERC023/04/23). All aspects of the research were conducted in accordance with the ethical principles outlined in the Declaration of Helsinki.

4.11.2 Permission/Approval from study area

Formal institutional permission was secured from the management of GPHA Tema through an official letter detailing the study's objectives, methods, and potential benefits. Departmental heads were also briefed about the study and their cooperation was sought to facilitate access to participants and relevant documentation.

4.11.3 Description of subjects involved

The study involved employees of GPHA Tema, including operational staff, and management personnel. Participants were selected based on their roles in relation to OHS policy implementation, with efforts made to ensure diversity in terms of age, gender, department, and length of service. No vulnerable populations were included in the study.

4.11.4 Potential risks and benefits

The study was assessed as minimal risk, with the primary potential risks being psychological discomfort when discussing workplace hazards and concerns about confidentiality. These risks were mitigated through careful interview techniques and robust confidentiality measures. Participants were not exposed to any physical risks during the study.

Potential benefits included the opportunity for participants to share their experiences and contribute to improvements in OHS policy implementation. At the organizational level, the findings provided valuable insights for enhancing workplace safety and health practices at GPHA.

4.11.5 Privacy and confidentiality

Strict confidentiality protocols were implemented throughout the study. Interviews were conducted in private settings to ensure participants could speak freely without being overheard. All participants were assigned unique identifier codes, and personally identifiable information was removed from all study documents. During reporting, data were presented in aggregated form to prevent identification of individual participants.

4.11.6 Data storage, security, and usage

All research materials including audio recordings, transcripts, and consent forms were stored securely. Physical documents were kept in locked cabinets in the principal investigator's office, while electronic data were stored in password-protected files on encrypted devices. Access to the data was restricted to authorized research team members who had signed confidentiality agreements. Data will be retained for five years after the completion of the study, after which physical documents will be shredded and electronic files permanently deleted. The data were used solely for the purposes outlined in the research protocol and will not be repurposed for other studies without additional ethical review and participant consent.

4.11.7 Description of the consenting process

The consenting process began with the provision of an information sheet detailing the study's purpose, procedures, risks, benefits, confidentiality measures, and participants' rights. This information was provided in both English and local languages as needed. Potential participants were given time to review the information and ask questions before making a decision.

Research assistants were trained to explain the study clearly and answer any questions without applying pressure to participate. For participants with limited literacy, the information was read aloud and explained in their preferred language, with an impartial witness present during the consenting process.

4.11.8 Voluntary consent/withdrawal

Prior to participation, each potential participant was informed that their involvement was entirely voluntary and that they could decline to participate without any negative consequences for their employment or relationship with GPHA. Written informed consent was obtained from all participants. Participants were also informed of their right to withdraw from the study at any point, to refuse to answer any questions, or to request that their data be excluded from analysis, all without penalty.

4.11.9 Compensation

Participants did not receive direct monetary compensation for their participation in the study. However, light refreshments were provided during interviews, and participants were given a small token (a notebook and pen) as an appreciation for their time. These items were of minimal value and not sufficient to constitute undue inducement to participate.

4.11.10 Protocol amendment

No substantial amendments were made to the study protocol after receiving ethical clearance. Minor procedural adjustments, such as scheduling changes and refinements to interview questions based on pre-testing, were documented and communicated to the research team but did not require additional ethical review as they did not affect the risk level or fundamental methodology of the study.

4.11.11 Declaration of conflict of interest

The researchers declared no conflicts of interest in relation to this study. None of the researchers had financial, professional, or personal relationships with GPHA that could potentially influence the conduct of the research or the interpretation of results. This declaration was included in the ethical clearance application and communicated to participants during the consenting process.

4.11.12 Protocol funding information

The study was primarily self-funded by the principal investigator as part of academic requirements for a Master's degree program. The funding sources had no involvement in the study design, data collection, analysis, interpretation, or reporting of the findings. By implementing these comprehensive methodological approaches and ethical safeguards, the study ensured a rigorous and responsible investigation of the hazard component of the occupational health and safety policy at GPHA Tema, while protecting the rights and welfare of all participants.

CHAPTER FIVE

RESULTS

5.1 Introduction

This chapter presents the results findings of the study. The results presented provide information on the demographic characteristics, professional characteristics of the respondent and the study objectives.

5.2 Demographics and professional characteristics of respondents

Table 3 shows the demographics and professional characteristics of respondents. At Ghana Port and harbor Authority most respondents are aged 30 to 39 years which is over (37.1%). Suggesting a relatively young professional workforce. About 60% of respondents are under 40 years, indicating a youthful demographic. The lowest percentage is 14.3% which falls between 50 to 60 age group. Suggesting fewer senior or late-career professionals. Most respondents were male (21) accounting for 60 % of the respondents. The professional category of respondents was (25.7 %) for Electrical Engineers, and Auto Mechanic Engineer (22.9%). Years of professional service of respondents ranged from <10 and > 20 years more. Of these, most respondents have worked for < 10 years.

Table 3 Demographics and professional characteristics of respondents

Variables	Ghana Port Harbor Authority N (%)
Age Group (Years):	
20 -29	8 (22.9)
30-39	13 (37.1)
40-49	9 (25.7)
50-60	5 (14.3)
Sex:	
Female	14 (40)
Male	21 (60)
Professional Category	
Auto Mechanic Engineer	8 (22.8)
Civil Engineer	5 (14.3)
Electrical Engineer	9 (25.7)
Fire and safety officer	7 (20.0)
Mariner Engineers	6 (17.1)
Years of Professional Service:	
< 10	17 (48.6)
10-14	13(37.1)
15- 20	4(11.4)
>20	1 (2.9)
TOTAL	35 (100)

5.3 Implementation status of the implementation of the occupational health, safety and environmental policy.

Table 4 shows the implementation status of the health and safety protocol of the Ghana Ports and Harbor Authority. The classification of the implementation levels of the OHSE policy was carried out using three predefined categories: *low implementation* (scores between 0 - 39), *moderate implementation* (scores between 40–69), and *full implementation* (scores between 70 - 100). The results from Table 4 were aggregated into key hazard categories, and average scores were calculated for each category. The table show that all the variables under the physical hazards

components are fully implemented scoring 100% from the 35 respondents. This Indicates strong compliance and awareness of physical safety risks.

Further, the table shows that, Eye Protection, and Fire Hazards related to Welding/Hot Work recorded consistent full compliance (100%), emphasizing strong control measures and awareness training. Electrical hazards recorded a percentage score of 93.1%, indicating strong implementation and high compliance levels. While safety measures are highly effective and close to full implementation, minor gaps remain, suggesting improvement in the area of identification and fire and explosion risk assessment. Rotating and Moving Equipment recorded a percentage score of 80.6%, which is still categorized as *full implementation*, though relatively lower compared to other categories. This suggests minor gaps in certain activities such as routine maintenance and risk assessments, which may require targeted improvement.

The Industrial Vehicles category (84.1%) demonstrated strong implementation through measures such as speed limits, proper signage, licensing and training of operators, and medical surveillance, although some variations in compliance scores indicate opportunities for enhancement. Similarly, Chemical Hazards (70.1%) and Fire and Explosion (87.9%) scored in the full implementation range, but require attention to ensure consistent compliance across all activities, such as proper labeling, storage of chemicals, and mitigation of explosion risks.

Finally, Vibration Hazard Assessment is 71.4% placing it in *full implementation*, but this score is close to the lower bound, indicating moderate compliance in some subcomponents like vibration risk assessment and the use of dampening equipment. This mixed performance within the subcomponents highlights the importance of sustained monitoring and targeted capacity building in this hazard category.

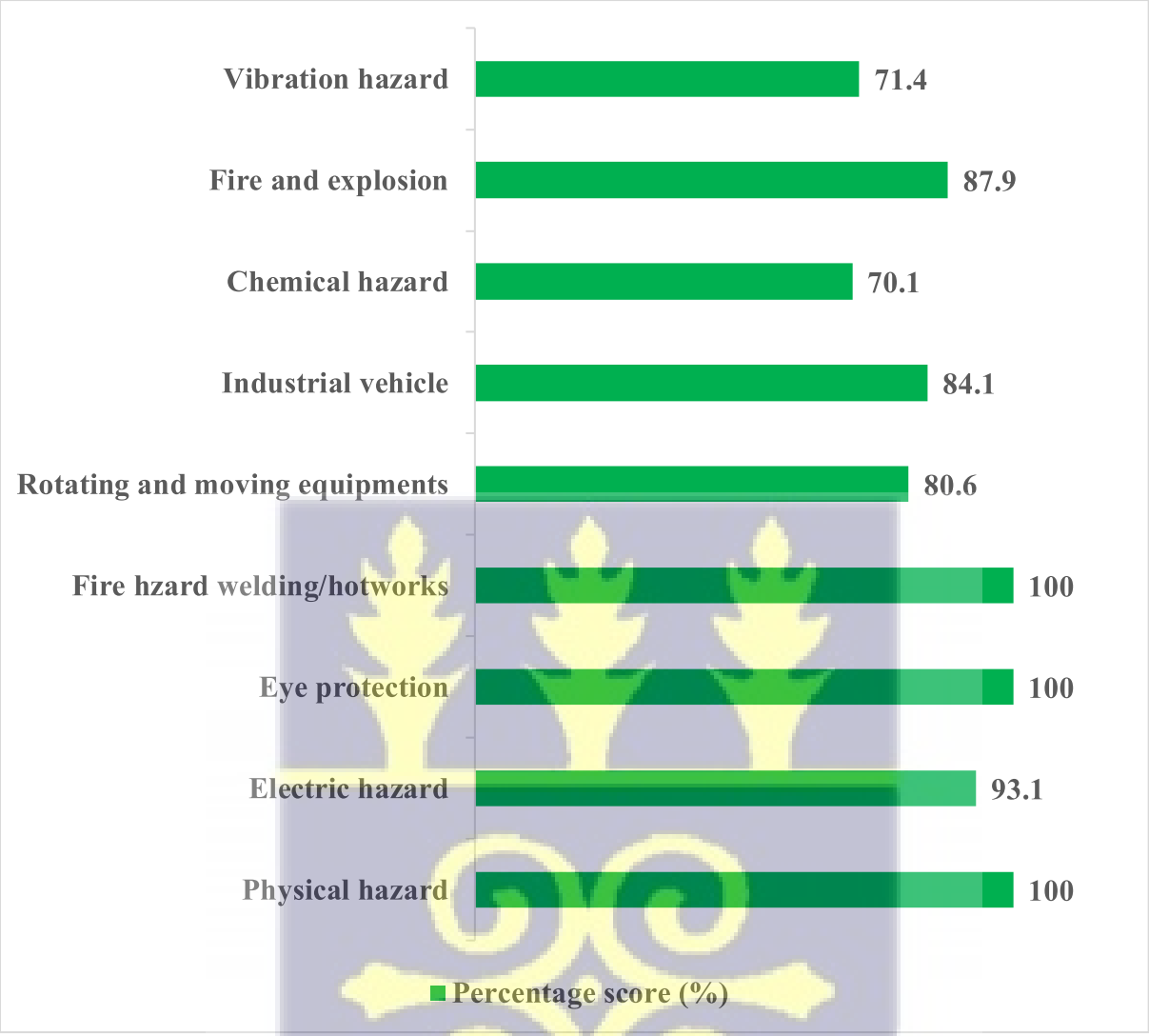

Figure 3 Implementation status of the occupational health and safety environment of Ghana Port and Harbor Authority.

