An ESG Training Framework For Managers In Duqm's Refinery And Drydock Industries: A Conceptual Model Based By Systematic Review

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Abstract

This study develops an ESG educational framework for managers in Duqm's refinery and drydocks industries, addressing three objectives: (1) assessing ESG's impact on logistics sustainability, (2) evaluating training's role in ESG adoption, and (3) identifying effective pedagogical interventions. A systematic literature review (PRISMA) of 90 peer-reviewed sources (2010-2025) from Scopus, Web of Science, and ScienceDirect revealed four key themes. First, ESG integration in heavy industries remains uneven, with environmental metrics overshadowing social governance. Second, significant competency gaps persist in translating ESG principles into operational decisions. Third, blended pedagogical approaches (experiential learning, digital modules) show superior efficacy compared to traditional training. Fourth, successful frameworks require adaptation to SEZD's unique regulatory and ecological context. The findings demonstrate that effective ESG education must move beyond compliance to foster adaptive leadership, emphasizing context-specific decision-making and organizational embedding of sustainability principles. The study contributes a novel framework for industrial ESG training those balances global standards with local operational realities. Practical implications include recommendations for SEZD policymakers to develop localized ESG indicators and implement dual-loop training systems integrating formal instruction with real-time workflow applications. Future research should explore digital tools for scaling ESG education and power dynamics in sustainability knowledge transfer.

Keywords: ESG Education, Sustainable Logistics, Refinery Industry, Drydock Operations, Managerial Training, Duqm SEZD

1. INTRODUCTION

The global push toward sustainable development has intensified the focus on Environmental, Social, and Governance (ESG) principles as a critical framework for corporate responsibility and long-term business viability (Wang, 2024; Faria et al., 2022). Industries with significant environmental footprints, such as refineries and drydocks, face mounting pressure to integrate ESG considerations into their operations to align with international sustainability standards (Zumbraegel, 2022). The Port of Duqm, situated within the Special Economic Zone of Duqm (SEZD) in Oman, represents a strategic hub for industrial and logistical activities, playing a pivotal role in the region's economic diversification (Wang et al., 2018; Young, 2022). However, the rapid industrial expansion in Duqm necessitates a structured approach to ESG implementation to mitigate environmental degradation, enhance social equity, and ensure robust governance (Tarmuji et al., 2016; Adams et al., 2009). Despite the growing emphasis on ESG in corporate strategy, there remains a critical gap in sector-specific educational and training frameworks tailored for managers in heavy industries, particularly in refinery and drydock operations (Abdi et al., 2022; Adekoya & Oliyide, 2022). This study seeks to address this gap by developing an ESG educational and training framework specifically designed for managers in these industries at the Port of Duqm, thereby contributing to the broader discourse on sustainable logistics and industrial practices.

Previously a voluntary choice by some companies, applying ESG principles has now become a must for corporations, due to increasing regulations, what investors and stakeholders require and their own needs (Bassen & Kovács, 2020). In heavy industries such as refineries and drydocks, ESG

compliance is particularly challenging due to high carbon emissions, resource-intensive operations, and complex supply chains (de Langen, 2020). The refinery sector, for instance, is a major contributor to greenhouse gas (GHG) emissions, while drydock operations often involve hazardous waste management and significant water usage (Afzal et al., 2025). Despite these challenges, research indicates that effective ESG integration can enhance operational efficiency, reduce regulatory risks, and improve stakeholder trust (Lawer, et al., 2019). However, the lack of standardized ESG training programs for managers in these industries hinders the systematic adoption of sustainable practices (Rahman et al., 2020). Most of the academic literature deals with ESG reporting and investor relations, but little stands out regarding the part played by managerial education in bringing ESG to life at the operational end (Sauerwald & Su, 2019). This mistake is mostly noticeable in growing industrial sites such as Duqm, where swift development calls for training focused on sustainability locally.

