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Enhancing the Design for Safety System in South Korea's Construction Industry: A Stakeholder-Based Approach

Seung-Hyeon Shin[1], Jeong-Hun Won[2], Hyeon-Ji Jeong[3] and Min-Guk Kang[4]

[1]Department of Big Data, Chungbuk National University, Cheongju, Republic of Korea

[2]Department of Big Data & Department of Safety Engineering, Chungbuk National University, Cheongju, Republic of Korea

[3] Department of Disaster Prevention Engineering, Chungbuk National University, Cheongju, Republic of Korea

[4]Department of Safety Engineering, Chungbuk National University, Cheongju, Republic of Korea

Corresponding author's Email: shshin0317@chungbuk.ac.kr

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Abstract: This study aims to propose improvement measures for the Design for Safety (DfS) system in South Korea by conducting research on construction stakeholders. The construction industry exposes workers to high-risk environments, such as those working at height, mixed tasks, and discontinuous and non-repetitive work. Accident fatality rates in the construction industry are significantly higher than in other industries. This study focuses on the Design Safety and Health Ledger (DSHL) system as a DfS measure implemented by the Ministry of Employment and Labor in South Korea.A focus group interview (FGI) analysis was conducted with construction stakeholders, including clients, designers, contractors, safety managers, employees, and supervisors, to examine the DfS system's functionality, advantages and disadvantages, limitations, blind spots of system, and improvement. The analysis revealed that the effectiveness of the DSHL system varied, with lower functionality in privately commissioned construction projects and better performance in publicly commissioned projects. Although eliminating risk factors from the design phase is effective, designers' lack of knowledge and risk assessment concepts contributes to the system's superficial implementation. To improve the DSHL system, stakeholder awareness and attitudes toward the system must be enhanced. The government should distribute guidelines and explanatory materials for DSHL and encourage designers to draft the documents themselves. In addition, the DSHL system should be included in the construction completion documents. This research provides valuable insights for enhancing the effectiveness of DfS systems in reducing construction accidents and improving overall safety in the industry.

Keywords: Design for Safety(DfS), Construction Industry, Design Safety and Health Ledger(DSHL)

1. Introduction

The construction industry's high work-related fatality rate is a global concern. In South Korea, construction workers face a higher fatality rate than the manufacturing sector, highlighting the need for effective safety and health (S&H) management systems (Yi & Langford, 2006; Tam et al., 2004). The Korean government introduced the Safety and Health Ledger (SHL) system as part of a broader Occupational Safety and Health Act revision, requiring clients to create and verify stage-by-stage Safety and Health Ledgers. The Design Safety and Health Ledger (DSHL) specifically mandates designers to develop risk reduction strategies, with clients ensuring implementation. However, DSHL faces implementation challenges stemming from low awareness and the perception of being a mere formality (Kim et al., 2019). This study aims to gather stakeholders' opinions and propose enhancements to improve DSHL's effectiveness within the Korean construction industry.

2. Methodology

This study utilizes a qualitative research methodology to examine the DSHL system's effectiveness and areas for improvement within the South Korean construction industry. We adopted a Focus Group Interview (FGI) approach, enabling in-depth conversations among diverse industry stakeholders. Participants were selected from various roles in the industry,

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including clients, designers, contractors, safety managers, on-site employees, and supervisors, ensuring comprehensive DSHL system perspectives. Each focus group contained at least five participants, leading to robust discussions and numerous insights. The interviews covered topics such as practical functionality, advantages and disadvantages, limitations, blind spots, and potential improvements. The same themes were explored within each group to maintain consistency across collected data. Two separate FGIs were held with different participants, facilitating validation and refinement of initial findings. This thorough approach offered valuable insights into the DSHL system's implementation, impacts, and enhancement opportunities, allowing us to put forward effective measures for improving DSHL and overall construction site safety.

3. Results

The FGIs elicited a wide range of responses concerning the operational efficacy of the DSHL system. Given the system's relatively recent implementation—merely three years prior to the research—the divergence in perspectives is not surprising.

The potential for the DSHL system to preemptively eliminate risk factors at the design stage was widely recognized as advantageous. Nevertheless, the lack of safety and health management knowledge among designers emerged as a significant impediment to its comprehensive implementation. Despite the aforementioned hurdles, stakeholders acknowledged the inherent capacity of the DSHL system to fundamentally expunge hazards that could potentially manifest during the construction process, thereby enhancing the overall safety management. However, the dearth of knowledge and expertise in safety and health management among designers and clients often resulted in the proposition of suboptimal hazard remediation strategies. This gap often led to a perfunctory completion of the required documentation rather than a substantive evaluation of potential hazards.

Interestingly, designers expressed resistance to modifying their designs to accommodate safety considerations. They mentioned the reason for this is that it is practically unreasonable to change the design for safety when the design is almost finished. This antipathy is rooted in a misconceived understanding of the DSHL system, particularly given that the DSHL should be ideally compiled during the planning phase of the design, prior to finalizing any specific design methodologies. Designers also underscored the lack of financial and temporal support from clients for implementing the DSHL system. Conversely, clients pointed to the absence of a legal framework or guidelines that could justify the additional costs associated with the execution of the DSHL system.

Stakeholders suggested improvements to the current system included early involvement of safety experts during the DSHL creation process, establishment of risk analysis educational programs for designers, and the development of a legislative framework that provides a rationale for the costs associated with DSHL implementation.

4. Conclusion

This study examined South Korea's Design Safety and Health Ledger (DSHL) system's effectiveness and areas for improvement using qualitative research methodology and Focus Group Interviews (FGIs) with diverse construction industry stakeholders. The DSHL system's ability to preemptively eliminate risk factors was praised, but barriers such as insufficient safety and health management knowledge among designers and clients were identified. Additionally, resistance to design modifications for safety and insufficient support from clients were key challenges. We proposed recommendations including early safety expert involvement, risk analysis education for designers, and a legislative framework justifying DSHL implementation costs. This study offers insights for policymakers and regulators to refine the DSHL system, enhancing safety management within South Korea's construction industry. Future research could explore long-term impacts and DSHL effectiveness in various contexts or regions.

5. References

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