Table 4 Implementation status of the implementation of the occupational health, safety and environmental policy.

Variables IMPLEMENTATION STATUS	RESPONSE YES	INTEPRETATION
a. Physical Hazards		
Physical Hazards identification	35	Full implementation
Regular inspection	35	
Appropriate PPE	35	
Minimize Risk relating to physical hazards	35	
Physical Risk Assessment	35	
Total	175 (100%)	
b. Rotating and moving Equipment		
Rotating and Moving hazards	32	
Rotating and Moving risk	26	
Routine Maintenance	27	
Secure R/M Equipment	29	Full implementation
Personal Training R&M	27	
Total	141 (80.6%)	
c. Industrial Vehicles		
Industrial Vehicle Hazards identification	27	
Industrial Vehicle Hazards Assessment	27	
Speed limit industrial vehicle	30	
Proper signage	35	Full implementation
Train and license industrial vehicle operators	35	
Operator's undergo regular medical surveillance	25	
Total	206 (84.1%)	
d. Chemical Hazard		
Chemical Hazards identification	23	
Chemical hazards risk assessment	23	Full implementation
Proper labeling and storage	26	
Training of employee on chemical hazard	27	
Total	99 (70.1%)	
e. Fire and explosion		
Fire and explosion hazards identification	28	
Identification and mitigation explosion risk	28	Full implementation
Fire and explosion hazards risk assessment	35	
Fire extinguishers and system functioning	32	
Total	123 (87.9%)	

Table 4 Implementation status of the implementation of the occupational health, safety and environmental policy. (cont'd)

f. Vibration Hazard Assessment		
Vibration Hazard identification	33	
Vibration Hazard Risk	26	
Minimize exposure to harmful vibration	20	Full implementation
Vibration dampening pad and protective eqpt	23	
Monitoring and assessing vibration levels	23	
Total	125 (71.4%)	
g. Electricals Hazards		
Preventing electrical hazards	35	
Electrical hazards awareness training	35	Full implementation
Electrical installation and safety regulation	35	
Electrical hazards identification	29	
Fire and explosion risk assessment	29	
Total	163 (93.1%)	
h. Eye Protection		
wear PPE	35	
Emergency response procedure for eye	35	
Reducing exposure to chemical and debris	35	Full Implementation
Proper ventilation during welding	35	
Fire resistance protective gear	35	
Total	175 (100%)	
I. Fire hazards relating to welding and hot		
Training employees on hazards welding /hot	35	
Adequate lightening	35	
Replace faulty lightening	35	Full Implementation
Emergency lightening	35	
Total	140 (100%)	

5.4 Factors facilitating the implementation of the occupational health, safety and environmental policy.

The factors facilitating the implementation of the occupational health and safety protocol are leadership commitment and policy enforcement by top management, Compliance to regulatory

and legal framework, Effective Communication and Awareness, Dedicated OHSE Units and Committees, Risk Management Systems, and Technological Integration.

5.4.1 Leadership commitment and policy enforcement by top management

A crucial role in the effective implementation of OHSE policies is leadership setting the tone at the top.

"When management visibly prioritizes health, safety, and the environment, it cascades down to every level of the organization." According to a respondent *(GHPA, P2)*.

In addition to top management commitment a respondent also said

."I believe that having clear OHSE policies and procedures is non-negotiable. Without clarity, there's confusion. As it's often said, 'A policy not understood is a policy not followed.' At GPHA, structured guidelines and standard operating procedures make expectations clear and compliance measurable." (GHPA, P1)

5.4.2 Compliance to regulatory and legal framework.

The importance of compliance with regulatory and legal frameworks as a cornerstone of effective occupational health, safety, and environmental (OHSE) practice. Compliance is not optional; it's a responsibility. According to a respondent, during the interview he said:

"*Offices and Shops Act, 1970 (Act 328) mandates employers to provide safe working environments. It's a vital legal instrument that ensures that health and safety are not just best practices, but legal requirements. I often reflect on the quote, 'A safe workplace is not a privilege, it is a right guaranteed by law.'" (GHPA P3).*

This was also confirmed by another respondent:

"Similarly, the Environmental Protection Agency Act, 1994 (Act 490) is crucial in holding organizations accountable for their environmental impact. This act reinforces the idea that 'Environmental stewardship is not just good ethics, it is good governance.'" (GHPA, P5)

5.4.3 Effective communication and awareness

Communication and the channel used also play a critical role in the implementation of the occupational health, safety and environmental policy. The principle of effective communication and awareness are critical to the successful implementation of OHSE policies. As the saying goes, what people don't know, they can't act on. Clear and consistent communication ensures that everyone understands their roles and responsibilities in maintaining a safe working environment.

According to a respondent, during the interview she said:

"In my experience, the use of safety signage, bulletins, briefings, and digital platforms significantly enhances awareness. Visual aids like signs serve as constant reminders, while digital communication allows for real-time updates. As it's often said, 'Repetition breeds retention the more frequently safety messages are communicated, the more deeply they're embedded in day-to-day behavior." (GHPA, P 10)

Another respondent also said:

"*Most importantly, I believe that these tools help foster a strong safety culture. At GPHA, we always emphasize that 'Safety is everyone's responsibility, not just management's.' Building a culture where staff feel responsible for not only their own safety but also that of their colleagues creates an environment of mutual accountability and trust." (GHPA, P11)*

5.4.4 Dedicated OHSE units and committees.

The establishment of a specialized Occupational Health, Safety and Environment Department ensures that health and safety are not treated as secondary concerns, but as core operational priorities. According to a respondent, during the interview he said:

"The department provides technical leadership, policy direction, and strategic oversight on all matters related to workplace safety and environmental protection. I often refer to the expression, 'Structure drives behavior' and when you have a formal structure in place, it naturally promotes a safety-conscious working environment." (GPHA, P15)

Another respondent also states that:

"She strongly subscribe to the role of OHSE committees at various operational levels. These committees serve as platforms for engagement between management and employees. As it's commonly said, 'Safety works best when it's a shared conversation, not a top-down instruction.' Through these committees, workers have a voice in identifying risks and recommending solutions, which enhances ownership and compliance." (GPHA, P15)

5.4.5 Risk management systems

Risk management systems play critical role in ensuring a safe and healthy work environment. As the saying goes, you can't manage what you don't measure. This is why the integration of structured risk assessment frameworks is essential. According to a respondent, during the interview he said:

"In my experience, a proactive risk management approach begins with systematic assessments. I believe in the philosophy that 'Prevention is better and cheaper than cure.' By using formal

frameworks, we are able to prioritize high-risk areas and allocate resources more effectively." (GHPA, P34)

Again another respondent also said:

"Risk management systems are the backbone of a resilient OHSE program. They shift the organization from reactive to preventive thinking." (GHPA, P32)

5.4.6 Technological Integration

The use of automated systems and surveillance at facilities enhances both efficiency and real-time hazard detection, which are critical for proactive safety management. In today's dynamic and high-risk work environments, relying solely on manual processes can leave room for error. According to a respondent, during the interview he said:

"The deployment of CCTV and surveillance technology strengthens incident reporting and accountability. As we often say, 'The camera doesn't blink' it captures what the human eye might miss. This technology not only helps in real-time monitoring but also provides valuable data for post-incident analysis and continuous improvement." (GHPA, P7)

Also another respondent said:

"Embracing technology is no longer optional; it's essential for any organization aiming to maintain high OHSE standards and reduce human error." (GHPA, P17)

5.5 Barriers to the implementation of the occupational health, safety and environmental policy

5.5.1 Limited resource allocation.

Limited resource allocation is a significant barrier to the effective implementation of OHSE policies.

According to a respondent, during the interview he said:

"In my experience, when budget constraints persist, even critical areas like equipment maintenance and staff training suffer. This often leads to a reactive approach to safety rather than a preventive one. As it's often stated, 'When resources are stretched, safety is the first to be compromised.'"(GHPA P20)

"Therefore, I strongly believe that prioritizing OHSE in the budgeting process is not just a legal or ethical obligation it's a strategic investment. An underfunded safety program exposes the organization to higher operational risks and long-term costs." (GHPA P29)

5.5.2 Inadequate training and capacity building

Inadequate training and capacity building significantly hinder the effective operationalization of OHSE policies. Without the proper allocation of both human and financial resources, it becomes challenging to equip staff with the skills and knowledge required to uphold safety standards. According to a respondent, during the interview he said:

"One of the major issues I've observed is the high turnover of contract workers, which creates constant skill and knowledge gaps. It's often said, 'You can't build a culture of safety on a revolving door of workers.' Without continuous and structured training programs, new or

temporary staff are less likely to understand and comply with critical OHSE procedures." (GHPA P2)

"I believe that consistent investment in training not just as a one-off event but as a continuous process is essential. He emphasizes, Training is not a cost; it's a safeguard.'(GHPA P5)

5.5.3 Limited public and community engagement.

Limited public and community engagement can significantly undermine the success of OHSE initiatives. Working in environment without involving the people who live in it is very challenging. When local communities and stakeholders are not adequately informed or engaged, there is often resistance to change, even when it's in their best interest. According to a respondent, during the interview he said:

"Stakeholder pressure can delay or derail key safety and environmental reforms. This usually stems from a lack of trust or misunderstanding about the intentions behind certain projects or policy changes. As is often said, 'Where there is no communication, there is suspicion' (GHPA P6)

Additionally, he said:

'Safety and sustainability are shared responsibilities, and unless the community is part of the solution, they may unintentionally become part of the problem." (GHPA P6)

Building strong relationships with external stakeholders through education, transparency, and regular dialogue is essential.

CHAPTER SIX

DISCUSSION

6.1 Introduction

The study presents a process evaluation of the implementation of the occupational health, safety and environmental policy at Ghana Harbor Port Authority. The main objective of the study is to evaluate the process evaluation of the hazard component of the occupational health and safety policy of Ghana ports and Harbors Authority, Tema.

There are three primary objectives for the study. Firstly, to ascertain the implementation status of the hazard component of the occupational health and safety policy at GPHA. Second to explore the implementation related facilitators in the hazard component of the occupational health and safety policy on hazards at GPHA. Lastly, to explore the implementation related obstacles in the hazard component of the occupational health and safety policy on hazards at GPHA.

6.2 Implementation status of the hazard component of the occupational health and safety (OHS) policy within the Ghana Ports and Harbors Authority (GPHA).

The study revealed a generally positive implementation status of the hazard component of the Occupational Health and Safety (OHS) policy within the Ghana Ports and Harbours Authority (GPHA). The analysis focused on the degree to which physical hazards, a core element of occupational risks in port environments. One of the key findings is that all operational levels under GPHA fully complied (100%) with the physical hazard component of the policy. This high compliance rate demonstrates a strong institutional commitment to safeguarding employees from common physical risks such as slips, trips, falls, exposure to loud noise, and injuries from machinery or cargo operations. These findings align with existing literature, which underscores

the importance of frontline hazard mitigation in high-risk industrial settings (e.g., ports and shipping terminals) as a first line of defense in occupational safety (ILO, 2021). The study identified a number of proactive measures implemented consistently across the GPHA's operational zones. These include the provision of appropriate personal protective equipment (PPE) to all employees and contractors. PPE availability and usage are crucial in managing residual risks after engineering and administrative controls have been applied. The regular inspection of port facilities and equipment was another area of strength. These inspections help in the early identification of hazard-prone areas and facilitate timely corrective actions.