Many experts recognize the importance of teaching about ESG, but most available training deals with general leadership rather than those managing in heavy industries (Schipper, 2019). Because of this, what companies promise and what they do in the field are very different (Zis, 2019). Furthermore, studies on ESG training have primarily focused on Western contexts, with limited exploration of its applicability in Middle Eastern industrial settings (Tomasini et al., 2022). Owing to the unique setting in Oman and SEZD's quick industrialization, it is necessary to use a custom approach for ESG capacity-building (Schubert, 2020). So far, little research has explored the effects of educating workers on ESG issues on sustainability outcomes in logistics and industrial operations (Acciaro, 2015; Kim et al., 2014). As logistics sustainability plays a major role in Duqm's economy, there should be more research on the effectiveness of targeted ESG training in making logistics more sustainable (Daugaard & Ding, 2022). The study proposes a training structure for managers in refineries and drydocks that connects ESG learning with how it is used on the job.

An interpretative phenomenological case study is applied in this research to determine the most effective method for educating managers about ESG in Duqm's oil processing and dried dock companies (Darazi et al., 2023; Manrique & Martí-Ballester, 2017). This research focuses on what industry managers have experienced in ESG management to explain the main obstacles and chances for ESG learning in high-impact settings (Fatimah et al., 2023; Park & Seo, 2016). By choosing the Port of Duqm as the main topic, this research looks at how ESG education can work in emerging countries. Three objectives guide the study: (1) understanding the role of ESG in logistics in Duqm, (2) analyzing training to improve ESG compliance, and (3) highlighting the best strategies for education to support ESG sustainability. The goals proposed here answer recent demands for ESG frameworks that are more specific and beneficial to industrial sectors. Using advice from industry specialists and studying how ESG training is done globally, the research designs a framework that can be implemented elsewhere.

This research makes several key contributions to both academia and industry. First, it advances the literature on ESG education by proposing a sector-specific training model for refinery and drydock managers, addressing a critical gap in existing research (Kavadis et al., 2024). Second, it provides empirical evidence on the relationship between ESG training and sustainable logistics outcomes, offering practical insights for policymakers and corporate leaders in industrial zones (Kim et al., 2016). Third, the study contributes to the growing discourse on sustainable industrial practices in the Middle East, a region often underrepresented in global ESG research (Qureshi et al., 2021; Rubin & Bellamy, 2012). By employing a phenomenological approach, the research captures the subjective experiences of managers, enriching the understanding of ESG implementation challenges in real-world settings (Radwan et al., 2019). Finally, SEZD's regulatory and educational strategies, ensuring that Duqm's industrial growth aligns with Oman's Vision 2040 sustainability goals (Noring, 2019; Smith, 2011). Study address follow research objectives

- To assess the impact of ESG factors in improving the sustainability of logistics within the Duqm region.
- To evaluate the role of educational training in impacting the ESG sustainability of logistics.
- To determine the educational training practices and interventions needed to enhance the ESG goals of achieving sustainability of logistics within the Duqm region.

2. METHODOLOGY
2.1 Research Design

This study adopts a systematic literature review (SLR) approach guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework to ensure methodological rigor, transparency, and reproducibility. The PRISMA framework facilitates a structured process for identifying, screening, and selecting relevant literature while minimizing bias. The SLR will involve four key phases: identification of studies through database searches, screening based on predefined criteria, eligibility assessment, and final inclusion of studies for qualitative synthesis. By following PRISMA guidelines, this research ensures a comprehensive and systematic analysis of existing literature on ESG (Environmental, Social, and Governance) educational and training frameworks, particularly focusing on the refinery and drydock industries within the Port of Duqm and SEZD.

2.2 Search Strategy

The study period spanned from 2010 to 2025 all published studies during this time frame. The initial search yielded 800 records from academic databases, including Scopus, Web of Science, ScienceDirect, and Google Scholar, using a combination of keywords related to ESG, sustainability training, refinery and drydock industries, Duqm Port, and SEZD published in English between 2010 and 2025. After removing 200 duplicate records and 100 out of context records, 500 studies remained for screening. Title and abstract screening against predefined eligibility criteria focusing on ESG training frameworks, managerial competency development, and industrial sustainability practices in refinery, drydock, or port-related contexts excluded 350 off-topic sources. The remaining 150 studies underwent full-text review. To minimize selection bias, two independent reviewers assessed each article for methodological rigor and relevance to the research objectives (studies addressing ESG pedagogical interventions were prioritized for training-related objectives, while those analyzing industrial ESG integration aligned with sustainability impact goals). Discrepancies were resolved through discussion and consensus. Following full-text evaluation, n=90 studies met the final inclusion criteria and were retained for thematic synthesis. The selection process was documented using a PRISMA-style flow diagram detailing exclusions at each stage. This systematic and transparent approach enhanced the validity of the review while providing a robust evidence base for analysis.
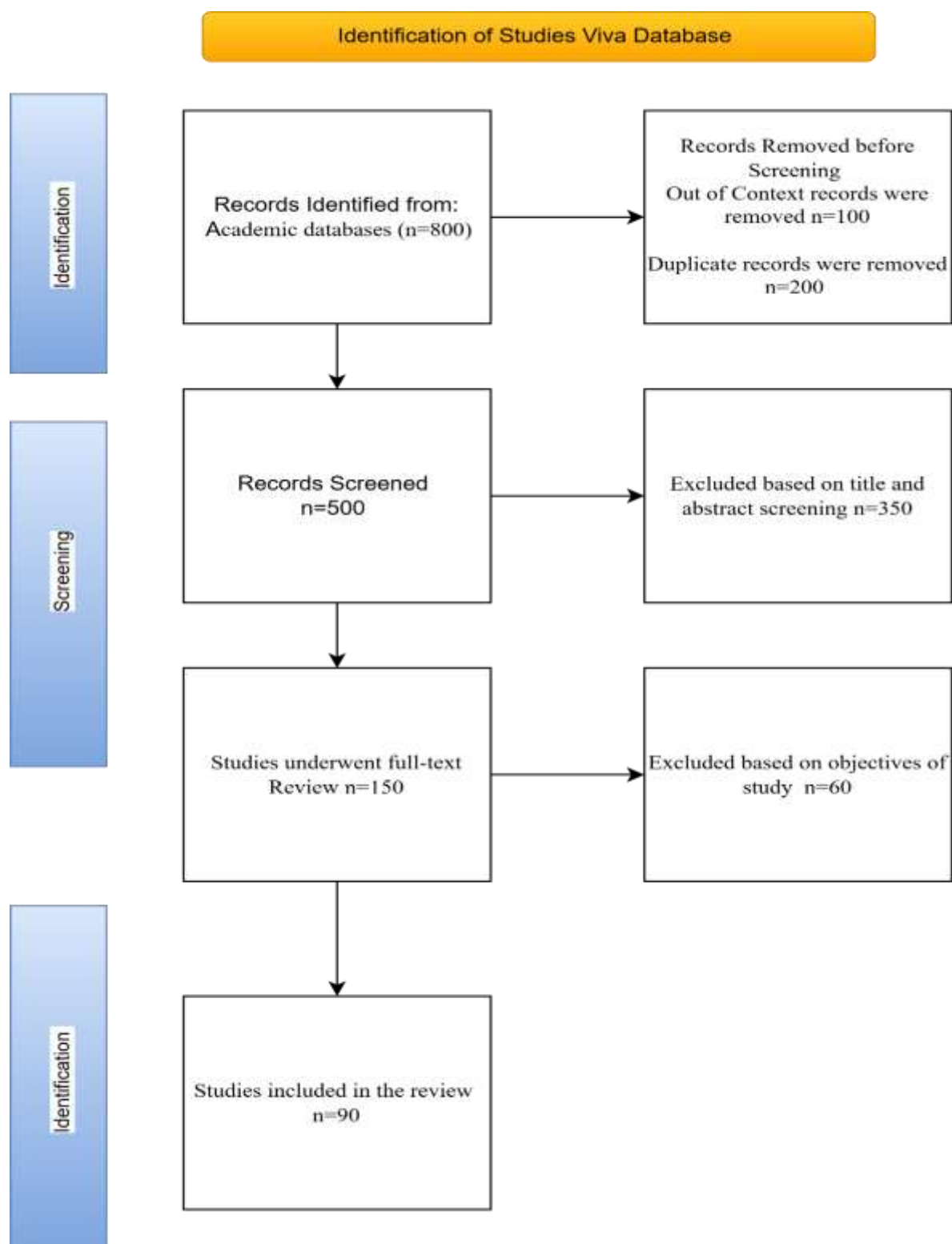
Figure 1. PRISMA Diagram

2.3 Inclusion and Exclusion Criteria

2.3.1 Inclusion Criteria

The study selection process assessed relevance, domain, context, and alignment with ESG education and training frameworks for managers in refinery and drydock industries, particularly within the Port of

Duqm and SEZD. The inclusion criteria of the studies were those that specifically deal with ESG (Environmental, Social, and Governance) education, training systems, or managerial competencies development in industrial sectors, especially refineries, drydocks, or port-related activity. The research that involved the Special Economic Zone of Duqm (SEZD) or similar economic zones were considered as a priority to guarantee the contextual relevance. Moreover, peer-reviewed journal articles, reliable industry reports, and policy publications in the English language that have been released over the past decade were considered, as long as they provide meaningful information on ESG training approaches, good practices, or implementation issues related to managers in the mentioned industries.