Additionally, the routine conduct of physical risk assessments was found to be standardized across all GPHA departments covered in the study. This implies that there is a systematic approach to identifying, evaluating, and controlling workplace hazards. Importantly, risk minimization strategies, such as equipment upgrades, noise reduction measures, and the marking of hazardous zones, were noted as active components of the implementation process.

Further, the One critical area examined was the management of rotating and moving equipment hazards, which are particularly relevant in port operations where mechanical handling systems, cranes, forklifts, and conveyor belts are commonly used. Findings from the study revealed that the implementation of the rotating and moving equipment component was only fully achieved, with a compliance rate of 80.6% across all operational levels with an average score of 28.2 from 35 respondents. While this suggests full implementation, it also indicates that full implementation has not yet been attained, and there remain critical gaps in hazard control measures related to machinery operation. These findings resonate with broader occupational safety literature, which emphasizes that rotating and moving machinery remains one of the leading sources of workplace injuries, particularly in logistics and industrial operations (OSHA, 2020). Therefore, addressing

this hazard is not merely a compliance issue, but a critical safety imperative. Moreover, the study observed that each implementing level still has outstanding activities that need to be completed before the OHS policy can be considered fully operational. This includes finalizing standard operating procedures, conducting targeted risk assessments, and establishing formal training modules focused on machinery-related hazards.

A notable finding from the study was that the industrial vehicle hazard component of the policy was fully implemented across all operational levels of GPHA with an average score of 29.43. This component includes a wide range of safety-critical measures, such as industrial vehicle hazard identification, hazard assessment, enforcement of speed limits, and installation of proper signage, regular safety inspections, and training and licensing of operators. The study also found that operators undergo regular medical surveillance, which is essential for ensuring that only medically fit personnel are permitted to operate heavy machinery within the port environment. The full compliance in this area suggests a high level of institutional commitment and operational maturity in managing one of the most critical hazard sources in port operations. Industrial vehicles, including forklifts, container handlers, and terminal tractors, pose significant risks to workers, cargo, and infrastructure. Therefore, the implementation of structured safety systems for their use is a key indicator of proactive hazard management.

These findings align with international safety standards and best practices, such as those outlined by the International Maritime Organization (IMO) and the Occupational Safety and Health Administration (OSHA,2020), which emphasize that ports must establish rigorous controls around the use of industrial vehicles due to their high potential for fatal and non-fatal injuries.

Furthermore, the presence of routine safety inspections and mandatory operator training and licensing illustrates a shift from a reactive to a preventive safety culture. The use of speed controls and appropriate signage helps in maintaining order in high-traffic zones and minimizes the risk of vehicle-related incidents. Importantly, regular medical surveillance of operators ensures that individuals are physically and mentally fit to handle such equipment, reducing the risk of operator error due to health-related issues.

Chemical hazard component was not fully complied with, with an implementation average rate of 24.75 across the study areas. This component includes key activities such as chemical hazard identification, chemical risk assessments, proper labeling and storage of hazardous substances, and employee training on chemical safety protocols. While some progress has been made in these areas, the incomplete implementation suggests the presence of institutional or operational gaps that could compromise the safety of workers exposed to chemical risks. Chemical hazards in port environments typically stem from the handling, transport, and storage of substances such as fuels, cleaning agents, industrial chemicals, and cargo residues. These substances, if not properly managed, can result in acute or chronic health issues including respiratory problems, chemical burns, or long-term organ damage (International Labour Organization [ILO], 2021). In this regard, chemical hazard identification and risk assessments form the foundation for a safe working environment, yet the study revealed inconsistency in their application across departments.

The proper labeling and storage of hazardous substances is another area where implementation appears uneven (74.2%). The Globally Harmonized System (GHS) of Classification and Labelling of Chemicals emphasizes the need for clear hazard communication through standardized labels and safety data sheets (United Nations, 2019). Failure to comply with this requirement can lead to confusion, mishandling, and potential accidents.

Moreover, the study highlighted that training of employees on chemical hazard management was not conducted consistently across all units. According to the World Health Organization (WHO, 2016), training is a critical control measure in chemical safety, enabling workers to recognize hazards, understand precautionary measures, and respond effectively to exposure incidents. The lack of structured and recurring training sessions may leave employees inadequately prepared to handle chemical emergencies. The level of implementation of this component could be attributed to limited technical expertise, insufficient budget allocation, or a lower prioritization of chemical hazards compared to physical risks. This is consistent with studies by Boateng & Danso (2020), who noted that many Ghanaian industrial institutions tend to focus more on visible, physical hazards while underestimating the long-term risks associated with chemical exposure.

Findings from the study indicate that this component was fully complied with, recording an implementation rate with an average score of 30.75. While this suggests significant progress, it also reveals the existence of residual gaps that could compromise the effectiveness of fire and explosion risk mitigation strategies. One of the positive findings was that fire hazards were generally recognized across the ports, with most operational units having identified potential sources of ignition, such as fuel storage areas, welding operations, and combustible cargo. However, the identification and mitigation of explosion risks, such as those related to pressurized containers, fuel tanks, and chemical spills, was not uniformly applied. According to the International Labour Organization (ILO, 2021), a comprehensive fire and explosion risk management strategy must include both the identification of ignition sources and the control of fuel and oxygen availability, which seems to be unevenly implemented across GPHA.

Regarding fire protection systems, the study found that most GPHA facilities were equipped with fire extinguishers and fire suppression systems, and routine checks were conducted in most areas

scoring (100%). The partial implementation attributed to a combination of technical, financial, and operational constraints, as well as varying levels of risk perception among departments. Research by Boateng and Danso (2020) similarly points to inconsistent risk prioritization as a recurring challenge in Ghanaian industrial safety systems.

Vibration hazards, though often less visible than other physical risks, represent a significant occupational health threat, particularly in industrial settings such as seaports, where workers regularly operate heavy machinery and power tools. This study assessed the extent to which the Ghana Ports and Harbours Authority (GPHA) has implemented its Occupational Health and Safety (OHS) policy concerning vibration-related hazards. The findings reveal that the vibration hazard component was fully complied with, with a compliance average score of 24.4 across GPHA operational areas. Despite some positive efforts, the overall implementation of vibration hazard controls remains incomplete, and critical gaps were identified. For instance, while some units had conducted basic vibration hazard identification, there was inconsistency in the depth and frequency of risk assessments. This falls short of international recommendations, such as those by the International Labour Organization (ILO, 2021), which stress that vibration exposure should be regularly assessed and documented, especially for workers handling jackhammers, forklifts, cranes, and other heavy-duty vibrating equipment.

Also, electrical hazards pose serious risks in high-risk work environments like ports, where workers are routinely exposed to electrical systems, heavy equipment, and machinery powered by electricity. The effective control of these hazards is essential in preventing electrocution, electrical fires, equipment failure, and associated injuries or fatalities. This study assessed the extent of implementation of the electrical hazard component of the Occupational Health and Safety (OHS) policy at the Ghana Ports and Harbours Authority (GPHA), revealing that this component was

fully complied with by all operational units (100%) under the study with average score of 35. The full compliance observed reflects a robust institutional commitment to electrical safety. The study found that all GPHA departments had adequate systems in place to prevent electrical hazards, including the use of circuit breakers, grounding systems, insulation, and regular inspection of electrical equipment. These findings align with international best practices such as those outlined by the International Labour Organization (ILO, 2021), which recommends proactive measures like proper equipment installation and routine inspections as the first line of defense against electrical incidents.

Findings from the study indicate that eye protection compliance was fully achieved across all sampled operational units within GPHA, with a 100% compliance rate with average score of 35. This significant achievement in high-risk environments like port and harbor operations, where ocular hazards are frequent due to welding, chemical handling, debris, and mechanical operations.

The high compliance rate in the use of Personal Protective Equipment (PPE), especially protective eyewear, aligns with global best practices in occupational health management. According to the International Labour Organization (ILO, 2021), consistent PPE usage is a fundamental defense against workplace injuries, particularly in physically demanding sectors such as maritime and industrial logistics. Workers were consistently observed donning protective goggles and face shields in tasks involving metal grinding, cargo handling, and chemical applications.

Again, the findings revealed full compliance across all operational units under review, indicating a high level of adherence to established safety protocols and fire prevention strategies. One of the primary preventive measures observed was the consistent use of Personal Protective Equipment (PPE) among workers engaged in welding and high-temperature tasks. All welders and associated personnel were equipped with fire-resistant clothing, welding shields, heat-resistant gloves, and

safety boots, aligning with the National Fire Protection Association (NFPA) 2112 standards for flame-resistant garments. According to OSHA (2020), appropriate PPE use is a fundamental barrier against fire-related injuries in hot work environments, especially in high-risk sectors such as maritime logistics and heavy-duty mechanical operations.

The integration of PPE, targeted training, engineering controls and emergency preparedness measures reflects a comprehensive strategy consistent with international occupational safety guidelines. These findings also align with literature suggesting that multi-faceted safety interventions, rather than isolated actions, lead to substantial improvements in fire hazard control Boateng and Danso, 2020. The high compliance rate observed could serve as a benchmark for other maritime and industrial entities operating in similar high-risk environments.

Risk management systems and formal risk assessment frameworks. These systems provide the foundation for proactive hazard identification, risk evaluation, and the implementation of targeted control measures to prevent occupational incidents and promote safe working environments.

At GPHA, risk management systems have been institutionalized to ensure that potential hazards associated with port operations including heavy cargo handling, chemical exposure, equipment use, and maritime activities are systematically identified, evaluated, and mitigated. The organization's risk management process is guided by internationally recognized standards such as ISO 31000 and ISO 45001, which advocate for an integrated, continuous, and participatory approach to workplace safety. According to Aven (2016), effective risk management is not only about compliance but about embedding safety into decision-making, planning, and daily operations.

Moreover, the risk assessment process at GPHA is participatory, involving line managers, safety officers, and frontline workers. This inclusive approach promotes shared responsibility and practical relevance, as those most familiar with operational realities contribute directly to the identification and prioritization of risks. This finding is supported by Lingard et al. (2010), who note that participatory risk assessments enhance both the accuracy of risk identification and the legitimacy of control strategies among employees.

6.3 Implementation related facilitators of the occupational health, safety and environmental policy.

The successful implementation of Occupational Health and Safety (OHS) policies is often contingent upon a set of internal facilitators. Among are leadership commitment and policy enforcement. The findings of this study demonstrate that the Ghana Ports and Harbours Authority (GPHA) benefits from a high level of top management commitment, a factor that has significantly contributed to the effective rollout of OHS policies across operational units.

Leadership commitment has been widely recognized in the literature as a foundational pillar for occupational health and safety performance. Within GPHA, leadership has demonstrated their support not only through the development of policies but also through active involvement in health and safety audits, funding of PPE and training programs, and the appointment of competent safety officers. These practices align with the assertions of Fernández-Muñiz et al. (2007), who argued that visible and sustained commitment from top management enhances employees' perception of safety importance and influences safety behavior across organizational levels.