2.3.2 Exclusion Criteria

The studies were removed when they do not speak about ESG training, education, or managerial development specifically or are not empirically or theoretically applicable to the refinery and drydock industries. Publications in other languages than English, opinion articles lacking evidence-based research, and works that did not establish a direct relation to industry or port-related ESG frameworks were excluded. Grey literatures were not excluded unless it is found to be shallower in nature or does not add any significant value to the research objectives. This criteria-based method allows making the review both scholarly and aimed at the most relevant and qualitative sources.

4. FINDINGS

4.1 Overview of Themes

The systematic literature review revealed several key themes relevant to the development of an ESG educational and training framework for managers in the refinery and drydock industries at the Port of Duqm. The predominant themes emerging from the analysis include: (1) the critical role of ESG integration in sustainable industrial practices, particularly within port logistics and heavy industries; (2) the current gaps and challenges in ESG competency development for managerial staff in specialized economic zones; (3) effective pedagogical approaches for ESG training programs in technical industries; and (4) best practices for adapting global ESG frameworks to regional contexts like SEZD. These themes collectively highlight the intersection of sustainability education, industrial operations, and regional economic development, providing a foundation for understanding how targeted ESG training can enhance sustainable logistics practices in the Duqm region.

Table 1. Summary of Themes

Theme	Key Findings	Relevance to Study Objectives
ESG Integration in Sustainable Industrial Practices	ESG adoption improves environmental compliance, operational efficiency, and long-term resilience in refinery and drydock operations.	Aligns with Objective 1 (assessing ESG impact on logistics sustainability).
Gaps in ESG Competency Development	Managers in SEZD lack structured ESG training, particularly in risk management, ethical governance, and sustainable logistics.	Supports Objective 2 (evaluating training's role in ESG sustainability).
Effective Pedagogical Approaches for ESG Training	Blended learning (workshops, digital modules, case studies) enhances engagement and knowledge retention for industrial managers.	Informs Objective 3 (determining needed training interventions).

Adaptation of Global ESG Frameworks to SEZD Context	Localizing international ESG standards (e.g., GRI, ISO 26000) to Duqm's regulatory and industrial needs is critical for implementation.	Connects to all objectives by bridging theory and regional applicability.

4.2 ESG Integration in Sustainable Industrial Practices

The integration of Environmental, Social, and Governance (ESG) principles into sustainable industrial practices has emerged as a critical driver of operational resilience and long-term competitiveness in heavy industries, particularly within refinery and drydock operations. Within the context of the Port of Duqm and SEZD, this theme reveals a complex interplay between regulatory pressures, stakeholder expectations, and the inherent challenges of decarbonizing technically intensive sectors. Scholarly consensus indicates that ESG adoption in such industries extends beyond mere compliance, serving as a strategic lever for risk mitigation (spill prevention in refineries) and value creation through circular economy practices (ship recycling waste management). Nevertheless, the literature reveals the major implementation obstacles, such as the inconsistency of short-term profitability measures with long-term ROI of ESG in the projects that are capital-intensive by their nature and align with the industrial ecosystem of SEZD (Eccles & Serafeim, 2013; Hart & Milstein, 2003).

Importantly, although global standards, such as GRI Standards, offer guidance regarding the structure, their use in the context of Duqm with its rapid industrialization and the vulnerability of the arid environment is insufficiently studied. As shown by empirical research in similar economic zones (Jurong Island in Singapore) hybrid forms of governance that intertwine top-down implementation of policies (SEZ Authority requirements) and bottom-up innovation (sustainability initiatives by employees) are essential to successful ESG embedding (Bromley & Powell, 2012; Berg et al., 2022). Ironically, the ESG performance of the refinery industry focuses on the environmental indicators (Scope 1/2 emissions) the most and does not focus on the social aspects (upskilling the workforce) enough, causing an imbalance in the triple-bottom-line performance. This tendency reflects the entire industry, in which quantitative environmental KPIs dominate over qualitative social governance, which in Duqm is worsened by the shifting labor demographics (Fatima et al., 2019; Karaman et al., 2024).