Moreover, policy enforcement mechanisms were found to be robust and well-integrated within operational processes. The presence of internal compliance audits, disciplinary measures for non-compliance, and reward systems for safety excellence illustrates the organization’s shift from a

passive to a proactive safety culture. This reflects findings by Vinodkumar and Bhasi (2010), who noted that consistent policy enforcement plays a key role in reducing workplace incidents and improving overall safety climate.

The implementation of Occupational Health and Safety (OHS) policies at the Ghana Ports and Harbours Authority (GPHA) is not only shaped by internal organizational dynamics but also significantly facilitated by the national regulatory environment. The study identified that compliance and operationalization of OHS policies were strongly influenced by three key regulatory instruments: Ghana's Factories, Offices and Shops Act, 1970 (Act 328); the Environmental Protection Agency Act, 1994 (Act 490); and maritime safety laws governed by the Ghana Maritime Authority (GMA). Together with regular audits and inspections, these regulatory tools have created a structured and accountable environment conducive to effective OHS implementation.

Firstly, Act 328, which governs the health, safety, and welfare of workers in factories, offices, and shops, provides a legal basis for enforcing workplace safety standards at GPHA. The Act mandates safe machinery operation, proper ventilation, sanitation, and fire precautions all of which were found to be integrated into GPHA's OHS framework. The enforcement of this Act has functioned as a compliance driver, compelling management to institutionalize safety policies not only to reduce workplace hazards but also to avoid legal penalties. As noted by Agyemang and Ayensu (2018), legal accountability is a critical motivator for employers in Ghana to prioritize OHS interventions.

Secondly, the Environmental Protection Agency Act, 1994 (Act 490) serves as a complementary facilitator by emphasizing environmental health and pollution control both of which are intrinsically linked to occupational safety, particularly in port environments where fuel handling,

shipping emissions, and waste management pose significant risks. The EPA's regulatory oversight, including environmental audits and permits, ensures that GPHA operations conform to sustainable practices that mitigate health risks for workers and nearby communities. This reflects findings by Ofori and Awuah (2020), who observed that environmental regulations in Ghana increasingly intersect with occupational health policies in high-risk industries.

The findings of this study also reveal that training and capacity building are central facilitators in the successful implementation of the Occupational Health and Safety (OHS) policy at the Ghana Ports and Harbours Authority (GPHA). Effective safety training programs contributed significantly to building a competent workforce capable of identifying hazards, responding to emergencies, and properly utilizing personal protective equipment (PPE). These interventions have created a foundation for preventive behavior and procedural compliance among workers in high-risk operational settings.

A critical area in which training has shown tangible impact is hazard identification and risk assessment (HIRA). Workers at GPHA demonstrated the ability to recognize unsafe conditions and practices, such as unguarded machinery, chemical spills, or improper cargo stacking. Through routine safety briefings, on-the-job instruction, and formal HIRA workshops, employees gained practical skills to assess risk levels and report incidents or near-misses. According to DeJoy et al. (2010), empowering workers to participate in hazard recognition strengthens an organization's safety culture and reduces reliance solely on managerial oversight. At GPHA, hazard mapping and job safety analysis were incorporated into daily operations, suggesting a systematic integration of HIRA into the safety management system.

A central aspect of this facilitation is the use of structured communication tools, including safety signage, bulletins, regular briefings, and digital communication platforms. Field observations and

worker interviews revealed that safety messages were prominently displayed at strategic points across operational zones ranging from caution signs near heavy machinery to emergency contact posters in chemical storage areas. These visual cues function as constant reminders of hazards and safe behavior, reinforcing real-time decision-making. According to Neal and Griffin (2006), visible and consistent safety messaging is directly correlated with increased safety compliance and awareness.

6.4 Implementation related obstacles of the occupational health, safety and environmental policy.

One of the most pressing challenges hindering the full implementation of the Occupational Health and Safety (OHS) policy at the Ghana Ports and Harbours Authority (GPHA) is the issue of limited resource allocation, particularly in the form of budgetary constraints. The study revealed that despite a strong institutional commitment to OHS principles, insufficient financial investment continues to hamper the provision of adequate safety infrastructure, training programs, and regular maintenance of essential safety equipment.

According to the International Labour Organization (ILO, 2021), effective occupational safety systems require consistent funding to support risk assessments, procure personal protective equipment (PPE), upgrade facilities, and maintain technological systems such as surveillance and hazard detection tools. In the case of GPHA, limited capital allocations often result in the postponement of infrastructure upgrades, under-resourced OHS departments, and minimal emergency preparedness investments. This under-resourcing undermines the proactive management of occupational risks, particularly in high-risk environments like ports where heavy equipment, hazardous materials, and dynamic human activity converge.

Empirical evidence from similar port environments suggests that financial underinvestment not only limits the acquisition of safety tools but also affects human resource development. As noted by Boateng and Danso (2020) in their study of industrial safety in Ghanaian ports, inadequate budgets typically lead to a lack of specialized training for staff, poor enforcement of safety protocols, and a high dependency on temporary workers with limited safety orientation. This phenomenon was corroborated in the current study, where departments cited difficulties in accessing funds for routine training, risk communication campaigns, and the implementation of corrective action plans.

One of the recurring barriers identified in the implementation of the Occupational Health and Safety (OHS) policy at the Ghana Ports and Harbours Authority (GPHA) is inadequate training and capacity building. The limited allocation of financial and human resources to OHS training programs and the high turnover of contract and temporary workers, which collectively contribute to persistent skill and knowledge gaps across the workforce. Occupational safety in high-risk operational environments like ports requires a continually educated and safety-conscious workforce.

However, findings from the study show that training efforts at GPHA are often sporadic, department-specific, and dependent on budget availability. This aligns with the observation by Boateng and Danso (2020), who found that irregular training and inconsistent OHS education across Ghanaian industrial workplaces significantly weaken compliance and hazard preparedness. Additionally, inadequate capacity building affects not only operational staff but also supervisors and safety officers, who require advanced training in risk assessment, regulatory compliance, and incident investigation. The lack of ongoing professional development restricts the organization's

ability to adapt to evolving safety challenges and to meet international safety standards such as ISO 45001:2018.

The International Labour Organization (ILO, 2021) underscores that capacity building is not a one-time event but a continuous process requiring long-term investment in human capital. Without a strategic and well-resourced training framework, OHS policies risk being inadequately internalized, particularly among frontline workers who bear the greatest exposure to occupational hazards.

The implementation of Occupational Health and Safety (OHS) policies within public sector organizations like the Ghana Ports and Harbours Authority (GPHA) does not occur in isolation. It is significantly influenced by external stakeholder engagement, including that of local communities, civil society organizations, and environmental interest groups. The study found that limited public and community engagement presents a notable barrier to the effective implementation of OHS policies, with stakeholder pressure often slowing down or obstructing key safety and environmental reforms. Ports, by their nature, are situated within and closely interact with surrounding communities. As such, any reform that affects land use, waste disposal, emissions control, or noise and vibration levels tends to attract the attention of local residents and advocacy groups.

However, the study revealed that GPHA's community engagement mechanisms are often reactive rather than proactive, leading to delays in the implementation of safety and environmental upgrades. This is consistent with findings by Oduro and Offei (2020), who emphasized that weak community consultation and insufficient environmental communication contribute to mistrust and opposition in Ghana's industrial sectors

CHAPTER SEVEN

SUMMARY, CONCLUSION AND RECOMMENDATION

The process evaluation of the Occupational Health, Safety, and Environment (OHSE) policy at GPHA examined the extent to which the policy's implementation aligns with established procedures, operational standards, and regulatory frameworks. Key components such as hazard identification, risk assessment, training, stakeholder engagement, and compliance mechanisms were assessed. The evaluation revealed that while components such as physical and electrical hazard management, as well as industrial vehicle safety, have been fully implemented across GPHA, other critical areas including chemical hazard management, vibration hazard assessment, and fire/explosion preparedness also showed full compliance with some gaps.

Facilitators of successful implementation included strong top management commitment, the presence of dedicated OHSE units and committees, and technological integration such as surveillance and inspection systems. However, notable barriers such as limited resource allocation, high turnover of contract workers, insufficient public and community engagement, and gaps in training and capacity building were identified as significant constraints to full policy operationalization.

7.1 Conclusion

With evidence gathered in this study, the evaluation has demonstrated that GPHA has made commendable progress in institutionalizing OHSE practices, particularly in areas related to physical safety and regulatory compliance. However, the implementation remains uneven, with deficiencies in key risk domains such as chemical and vibration hazards, which pose ongoing threats to worker safety and environmental sustainability. The process is further hindered by

inadequate resource commitment, insufficient stakeholder engagement, and the fragmented inclusion of temporary or contract staff in OHSE systems. Without strategic interventions, these gaps may continue to undermine the effectiveness and sustainability of the OHSE policy.

7.2 Recommendations

Based on the conclusions of this study, it is recommended that:

1. GPHA should increase budgetary allocations for safety training, infrastructure upgrades, and maintenance of hazard monitoring systems. Consider earmarking funds specifically for high-risk areas like chemical safety and fire prevention.
2. Institutionalize Contract Worker Inclusion: Revise policies to ensure full OHSE integration of contract and temporary staff. Promote long-term contracting and workforce retention to reduce skill and knowledge gaps.
3. Improve Stakeholder and Community Engagement: Establish formal community feedback channels and involve local stakeholders in environmental planning and safety reforms. Partner with civil society organizations and NGOs to build trust and co-develop awareness campaigns.
4. Enhance Training and Capacity Building: Implement regular, role-specific training programs for both permanent and contract staff. Introduce refresher courses and integrate OHSE training into onboarding processes for all new workers.
5. Expand Monitoring and Evaluation Mechanisms: Introduce Key Performance Indicators (KPIs) and periodic audits to track OHSE compliance. Adopt a continuous improvement approach using Corrective and Preventive Action Plans (CAPAs).

By implementing these recommendations, GPHA can move toward a more robust, inclusive, and sustainable occupational health and safety culture that aligns with both national regulations and international best practices.

REFERENCES

Addo-Atuah, J., Senhaji-Tomza, B., & Ray, D. (2022). Curriculum considerations for global health engagement in pharmacy education in the United States. *Currents in Pharmacy Teaching and Learning*, 14(5), 589-597.

Addo-Kwafo, S., Kootin-Sanwu, V., & Nkansah, M. A. (2018). Occupational health and safety management: Safe work environment in the local automotive garage in Ghana. *Journal of Academic Research in Business and Social Sciences*, 8(12), 1177-1185.

Addo-Kwafo, S., Mensah, M., & Danquah, J. A. (2021). Occupational health and safety practices in small and medium-sized enterprises in Ghana. *International Journal of Workplace Health Management*, 14(4), 420-437.

Addai, E. K., Tulashie, S. K., Annan, J. S., & Yeboah, I. (2021). Trend of fire incidents in Ghana and ways to mitigate future incidents. *Safety Science*, 138, 105196.

Adu-Gyamfi, A. B., Addo, M. A., Amankwah, R. K., & Akanbang, B. A. A. (2021). Occupational health and safety management practices in the small-scale gold mining sector of Ghana. *International Journal of Environmental Research and Public Health*, 18(17), 9252.

Agbola, R. M., Hemans-Brew, S., & Dumevi, R. (2018). Implementation challenges of primary health care in Ghana: The case of community-based health planning and services. *International Journal of Health Promotion and Education*, 56(6), 292-307.

Agyabeng, K., Amponsah-Tawiah, K., Egyir, I. S., & Owusu-Aduamah, J. K. (2021). Occupational health and safety management challenges in the mining sector of Ghana: A descriptive phenomenological study. *Safety Science*, 136, 105144.

Agyabeng, K., Botchway, E. A., Egyir, I. S., & Amponsah-Tawiah, K. (2019). Occupational health and safety management challenges in the manufacturing industry in Ghana. *Journal of Science and Technology*, 39(3), 61-75.

Agyabeng, K., Dartey-Baah, K., & Amponsah-Tawiah, K. (2022). Occupational health and safety culture in Ghana's mining industry: A qualitative analysis. *Safety Science*, 146, 105540.

Agyabeng, K., Amponsah-Tawiah, K., & Mensah, J. (2023). The role of leadership in promoting occupational health and safety in Ghana's mining sector. *Safety Science*, 159, 106042.

Agyei-Baffour, P., Kotha, S. R., Johnson, J. C., Gyakobo, M., Asabir, K., Kwansah, J., Nakua, E., & Kretchy, I. (2021). Willingness to work in rural areas and the role of intrinsic versus extrinsic professional motivations: A survey of medical students in Ghana. *BMC Medical Education*, 21(1), 157.

Agyekum, E. B., Hossin, M. A., & Bayray, I. (2021). Occupational health and safety management in the construction industry: A systematic review. *Journal of Construction Engineering and Management*, 147(10), 03121003.

Agyemang-Duah, W., Peprah, C., & Peprah, P. (2019). Barriers to formal healthcare utilisation among poor older people under the livelihood empowerment against poverty programme in the Atwima Nwabiagya District of Ghana. *BMC Public Health*, 19(1), 1185.

Aidoo, E. N., Amoh-Mensah, K., & Agyei-Frimpong, K. (2019). Modelling the relationship between road traffic accidents and mobile phone usage in Ghana. *Mathematical Modelling and Applications*, 4(1), 1-8.

Akinwotu, S. A., Oladosu, A. O., Adeyanju, C. O., & Olatile, T. O. (2018). Occupational health and safety challenges in the Nigerian manufacturing sector. *Journal of Environmental Health Research*, 18(3), 229-242.

Akpan, E. I., Amade, B., Ukwuoma, F. P., & Nwoko-Omere, M. C. (2021). Occupational health and safety management in construction industry: A review of studies. *Journal of Engineering, Project, and Production Management*, 11(2), 143-162.

Albers, B., Mildon, R., Lyon, A. R., & Shlonsky, A. (2017). Implementation frameworks in child, youth and family services – Results from a scoping review. *Children and Youth Services Review*, 81, 101-116.

Alhassan, R. K., Nketiah-Amponsah, E., Spieker, N., Arhinful, D. K., & Rinke de Wit, T. F. (2018). Perspectives of frontline health workers on Ghana's National Health Insurance Scheme before and after community engagement interventions. *BMC Health Services Research*, 18(1), 361.

Allotey, P., Davey, T., & Reidpath, D. D. (2022). NCDs in sub-Saharan Africa: From the global to the local. *Global Health Action*, 15(1), 2022207.

Amo-Adjei, J., Anku, P. J., Amo, H. F., & Effah, M. O. (2018). Perception of quality of health delivery and health insurance subscription in Ghana. *BMC Health Services Research*, 18(1), 103.

Amoakoh-Coleman, M., Klipstein-Grobusch, K., Agyepong, I. A., Kayode, G. A., Grobbee, D. E., & Ansah, E. K. (2019). Implementation of provider payment systems in maternal health: A systematic review of evidence from low-and middle-income countries. *Health Policy and Planning*, 34(1), 46-66.

Amponsah-Tawiah, K., & Dartey-Baah, K. (2023). Occupational health and safety management systems in Ghana: Challenges and prospects. *Safety Science*, 157, 105971.

Amponsah-Tawiah, K., & Dartey-Baah, K. (2017). Occupational health and safety: Key issues and concerns in Ghana. *International Journal of Business and Social Science*, 2(14), 119-126.

Amponsah-Tawiah, K., & Dartey-Baah, K. (2021). Improving occupational health and safety in Ghana: A multistakeholder perspective. *International Journal of Environmental Research and Public Health*, 18(4), 1936.

Amponsah-Tawiah, K., & Nsiah-Poodoh, F. (2022). Occupational health and safety and performance: Evidence from the mining industry in Ghana. *Safety and Health at Work*, 13(1), 27-35.

Amponsah-Tawiah, K., & Mensah, J. (2016). Occupational health and safety and organizational commitment: Evidence from the Ghanaian mining industry. *Safety and Health at Work*, 7(3), 225-230.

Amponsah-Tawiah, K., Poku-Boansi, M., Badoe, W., & Amekah-Bawuah, M. E. (2020). Occupational health and safety management in the Ghanaian mining industry: A systematic review. *Safety Science*, 124, 104600.

Ancel, E., Shih, A. T., Jones, S. M., Reveley, M. S., Luxhøj, J. T., & Evans, J. K. (2021). Predictive safety analytics: Inferring aviation accident shaping factors and causation. *Journal of Risk Research*, 18(4), 428-451.

Aneziris, O. N., Nivolianitou, Z., Konstandinidou, M., Mavridis, G., & Plot, E. (2017). A Total Safety Management framework in case of a major hazards plant producing pesticides. *Safety Science*, 100, 183-194.

Ankoma-Key, T. (2015). The impact of port expansion on the community: A case study of Tema Community Three. Doctoral dissertation, University of Ghana.

Ankrah, N. A., Manu, P., & Proverbs, D. (2018). Occupational health and safety management in developing countries: A study of construction SMEs in Ghana. *Construction Management and Economics*, 36(3), 186-198.

Annan, J. S., Addai, E. K., & Tulashie, S. K. (2017). Occupational health and safety practices among vehicle repair artisans in Ghana. *Safety and Health at Work*, 8(2), 147-152.

Annan, J. S., Addai, E. K., & Tulashie, S. K. (2022). Assessment of occupational health and safety hazards and risks in the informal sector: The case of artisanal and small-scale gold mining in Ghana. *Safety Science*, 146, 105520.

Annan, J. S., Addai, E. K., & Tulashie, S. K. (2023). Occupational health and safety culture in Ghana's mining industry: A mixed-methods study. *Safety Science*, 158, 105956.

Appiah-Baiden, J., Osei-Asibey, D., & Agyemang, S. (2021). Occupational health and safety in Ghana's informal sector: A qualitative study of market traders in Kumasi. *International Journal of Occupational Safety and Ergonomics*, 27(3), 894-901.

Appiah-Baiden, J., Osei-Tutu, E., & Frimpong, S. (2022). Occupational health and safety management systems implementation in Ghana's construction industry: Barriers and facilitators. *Journal of Engineering, Design and Technology*, 20(3), 643-662.

Asare, P., Adamtey, R., & Oppong-Yeboah, N. Y. (2019). Occupational health and safety compliance in Ghana's construction industry: Challenges and recommendations. *Journal of Building Construction and Planning Research*, 7(3), 63-79.

Asikia, C. I. I., Phd, N. E., Nwabueze, E., Nwoloziri, C. N., & Mattias, U. (2022). Healthcare Maintenance and Safety Policy: Evidence from Port Harcourt Seaport. *International Journal of Geography & Environmental Management*, 8(2), 64-88.

Asumeng, M., Asamani, L., Afful, J., & Agyemang, C. B. (2019). Occupational safety and health compliance in Ghana's small and medium scale enterprises. *Journal of Workplace Behavioral Health*, 34(1), 20-37.

Autenrieth, D. A., Brazile, W. J., Sandfort, D. R., Douphrate, D. I., Román-Muñiz, I. N., & Reynolds, S. J. (2018). The associations between occupational health and safety management system programming level and prioritized audit findings on manufacturing workplace Occupational Health and Safety performance. *Safety Science*, 111, 72-80.

Ayilu, R. K. (2023). Limits to blue economy: challenges to accessing fishing livelihoods in Ghana's port communities. *Maritime Studies*, 22(2), 11.

Badri, A., Boudreau-Trudel, B., & Souissi, A. S. (2018). Occupational health and safety in the industry 4.0 era: A cause for major concern? *Safety Science*, 109, 403-411.

Bauer, M. S., Damschroder, L., Hagedorn, H., Smith, J., & Kilbourne, A. M. (2019). An introduction to implementation science for the non-specialist. *BMC Psychology*, 7(1), 32.

Berman, P., Azhar, A., & Bhawalkar, M. (2022). Factors influencing uptake of new methods to improve quality of healthcare: Lessons from implementation research in low- and middle-income countries. *BMJ Global Health*, 7(7), e009574.

Beyene, K. A., Aspden, T., & Sheridan, J. (2020). The impact of occupational stress and burnout on employee turnover intentions in the pharmaceutical retail sector: A qualitative study in Gondar, Ethiopia. *International Journal of Workplace Health Management*, 13(2), 167-188.

Birken, S. A., Powell, B. J., Shea, C. M., Haines, E. R., Alexis Kirk, M., Leeman, J., Rohweder, C., Damschroder, L., & Presseau, J. (2017). Criteria for selecting implementation science theories and frameworks: results from an international survey. *Implementation Science*, 12(1), 124.

Boakye, D., Owusu-Ansah, E., & Agyekum, K. (2021). Occupational health and safety practices in the Ghanaian mining industry: Evidence from a mining organization. *Journal of Environmental and Public Health*, 2021, 5567013.

Boakye-Dankwa, E., Teeple, E., Gore, R., Punnett, L., & Cavallari, J. M. (2022). Associations of organizational safety practices and culture with physical workload, psychosocial workload, and symptoms of musculoskeletal disorders among hospital workers. *American Journal of Industrial Medicine*, 65(1), 51-63.

Boateng, C. A., Basu, N., Acquah, G. F., & Asamoah, A. (2018). Occupational health and safety management in Ghana's mining industry: A qualitative study of stakeholder perspectives. *International Journal of Environmental Research and Public Health*, 15(12), 2824.

Boateng, D., & Danso, S. (2020). Assessing Occupational Health and Safety Practices in Ghanaian Industrial Workplaces. *International Journal of Occupational Safety and Ergonomics*, 26(3), 455–463.

Bolarinwa, O. A., Olagunju, O., Babalola, T., & Odusanya, O. (2019). Occupational hazards and safety measures among health workers in a tertiary institution in Southwest Nigeria. *International Journal of Medical Research and Health Sciences*, 8(8), 59-67.

Bonsu, J., van Dyk, W., Franzidis, J. P., Petersen, F., & Isafiade, A. (2020). A systems thinking approach to understanding the challenges to implementing occupational health and safety legislation in small-scale mines in Ghana. *Journal of Cleaner Production*, 248, 119244.

Bonsu, J., van Dyk, W., Franzidis, J. P., Petersen, F., & Isafiade, A. (2021). The implementation of occupational health and safety principles in small-scale mines in Ghana: An application of social marketing. *Resources Policy*, 72, 102110.