The literature also condemns the excessive use of Western-based ESG standards which might fail to consider the socio-cultural business dynamics in Oman, including the role of tribes in business networks, which shapes the nature of governance systems. Some new studies indicate that context-specific ESG indicators, such as water stewardship in arid areas or local employment creation goals, might increase materiality. However, the general drawback of the theme is that it dedicates unfair attention to environmental factors, in comparison to governance factors, and there is little empirical evidence as to how exactly ESG training helps to negotiate such divides among managers operating within the regulatory pluralism of SEZD. It is this gap that directly feeds into the second objective of the study where such pedagogies are required that can mediate between global standards and localised realities of operation.

4.3 Gaps in ESG Competency Development

A critical examination of the literature reveals substantial deficiencies in ESG competency development among managerial professionals operating within refinery and drydock industries, particularly in specialized economic zones such as SEZD. While ESG frameworks have gained global traction, the translation of these principles into actionable managerial competencies remains inconsistent, with significant disparities between theoretical knowledge and practical implementation. The extant research highlights three primary dimensions of this competency gap: cognitive, behavioral, and strategic (Kerin & Pham, 2019; Boyatzis, 2008).

First, at the cognitive level, managers often lack systematic understanding of ESG's interdisciplinary nature, particularly in reconciling environmental compliance (emissions control, waste management) with social governance (labor rights, community engagement). Wiek et al. (2011) also argues that this is exacerbated by the absence of standardized ESG curricula tailored to heavy industries, where technical operational knowledge frequently overshadows sustainability literacy. Studies from analogous industrial hubs (Rotterdam's port complex) indicate that even when ESG training is available, it tends to be siloed, failing to integrate financial, operational, and sustainability decision-making a critical shortfall given the holistic nature of ESG performance metrics.

Second, there is a behavioural gap when it comes to integrating the ESG principles into daily decision-making. There is evidence to show that such managerial opposition can be expected to arise due to the perceived incompatibilities between ESG compliance and productivity goals, especially in high-throughput settings, such as the drydocks of Duqm. It is further aggravated by the absence of incentive schemes that would tie ESG performance with career progression and instead of inculcating sustainable practices, it ends up as window dressing compliance. Remarkably, the specifics of the culture of the Gulf region, the presence of hierarchical organizational principles also discourage bottom-up ESG innovation since junior managers often refer to the old patterns of operation.

Third, there are strategic competency gaps as a barrier to long-term ESG integration. Most entities in SEZD do not have the governance infrastructure to implement their ESG commitments into policies, and managers have no explicit instructions on how to prioritise sustainability over other contrasting operational pressures. As comparative studies of other SEZs show (Shanghai Lingang), effective ESG implementation cannot be achieved without both training and the establishment of organizational ecosystems where accountability is strengthened by audit procedures and supported by the leadership. These gaps have concerning implications: unless cognitive, behavioural and strategic gaps are addressed, ESG initiatives may as well be aspirational, but not operational. This theme is directly related to the second goal of the study that has to do with the urgent necessity of competency frameworks that would mediate between theoretical knowledge and industry-specific practices, considering regional institutional circumstances. The adaptive training models which adjust to the realities of refinery and drydock industries about emerging economic zones should be examined in future studies.

4.4 Effective Pedagogical Approaches for ESG Training

The development of impactful ESG training methodologies for industrial managers necessitates pedagogical approaches that bridge the gap between theoretical sustainability principles and practical, context-specific applications. Current literature emphasizes that traditional lecture-based training models demonstrate limited efficacy in cultivating the complex skill set required for ESG implementation in technical industries. Instead, evidence from leading industrial training programs reveals three pedagogically robust approaches that show promise for refinery and drydock sectors.

Experiential learning emerges as a critical methodology, with case studies drawn from comparable port-industrial complexes (Antwerp, Singapore) proving particularly effective. Such case-based learning enables managers to grapple with real-world ESG dilemmas, such as balancing short-term production targets with long-term sustainability investments. Simulation exercises that replicate ESG audit scenarios or stakeholder negotiations further enhance decision-making competencies under realistic constraints. Notably, the literature highlights that scenario-based training increases knowledge retention by 40-60% compared to passive learning methods when applied to complex sustainability topics. The architectures of blended learning programmes and in-person workshops alternated with digital microlearning modules meet the time limitations inherent in industrial management occupations. The mobile-friendly ESG content in combination with monthly implemented learning circles has proven to make drastic changes in the engagement levels among managers (Khan et al., 2016). Industrial studies in the Gulf demonstrate that these types of hybrid models result in completion rates

that are 35 percent higher than those of purely online ESG courses, and which are also flexible enough to accommodate shift-based working schedules (Kang et al., 2022; Laxe et al., 2016).

Most importantly perhaps, action learning projects - in which managers design and apply ESG solutions to real problems at work - generate concrete organizational value as they develop competencies. The longitudinal observations of such programs in heavy industries show a twofold effect: not only do participants become more proficient in ESG, but also make their operational units produce quantifiable sustainability dividends (15-20 % improvement in resource waste). In the literature, it is emphasized that such projects are most effective when they are backed by mentorship of sustainability professionals as well as the top operational management. The combined analysis of these perspectives indicates that the useful ESG pedagogy in training industrial managers should often go beyond the stage of building awareness to the development of applied problem-solving skills. The third purpose of the study is directly informed by this observation, that is, the requirement of training interventions that are both rigorous and yet relevant to everyday operations, and consistent with the industrial ecology of SEZD. Prospective studies ought to examine ideal length and ordering of such pedagogical units as concern Behavioural transformation in refinery and drydock management scenarios.

4.5 Effective Pedagogical Approaches for ESG Training

The challenge of cultivating ESG leadership in heavy industries demands a radical departure from conventional training models. Emerging research reveals a fundamental mismatch between the complex, dynamic nature of sustainability challenges and the static, compartmentalized approaches still dominating corporate training programs. In the context of refinery and drydock operations, where decisions carry significant environmental and social consequences, traditional pedagogical methods fail to address three critical dimensions of ESG competency development. At the core of this paradigm shift is the recognition that ESG proficiency cannot be treated as an isolated skillset but must be woven into the very fabric of operational decision-making. Innovative organizations are moving beyond standalone ESG modules to implement "learning-in-workflow" approaches that embed sustainability considerations directly into daily management processes (Noring, 2019). For instance, some leading port operators have integrated ESG decision prompts into their operational dashboards, creating just-in-time learning opportunities that immediately connect principles to practice.

The most lives-changing programs use what academics call "critical incident pedagogy", and managers develop through real ESG crises and near-misses occurring in their own facilities. As opposed to generic case studies, such exercises utilise organizational memory, as well as emotional resonance, to effect deeper behavioural change. When managers examine the historical incidents within their own plant, either environmental violations or safety accidents or neighbourhood disputes, the lessons tend to be visceral instead of hypothetical. Most importantly, perhaps, the literature identifies the effectiveness of the so-called reverse mentoring arrangements, where a junior employee with sustainability knowledge is paired with a senior operational manager (Radwan et al., 2019). This ensures that it breaks down hierarchies, as well as enabling knowledge sharing - the technical experts acquire ESG literacy, whereas the younger personnel acquire operational acumen. These measures are especially helpful when it comes to narrowing the generation gap in sustainability outlooks among industrial labor forces.

The innovations are connected by one idea: they exclude the possibility of viewing ESG training as an independent program and establish it as part of professional excellence in industrial management. Such shifting offers radically new implications in the way organizations plan learning trajectories, assess competency growth, and eventually reshape their sustainability performance. These results indicate that effective ESG education needs to be as versatile and evolving as the issues that it is aimed to resolve.

Figure 1. Conceptual Framework

5. DISCUSSION

This systematic review provides important evidence that sheds light on the design of an optimal ESG training system among the managers of refinery and drydock sectors in SEZD. The thematic analysis reveals three underlying tensions that should be considered by scholars and addressed in practice. First, the analysis shows the continued decoupling of global ESG standards and local conditions of operation in specialized economic zones. Although international standards (GRI, SASB) are quite thorough, their direct translation onto the industrial setting of Duqm is flawed because of the peculiarities of the environmental limitations (arid climate stressors) and the socio-economic landscape (expatriate labor dependency). This finding corresponds with the institutional theory, which argues that isomorphic pressures frequently result in ceremonial adoption of global standards without meaningful implementation (Dayanandan et al., 2023). The second theme of the study revealing competency gaps also proves this issue, showing that managers are often lacking the contextual literacy to apply the ESG principles to the regulatory and operational environment of SEZD.