Bonsu, J., van Dyk, W., Franzidis, J. P., Petersen, F., & Isafiade, A. (2022). A conceptual framework for enhancing the implementation of occupational health and safety in small-scale mining in developing countries. *Journal of Cleaner Production*, 330, 129839.

Braun, V., & Clarke, V. (2022). *Thematic analysis: A practical guide*. Sage.

Bunger, A. C., Powell, B. J., Robertson, H. A., MacDowell, H., Birken, S. A., & Shea, C. (2019). Tracking implementation strategies: A description of a practical approach and early findings. *Health Research Policy and Systems*, 17(1), 19.

Chambers, D. A., Glasgow, R. E., & Stange, K. C. (2018). The dynamic sustainability framework: Addressing the paradox of sustainment amid ongoing change. *Implementation Science*, 8(1), 117.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.

Cudjoe, S. F., Amponsah-Tawiah, K., & Peasah, O. (2018). Occupational health and safety in the banking sector: Evidence from Ghana. *Indian Journal of Occupational & Environmental Medicine*, 22(1), 29-37.

Damschroder, L. J., Reardon, C. M., Opra Widerquist, M. A., & Lowery, J. (2019). Conceptualizing outcomes for use with the Consolidated Framework for Implementation Research (CFIR): The CFIR Outcomes Addendum. *Implementation Science*, 14(1), 58.

Dankwa, J. A., Amponsah-Tawiah, K., & Darko, D. (2018). Occupational health and safety management systems: A critical review of the literature. *Journal of Safety Studies*, 4(1), 11-24.

Dankwa, J. A., Amponsah-Tawiah, K., & Darko, D. (2020). Safety climate as a predictor of safety performance in the Ghanaian construction industry. *International Journal of Occupational Safety and Ergonomics*, 26(2), 303-313.

Dartey-Baah, K., & Ampofo, E. Y. (2020). "Examining the role of transformational leadership in promoting safety culture in the mining industry of Ghana." *Global Business Review*, 21(1), 54-70.

Dearing, J. W., & Cox, J. G. (2018). Diffusion of innovations theory, principles, and practice. *Health Affairs*, 37(2), 183-190.

Donkoh, D. K., Adjarko, H., & Ansah, E. O. (2018). An appraisal of occupational health and safety regulations in Ghana: A study at Sunyani Municipality. *Journal of Building Construction and Planning Research*, 6(3), 183-197.

Donkoh, D. K., Adjarko, H., & Bugyei, K. A. (2023). Examining the regulatory framework for occupational health and safety in Ghana: A case study of the construction industry. *Journal of Engineering, Design and Technology*, 21(1), 220-240.

Donkor, S., Asumeng, M., & Amponsah-Tawiah, K. (2020). Safety behavior among commercial vehicle drivers in Ghana: The role of perceived organisational support and fatalism. *International Journal of Occupational Safety and Ergonomics*, 26(2), 314-323.

Dryden-Palmer, K. D., Parshuram, C. S., & Berta, W. B. (2020). Context, complexity and process in the implementation of evidence-based innovation: A realist informed review. *BMC Health Services Research*, 20(1), 81.

Dwamena, M. A. (2015). The role of Health and Safety Management and its effects on Employee Performance: A Case Study of Takoradi Thermal Power Station (T3). Doctoral dissertation, University of Cape Coast.

Dwomoh, G., Owusu, E. E., & Addo, M. (2013). Impact of occupational health and safety policies on employees' performance in the Ghana's Timber Industry: Evidence from Kumasi. *Journal of Entrepreneurship and Business Innovation*, 2(2), 11-30.

Dwomoh, G., Owusu, F., & Addo, M. (2017). Impact of occupational health and safety policies on employees' performance in the Ghana's timber industry: Evidence from lumber and logs limited. *International Journal of Education and Research*, 5(7), 167-178.

Dwomoh, G., Adu, C., & Frempong, E. (2021). A review of occupational health and safety practices in the energy sector of Ghana. *Journal of Health, Safety and Environment*, 37(1), 43-58.

Dwomoh, G., Kwarteng, K., & Frempong, E. (2022). Occupational health and safety issues in Ghana's mining sector: A systematic review. *Safety Science Monitor*, 23(1), 1-15.

Dwomoh, G., Kwarteng, K., & Frempong, E. (2023). Examining the implementation of occupational health and safety standards in Ghana's manufacturing sector. *Journal of Manufacturing Technology Management*, 34(1), 76-94.

Ekwochi, U., Osuorah, D. I., Ndu, I. K., Ezenwosu, O. U., Amadi, O. F., & Nwokoye, I. C. (2020). Determinants of occupational health hazards among roadside automobile mechanics in Enugu, Nigeria. *International Journal of Occupational Safety and Ergonomics*, 26(2), 324-329.

Ekor, M., Adongo, P. B., & Ahorlu, C. (2022). Implementation of community-based health planning and services in Ghana: A qualitative study of stakeholders' perceptions and experiences. *BMC Health Services Research*, 22(1), 251.

Fagan, R. P., Pogorzelska-Maziarz, M., & Stone, P. W. (2019). The adoption of recommended infection control practices by healthcare facilities in the US: Progress on an ongoing journey. *American Journal of Infection Control*, 47(3), 350-351.

Fang, W., Ding, L., Zhong, B., Love, P. E., & Luo, H. (2021). Automated detection of hazards on construction sites: State of the art and future perspectives. *Automation in Construction*, 124, 103558.

Francina, V. J., & Ragini, R. (2018). A Study on Employee's Health and Safety Measures in Pioneer Processing India (A Division of Jansons Industries Ltd.,) Erode. *TSM Business Review*, 6(1), 26-37.

Friend, M., Friend, M. A., Kohn, J., & Kohn, J. P. (2023). *Fundamentals of occupational safety and health*. Rowman & Littlefield.

Frimpong, S., Annan, J. S., & Ofori-Boateng, K. (2019). Occupational health and safety audit of small-scale gold mining operations in Ghana. *Journal of Safety Research*, 71, 153-161.

Frimpong, S., Kissi, E., Owusu-Ansah, S., & Adjei-Kumi, T. (2021). Predicting the rate of accidents in the Ghanaian mining industry using time series analysis. *Safety Science*, 138, 105206.

Geerligs, L., Rankin, N. M., Shepherd, H. L., & Butow, P. (2021). Hospital-based implementation of digital health interventions: A review of frameworks. *Health Research Policy and Systems*, 19(1), 13.

Ghana Port and Harbour Authority. (2018). *Annual report*. GPHA.

Ghana Port and Harbour Authority. (2020). *Occupational health, safety, and environment policy statement*. GPHA.

Gichuki, M., & Mwangi, J. (2021). Evaluation of occupational health and safety management systems implementation in Kenyan universities. *International Journal of Advanced Research in Engineering and Technology*, 12(2), 533-544.

Gould, D. J., Chudleigh, J., Purssell, E., Hawker, C., Gaze, S., & James, D. (2017). Survey to explore implementation of the national evidence-based guidelines on prevention of healthcare-associated infections in hospitals in England: Main findings. *Journal of Hospital Infection*, 97(1), 10-19.

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, 18(1), 59-82.

Gul, M., & Ak, M. F. (2018). A comparative outline for quantifying risk ratings in occupational health and safety risk assessment. *Journal of Cleaner Production*, 196, 653-664.

Gyasi, R. M., Amoako, Y. A., & Fynn, J. K. (2019). Environmental sanitation policies and sustainable waste management practices in Ghana: A review. *International Journal of Environmental Health Research*, 29(5), 566-578.

Gyasi, R. M., Amoako, Y. A., & Adjei, P. O. (2021). Occupational health and safety awareness and practices among small-scale gold miners in Ghana: Implications for public health practice. *International Journal of Environmental Research and Public Health*, 18(10), 5297.

Hill, J. N., Locatelli, S. M., Bokhour, B. G., Fix, G. M., Solomon, J., & Mueller, N. (2021). Institutional readiness for implementation of new care models: Perspectives from VA medical centers. *Journal of Healthcare Management*, 66(2), 137-152.

Iavicoli, I., Leso, V., Beezhold, D. H., & Shvedova, A. A. (2017). Nanotechnology in agriculture: Opportunities, toxicological implications, and occupational risks. *Toxicology and Applied Pharmacology*, 329, 96-111.

Ibrahim, M., El-Zaart, A., & Adams, C. (2019). Implementation success factors for healthcare information systems security: A systematic literature review. *Journal of Healthcare Informatics Research*, 3(2), 175-223.

Ilbahar, E., Karaşan, A., Cebi, S., & Kahraman, C. (2018). A novel approach to risk assessment for occupational health and safety using Pythagorean fuzzy AHP & fuzzy inference system. *Safety Science*, 103, 124-136.

Insaidoo, Y. (2019). Occupational health and safety management systems and productivity: The Ghanaian experience. *International Journal of Scientific and Research Publications*, 9(4), 49-55.

International Labour Organization (ILO). (2021). *Occupational Safety and Health in Ports*. Geneva: ILO.

International Labour Organization. (2019). *Safety and health at the heart of the future of work: Building on 100 years of experience*. ILO.

ISO 45001:2018. *Occupational Health and Safety Management Systems – Requirements with Guidance for Use*. International Organization for Standardization

Jilcha, K., & Kitaw, D. (2017). Industrial occupational safety and health innovation for sustainable development. *Engineering Science and Technology, an International Journal*, 20(1), 372-380.

Kaynak, R., Fallon, E., Ahmad, N., & Robertson, R. (2018). Occupational health and safety challenges for the mining industry workforce. *International Journal of Mining Science and Technology*, 28(6), 921-928.

Kim, J., Hong, J., Jang, Y. C., & Lee, Y. M. (2019). Occupational exposure and health behaviors among workers in South Korea. *Safety and Health at Work*, 10(1), 66-71.

Kletz, T. A. (2018). *Hazop & Hazan: Identifying and assessing process industry hazards*. CRC Press.

Konlan, K. D., Japiong, M., Suuk, A. N., & Afaya, A. (2021). Nurses' implementation of patient safety interventions in Ghana: A qualitative study using the Consolidated Framework for Implementation Research. *Nursing Open*, 8(6), 3641-3651.

Kontogiannis, T., Leva, M. C., & Balfe, N. (2017). Total safety management: Principles, processes and methods. *Safety Science*, 100, 128-142.

Kusi-Amponsah, H., Owusu-Addo, E., Kusi-Amponsah Tackie, M., Dwumfour-Asare, B., Kwesi Frempong, N., Kablan, S., & Cudjoe, G. (2021). Implementation and utilization of community-based health planning and services in Ghana: A systematic review. *Journal of Global Health Reports*, 5, e2021024.

Kwame, A. N., Oti-Sarpong, K., & Badu, E. (2020). Occupational health and safety practices in the Ghanaian construction industry: State of the art and future research agenda. *Construction Management and Economics*, 38(11), 1025-1045.

Kwame, A. N., Boadu, E. K., & Antwi-Afari, P. (2023). Determinants of safety performance in Ghana's construction industry: A structural equation modeling approach. *International Journal of Construction Management*, 23(1), 143-154.

Kwan, P. P., Sussman, S., & Valente, T. W. (2017). Peer leaders' implementation of a socially-oriented drug abuse prevention program. *American Journal of Health Behavior*, 41(2), 121-134.

Kwamie, A., Dahinten, V. S., & Agyepong, I. A. (2020). Power in implementation of digital health innovations in primary care settings. *BMJ Global Health*, 5(Suppl 4), e002766.

Kwesi, A. T., Dai, J., & Kobina, A. S. (2019). A review of health and safety leadership and managerial practices on modern construction sites. *International Journal of Safety and Security Engineering*, 9(1), 1-14.

Lay, A. M., Saunders, R., Lifshen, M., Breslin, C., LaMontagne, A. D., Tompa, E., & Smith, P. M. (2017). The relationship between occupational health and safety vulnerability and workplace injury. *Safety Science*, 94, 85-93.

Lingard, H., & Holmes, N. (2001). Understandings of occupational health and safety risk control in small business construction firms: barriers to implementing technological controls. *Construction Management and Economics*, 19(2), 217–226.

Manu, P., Mahamadu, A. M., Phung, V. M., & Nguyen, T. T. (2019). Factors influencing health and safety management in developing countries: A qualitative study in Ghana's construction industry. *International Journal of Construction Management*, 22(2), 258-270.

Means, A. R., Kemp, C. G., Gwayi-Chore, M. C., Gimbel, S., Soi, C., & Sherr, K. (2020). Evaluating and optimizing the consolidated framework for implementation research (CFIR) for use in low- and middle-income countries: A systematic review. *Implementation Science*, 15(1), 17.

Min, J., Kim, Y., Lee, S., Jang, T. W., Kim, I., & Song, J. (2019). The fourth industrial revolution and its impact on occupational health and safety, worker's compensation and labor conditions. *Safety and Health at Work*, 10(4), 400-408.

Mohammadfam, I., Kamalinia, M., Momeni, M., Golmohammadi, R., Hamidi, Y., & Soltanian, A. (2017). Evaluation of the quality of occupational health and safety management systems based on key performance indicators in certified organizations. *Safety and Health at Work*, 8(2), 156-161.

Moullin, J. C., Dickson, K. S., Stadnick, N. A., Rabin, B., & Aarons, G. A. (2019). Systematic review of the exploration, preparation, implementation, sustainment (EPIS) framework. *Implementation Science*, 14(1), 1.

Moyce, S. C., & Schenker, M. (2018). Migrant workers and their occupational health and safety. *Annual Review of Public Health*, 39, 351-365.

Munjanja, O. K., Kibuka, S., & Dovlo, D. (2018). The nursing workforce in sub-Saharan Africa. *The Global Nursing Review Initiative*, 7, 1-68.

Muthuviknesh, R., & Kumar, K. (2020). The effect of occupational health and safety measures on employee productivity in the manufacturing industries in India. *Materials Today: Proceedings*, 22(3), 2325-2330.

Mwangi, J. M., & Otego, L. O. (2018). Occupational safety and health management in organizations: A review of compliance levels. *Journal of Business and Strategic Management*, 3(2), 1-16.

Nanka, O., Lysychenko, M., Kiriyenko, M., Pavlykivskyi, V., Duyunova, T., & Senchuk, I. (2019). Relationship study between the student learning approach in the occupational safety and health field and acquired competencies. *Journal of Achievements in Materials and Manufacturing Engineering*, 95(1), 32-41.

Nielsen, K. J., Rasmussen, K., Glasscock, D., & Spangenberg, S. (2017). Exploring the leading high-performance work systems and organisational performance case. *Team Performance Management*, 23(3/4), 166-189.

Nilsen, P. (2015). Making sense of implementation theories, models and frameworks. *Implementation Science*, 10(1), 53.

Nivedhitha, K. S., & Rajan, D. (2019). Assessing the impact of corporate wellness programs on health outcomes in Indian context. *Advances in Management*, 12(1), 18-26.

Nnaji, C., Gambatese, J., & Karakhan, A. (2020). Building information modeling and safety implementation in design: Investment-worth or not? *Engineering, Construction and Architectural Management*, 27(10), 2727-2752.

Nwedu, C. (2018). The challenges of occupational safety and health in the Nigerian work environment: A review. *European Journal of Business and Management Research*, 3(5), 1-7.

Offei-Ansah, C., & Djan, P. A. (2023). Occupational health and safety policies implementation in Ghana's construction industry: Challenges and prospects. *Journal of Construction in Developing Countries*, 28(1), 1-18.

Oakman, J., Neupane, S., Proper, K. I., Kinsman, N., & Nygård, C. H. (2019). Workplace interventions to improve work ability: A systematic review and meta-analysis of their effectiveness. *Scandinavian Journal of Work, Environment & Health*, 45(4), 324-337.

Occupational Safety and Health Administration (OSHA). (2020). *Electrical Safety Standards*. Retrieved from https://www.osha.gov.

Oduro, R., & Offei, E. (2020). Stakeholder Engagement and Environmental Policy Implementation in Ghana's Industrial Sector. *African Journal of Public Policy and Management*, 6(2), 87–104.

Ofosu, E. K., Ebenezer, E. K., Akwasi, G., & Asiedu, R. O. (2020). Occupational health and safety practices among construction firms in Ghana. *Journal of Facility Management Research*, 3(1), 40-58.

Ofosu, G., Oduro-Kwarteng, S., Darko-Koomson, S., & Appiah-Effah, E. (2021). Occupational health and safety practices at the ports of Ghana: A gap analysis. *Maritime Policy & Management*, 48(3), 394-409.

Ofosu, E. K., Ebenezer, E. K., Akwasi, G., & Asiedu, R. O. (2023). Occupational health and safety performance in Ghana's construction industry: A mixed-methods approach. *Safety Science*, 158, 105967.

Okorie, V. N., Aigbavboa, C. O., & Chibuzor, O. A. (2021). Occupational health and safety practices in the Nigerian construction industry: A mixed-method approach. *Construction Economics and Building*, 21(2), 203-222.

Okoye, P. U., Aderibigbe, A. Q., & Adeyi, A. O. (2021). Validated modelling framework for predicting occupational health and safety risks in construction workers. *International Journal of Environmental Research and Public Health*, 18(7), 3748.

Okwabi, S. K., Boadu, E. K., & Agyemang, F. G. (2020). Occupational health and safety management systems implementation in Ghana's oil and gas industry. *Journal of Petroleum Exploration and Production Technology*, 10(7), 2885-2897.

Okyere, I., Chuku, E. O., Dzantor, S., & Adade, R. (2018). Implementation of the vessel monitoring system (VMS) in Ghana: Challenges and prospects. *Marine Policy*, 97, 181-190.

Oppong, N. Y., Bainson, H. A., & Eshun-Smith, P. (2017). Occupational health and safety compliance in Ghana's industries: Evidence from the port and railway sectors. *Journal of Business and Enterprise Development*, 7, 134-147.

Oppong, N. Y., Bainson, H. A., & Eshun-Smith, P. (2020). Management of occupational health and safety in the petroleum industry in Ghana. *Journal of Science and Technology Policy Management*, 11(2), 231-244.

Oppong, S., Osei-Asibey, D., & Amponsah-Tawiah, K. (2022). Occupational health and safety management in Ghana's oil and gas industry: Challenges and prospects. *Journal of Occupational Health Psychology*, 27(3), 302-315.

Oppong-Yeboah, G. Y., & Gyamfi, T. A. (2022). Advancing occupational health and safety management in Ghana: The role of leadership commitment. *Safety Science*, 147, 105619.

Osei-Asibey, D., Acheampong, A., & Amponsah-Tawiah, K. (2019). Occupational health and safety management and turnover intention in the Ghanaian mining sector. *Safety and Health at Work*, 10(1), 42-53.

Osei-Tutu, E., Frimpong, S., & Ampadu, E. (2022). Occupational health and safety management systems and safety performance in Ghana's construction industry. *Journal of Construction Engineering and Management*, 148(5), 04022027.

Osei-Tutu, E., & Ampadu, E. (2020). Implementing occupational health and safety management systems in construction firms in Ghana: Challenges and benefits. *Journal of Construction Engineering and Management*, 146(9), 04020105.

Osei-Tutu, E., & Ampadu, E. (2018). Implementing occupational health and safety management systems in construction firms in Ghana: Challenges and benefits. *Journal of Construction Engineering and Management*, 146(9), 04020105.

Osei-Tutu, E., Ampadu, E., & Frimpong, S. (2023). Safety climate and safety performance in the Ghanaian construction industry: A structural equation modelling approach. *Journal of Construction Engineering and Management*, 149(3), 04022175.

Owusu-Ansah, L., Agyei-Baffour, P., & Edusei, A. K. (2018). Implementation of free primary health care policy in Ghana: Perspectives of key stakeholders in the Northern Region. *Global Health Action*, 11(1), 1490927

Owusu-Sekyere, E., Adjei-Kumi, T., & Osei-Tutu, E. (2021). Occupational health and safety challenges in Ghana's construction industry. *Journal of Construction Engineering and Management*, 147(3), 05020025.

Patton, M. Q. (2015). *Qualitative research & evaluation methods* (4th ed.). Sage.

Powell, B. J., Waltz, T. J., Chinman, M. J., Damschroder, L. J., Smith, J. L., & Matthieu, M. M. (2019). A refined compilation of implementation strategies: Results from the Expert Recommendations for Implementing Change (ERIC) project. *Implementation Science*, 10(1), 21.

Puplampu, B. B., & Quartey, S. H. (2012). Key issues on occupational health and safety practices in Ghana: A review. *International Journal of Business and Social Science*, 3(19), 151-156.

Puplampu, B. B., Quartey, S. H., & Osei-Boateng, G. (2018). Occupational health and safety in Ghana: An agenda for reform. *Policy and Practice in Health and Safety*, 16(2), 158-172.

Rantanen, J., Lehtinen, S., & Iavicoli, S. (2019). Occupational health services in selected International Commission on Occupational Health (ICOH) member countries. *Scandinavian Journal of Work, Environment & Health*, 46(3), 321-329.

Reese, C. D. (2018). *Occupational health and safety management: A practical approach*. CRC Press.

Ritonja, J., Aronson, K. J., Matthews, R. W., Boivin, D. B., & Kantermann, T. (2019). Working Time Society consensus statements: Individual differences in shift work tolerance and recommendations for research and practice. *Industrial Health*, 57(2), 201-212.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

Sarfo, S. K., Yeboah-Assiamah, E., & Yeboah-Boateng, K. (2022). Occupational health and safety management systems in Ghana's mining industry: Implications for sustainable development. *Resources Policy*, 76, 102585.

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson.

Schaffer, M. A., Sandau, K. E., & Diedrick, L. (2018). Evidence-based practice models for organizational change: Overview and practical applications. *Journal of Advanced Nursing*, 69(5), 1197-1209.

Seker, S., & Zavadskas, E. K. (2017). Application of fuzzy DEMATEL method for analyzing occupational risks on construction sites. *Sustainability*, 9(11), 2083.

Smith, M. W., Machalicek, W., Maria Lang, R., White, P., Parnell, A., Wood, M. S., & Strickland, D. (2020). Implementation practice and systems research: Multiple stakeholder perspectives. *Research in Developmental Disabilities*, 106, 103766.