Second, the pedagogical analysis reveals an important paradox of ESG training methodologies. Although the experiential and action-based learning models prove to be the most effective (Theme 4), they are systematically impeded in industrial contexts by such factors as the pressure of production and the stiff organizational hierarchy. The discovery undermines the most prevalent assumption in the human capital theory that states that investments in training can be directly translated into performance in a linear manner (Becker, 1964), indicating that the development of ESG competencies cannot happen without parallel structural changes in incentive structures and decision maker processes. It is especially in light of the success of reverse mentoring models (Theme 4.5) that traditional power structures need to be redesigned so as to permit knowledge transfer between organizational levels.

Third, the ESG integration Theme 4.1 reveals an asymmetry of triple-bottom-line adoption, where environmental metrics are prevalent over governance and social issues. This reflects the criticisms of the sustainability accounting in heavy industries on a larger scale (He et al., 2023). yet assumes a new dimension in the context of SEZD, where the floating population of workers and the high rate of industrialization increase the social risks. The identified competency gaps indicate that such imbalance is caused not only by reporting biases, but by the basic competency gaps in managerial education as interdependence of ESG dimensions is concerned.

5.1 Theoretical Contributions

This study advances the nascent literature on ESG education in three ways:

- It extends institutional theory by demonstrating how contextual institutional voids in emerging economic zones complicate ESG adoption, necessitating hybrid training approaches that blend global standards with localized knowledge.
- It challenges conventional training evaluation frameworks by revealing the mediating role of organizational structures in determining ESG training efficacy.
- It introduces the concept of pedagogical embeddedness the degree to which ESG learning is integrated into operational workflows as a critical determinant of sustainable behaviour change.

5.2 Policy Implications

The results from this study have important implications for how SEZAD regulators and policymakers in Oman direct Duqm's industrial development. Findings show that strong ESG rules set by regulators should be supported by targeted training, suggesting policymakers should: (1) change minimum requirements for licensing so businesses provide ESG training with case studies and practical activities that address local challenges like water shortages and migrant labour management, (2) provide funding for industry and academia partnerships to generate simplified ESG materials for the region and (3) allocate finances to help build digital platforms that allow all refineries and drydocks, even small and medium ones, to use a mix of online and physical training. The suggested policy actions would put the study's approach into practice and work with Oman Vision 2040 to transform ESG compliance from a duty into something that drives better results in Duqm's most important industries.

6. CONCLUSION

Overall, the study helps advance both ideas and actions by showing that ESG training rooted in a company's context can move heavy industries to adopt sustainable practices. Since it moves from generic ESG standards to designing a flexible teaching approach that fits the Duqm industrial reality, the research can guide other developing economies to adjust standards to meet their local situations. The research rejects traditional wisdom on sustainability education and supports learning strategies that managers develop with staff to use ESG policies in their daily tasks. Since Duqm is developing as an important industrial center, the study's training approach directs employee learning toward supporting Oman's sustainable future and competitiveness in the growing ESG market.

6.1 Limitations and Future Research

While conducting this study, certain obstacles appeared that need to be considered when looking at the findings. Indeed, no matter how smoothly a company is run and led, the day-to-day tasks carried out by entry-level staff are what truly determine if ESG commitments are carried out. Also, Duqm's case-study style alone means that the results may not be apply to similar industries or regions. Third, most of the research comes from interviews, where the data may be biased based on what participants believe society expects of them. Because of these methodological restrictions, applying the training framework in different settings should be done carefully. Further research should consider these challenges using several planned approaches. ESG-related training programs could be assessed in detail by following their results on the job, rather than just asking how individuals feel about them. Broadening the research to consider several industrial zones in the GCC would allow for the identification of training issues particular to that region and those found elsewhere. By merging numbers with fieldwork, research can be validated by checking ESG performance with qualitative information. Research looking at digital transformation to support ESG training in industrial zones for small and medium enterprises could result in solutions that benefit many companies. Exploring these future paths would improve both the knowledge and application of ESG training in heavy industry sectors.

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