Strifler, L., Cardoso, R., McGowan, J., Cogo, E., Nincic, V., & Khan, P. A. (2018). Scoping review identifies significant number of knowledge translation theories, models, and frameworks with limited use. *Journal of Clinical Epidemiology*, 100, 92-102.

Tawiah, K. A., & Baah, K. D. (2011). Occupational health and safety: Key issues and concerns in Ghana. *International Journal of Business and Social Science*, 2(14), 119-126.

Umar, T., Egbu, C., Wamuziri, S., & Honnurvali, M. S. (2018). Occupational safety and health regulations in Oman. *Proceedings of the Institution of Civil Engineers - Management, Procurement and Law*, 171(3), 93-99.

United Nations. (2019). *Globally Harmonized System of Classification and Labelling of Chemicals (GHS)*, 8th Revised Edition. New York and Geneva: United Nations.

Vinodkumar, M. N., & Bhasi, M. (2010). *Safety management practices and safety behaviour: Assessing the mediating role of safety knowledge and motivation*. *Accident Analysis & Prevention, 42*(6), 2082–2093 https://doi.org/10.1016/j.aap.2010.06.021

World Health Organization (WHO). (2016). *Chemical safety and health*. Retrieved from https://www.who.int/health-topics/chemical-safety

World Health Organization (WHO). (2016). *Fire Safety and Emergency Preparedness in the Workplace*. Retrieved from https://www.who.int

World Health Organization. (2021). *Strategic toolkit for assessing risks: A comprehensive toolkit for all-hazards health emergency risk assessment*. WHO.

World Health Organization (WHO). (2016). *Occupational Health: Vibration and Health*. Retrieved from https://www.who.int

Wiru, K., Kumi-Kyereme, A., Mahama, E., Tenkorang, E. Y., & Owusu-Agyei, S. (2021). Utilization of community-based health planning and services compounds in the Kintampo North Municipality: A cross-sectional descriptive correlational study. *BMC Health Services Research*, 21(1), 5.

Wu, H., Wang, C., Qiao, D., & Li, H. (2021). Occupational health and safety management in the emerging artificial intelligence industry: A fuzzy text analytic approach. *Safety Science*, 143, 105416.

Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage.

Yoon, S. W., Lin, H. K., Chen, G., Yi, S., Choi, J., & Rui, Z. (2020). Effect of occupational health and safety management system practices with employee participation in project construction sites. *Safety Science*, 128, 104773.

Zhang, X., Luo, L., & Yang, Y. (2021). Drivers of technology adoption in the Chinese construction industry: A social network perspective. *Journal of Management in Engineering*, 37(1), 04020101.

Zhao, D., McCoy, A. P., Kleiner, B. M., Du, J., & Smith-Jackson, T. L. (2016). Decision-making chains in electrical safety for construction workers. *Journal of Construction Engineering and Management*, 142(1), 04015055.

Zwetsloot, G. I., Kines, P.,Ruotsala, R., Spittle, M., Lunde, J., & van Wijngaarden, B. (2017). After all, what constitutes the success of an occupational safety and health intervention program? A letter to the editors. *Safety Science*, 103, 90-91.

APPENDICES 1: QUESTIONNAIRE

QUESTIONNAIRE FOR PROCESS EVALUATION OF THE HAZARD COMPONENT OF THE OCCUPATIONAL HEALTH AND SAFETY POLICY OF GHANA PORTS AND HARBOURS AUTHORITY, TEMA

No	Questions Section A: Background Characteristics
1	Gender Male ☐ Female ☐
2	Age < 29 years ☐ 40-49 years ☐ 60 plus ☐ 30 – 39 years ☐ 50 – 59 years ☐
3	Years of Experience < 10 years ☐ 11- 14 years ☐ 15- 20 years ☐ 20 years plus ☐
4	Profession ……..

Section B: Hazard Components

Section B1: Physical Hazards

Response

5.	Do you normally carry out physical hazards identification? 1. Yes / 0. No	
6.	Do you put in place measures for conducting regular inspection? 1. Yes / 0 No	
7.	Do you ensure that workers have appropriate protective equipment against physical hazards? 1. Yes / 0. No	
8.	Do you put in place measures to minimize risks related to physical hazards? 1. Yes / 0. No	
9.	Do you normally carry out physical hazards risk assessment? 1. Yes / 0. No	

Section B2: Rotating and Moving Equipment Response

10.	Do you normally carry out rotating and moving equipment hazard identification? 1. Yes / 0. No	
11.	Do you normally carry out rotating and moving equipment risk assessment? 1. Yes / 0. No	
12.	Do you conduct routine maintenance of rotating and moving equipment? 1. Yes / 0. No	
13.	Do you normally secure rotating and moving equipment to prevent accident?	

	1. Yes / 0. No	
14.	Do you train all personnel's on the safe operation of rotating and moving equipment? 1. Yes / 0. No	

Section B3: Industrial Vehicle Driving and site Traffic Response

15.	Do you normally carry out industrial vehicle driving and site traffic hazard identification? 1. Yes / 0. No	
16.	Do you normally carry out industrial vehicle driving and site traffic risk assessment? 1. Yes / 0. No	
17.	Do you put measures to enforce speed limits for industrial vehicles within the port? 1. Yes / 0. No	
18	Do management ensure proper signage and road marking for site traffic? 1. Yes / 0. No	
19.	Do you often conduct safety inspections of industrial vehicles? 1. Yes / 0. No	
20.	Do you often train and license industrial vehicle operators? 1. Yes / 0. No	
21.	Do drivers and operator often undergo medical surveillance? 1. Yes / 0. No	

Section B4: Chemical Hazards		Response
22.	Do you normally carry out chemical hazard identification? 1. Yes / 0. No	
23.	Do you normally carry out chemical hazard risk assessment? 1. Yes / 0. No	
24	Do you put in place measures for ensuring proper labeling and storage of hazardous chemicals? 1Yes/ 0 No?	
25.	Do you put in place measures for training employees on chemical hazard identification and response? 1Yes/ 0. No?	

Section B5: Fire and Explosions		Response
26.	Do you normally carry out fire and explosions hazard identification? 1. Yes / 0. No	
27.	Do you normally carry out fire and explosions hazard risk assessment? 1. Yes / 0. No	
28.	Do you put in place measures for conducting regular fire drills and emergency preparedness training? 1. Yes / 0. No	
29	Does management put in place measures for ensuring fire extinguishers and suppression systems are functional? 1. Yes / 0. No	

30.	Do management put in place measures for identifying and mitigating explosion risks in the workplace? 1.Yes / 0. No	

Section B6: Vibration Response

31.	Do you normally carry out vibration hazard identification? 1. Yes / 0. No	
32.	Do you normally carry out vibration hazard risk assessment? 1. Yes / 0. No	
33	Do you put in place measures for minimizing exposure to harmful vibration in the workplace? 1. Yes/ 0. No?	
34	Does management put in place measures for providing workers with vibration-dampening protective equipment? 1. Yes/ 0. No?	
35	Does management put in place measures for monitoring and assessing vibration levels to ensure compliance with safety standards? 1. Yes/ 2 No?	

Section B7: **Electrical Hazards**

36	Do management put in place measures for preventing electrical hazards through regular system inspections? 1.Yes/ 0. No	
37	Does management put in place measures for providing electrical hazard awareness training for employees? 1.Yes/ 0.No	
38	Does management put in place measures for ensuring all electrical installations comply with safety regulations? 1Yes / 0. No	
39	Do you normally carry out electrical hazard identification? 1. Yes / 0. No	
40.	Do you normally carry out fire and explosions hazard risk assessment? 1Yes / 0. No	

Section B8 **Eye Hazards**

41	Do you put in place measures for ensuring workers wear appropriate eye protection in hazardous environments? 1. Yes / 0. No?	
42	Do you put in place measures for providing emergency response procedures for eye injuries? 1. Yes/ 0. No	

43	Do you put in place measures for reducing exposure to chemicals and debris that can cause eye damage? 1. Yes/ 0. No	

Section B9 **Welding/Hot Works**

44	Do you ensure proper ventilation during welding and hot work operations? 1. Yes / 0. No	
45.	Does management put in place measures for providing fire-resistant protective gear for workers involved in hot works? 1Yes/ 0. No	
46.	Do you put in place measures for training employees on fire hazards associated with welding and hot works? 1 Yes/ 0. No	

IN-DEPTH INTERVIEW GUIDE FOR MANAGEMENT

My name is Cynthia Sroeda Ablordeppey with your kind permission I will like to ask some questions for your response. The questions are to elicit barriers and facilitators of the occupational and health safety guidelines at Ghana port and harbor Authority. Thank you in anticipation for your responses and be assured that all information provided will be treated highly confidential

Component: physical hazards

1.	What were some of the facilitators of the implementation of physical hazards component of Occupational health and safety policy?	
2	Are they challenges in implementing physical hazard identification?	
3	What were some of the barriers in implementation of the physical hazards component of Occupational health and safety policy?	
Component: rotating and moving equipment		
4	What were some of the facilitators of the implementation of rotating and moving equipment component of Occupational health and safety policy	
5	What were some of the barriers of the implementation of rotating and moving equipment component of Occupational health and safety policy	
vibration component		
6	What were some of the facilitators of the implementation of vibration component of Occupational health and safety policy?	
7	What were some of the barriers of the implementation of vibration component of Occupational health and safety policy?	
Industrial vehicle driving and site traffic component		

8	What were some of the facilitators of the implementation of industrial vehicle driving and site traffic component of Occupational health and safety policy?	
9	What were some of the facilitators of the implementation of fire and explosions component of Occupational health and safety policy?	
Fire and explosions component		
10	What were some of the barriers of the implementation of fire and explosions component of Occupational health and safety policy?	
11	What were some of the facilitators of the implementation of illumination of the component of Occupational health and safety policy?	
Welding/Hot Works of the component		
12	What were some of the facilitators of the implementation of the Welding/Hot Works of the component of Occupational health and safety policy?	
13	What were some of the barriers of the implementation of the Welding/Hot Works of the component of Occupational health and safety policy?	
Eye hazards of the component		
14	What were some of the facilitators of the implementation of the eye hazards of the component of Occupational health and safety policy?	
15	What were some of the barriers of the implementation of the eye hazards component of Occupational health and safety policy?	
Electrical hazards of the component		

16	What were some of the facilitators of the implementation of the electrical hazards of the component of Occupational health and safety policy?	
17	What were some of the barriers of the implementation of the electrical hazards component of Occupational health and safety policy?	

APPENDIX II: ETHICAL CLEARANCE

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Digital Address: GA-050-3303
Mob: +233-50-3539896
Tel: +233-302-960628
Email: ethics.research@ghs.gov.gh
25th January 2024

My Ref. GHS/RDD/ERC/Admin/App /24/015
Your Ref. No.

Cynthia Sroeda Ablordeppey
P.O. Box SQ 97
Tema

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	**GHS-ERC: 046/09/23**
Study Title	Process Evaluation of Occupational Health and Safety Policy: A Case Study on Hazards at Ghana Port and Harbour Authority (GPHA).
Approval Date	25th January, 2024
Expiry Date	24th January, 2025
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....
Mr. Kofi Wellington
(GHS ERC Chairperson)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra