Research Article

Occupational Health and Safety in Construction Industry with Vision Zero Approach

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Abstract

Safety is one of the major issues for the construction industry which is a dangerous sector with fatality statistics. There are thousands of construction accidents all over the world that are the direct result of hazardous activities and working conditions. Safety management systems and policies are the key elements in order to increase safety awareness, improve working conditions, reduce human suffering, provide safety climate and culture etc. In this context, the Zero Accident Vision (ZAV) is a new approach that is founded on the premise that all accidents may be avoided. This review explores relationships between ZAV and construction safety with the aim of fostering further research.

Keywords: Construction Safety, Occupational Safety and Health (OSH), Prevention, Vision Zero Approach, Zero Accident Vision (ZAV)

1. Introduction

Millions of construction accidents occur each year, and many employees die as a result of occupational ailments. As a result, the EU OSH legal framework comprises a framework directive and twenty-four particular directives have evolved throughout time to enhance workplace occupational safety and health (OSH) culture. The "1989 European Framework Directive on Safety and Health at Work," which emphasizes a risk-avoidance culture and spells out the responsibilities of workers, serves as the foundation for minimum standards and common principles. The Advisory Committee on Safety and Health at Work (ACSH), a committee of trade unions, national government representatives, and employers' organizations, works to strengthen EU OSH legislation. Another body, the "Senior Labour Inspectors Committee (SLIC)," helps create a safety

culture by expressing opinions on EU OSH regulation enforcement and promotes knowledge sharing on labor-inspection procedures. European OSH strategic frameworks have played an essential part in setting OSH goals for nearly two decades, including (1) strengthening convergence on common aims; (2) promoting teamwork; (3) activating OSH developments; and (4) fostering encouraging workplace activities [1].

People and organizations frequently use the term "health and safety," or OSH, to allude to the dangers and risks that come with them, such as the risk of safety, mostly from technological parts of manufacturing processes, such as technical installations and workstation design (Leka et al., 2016). The focus on work-related health and wellbeing is frequently confined to dangers and associated risks, such as safety risks. Health often receives less organizational and systematic attention than safety, while psychological concerns and workplace wellbeing are frequently overlooked [2,3].

The Zero Accident Vision (ZAV) is based on the assumption that all accidents may be preventable. The goal of ZAV is to achieve safety excellence by creating and ensuring safe work environments and preventing any incidents [4, 5]. It is easy to get the impression that ZAV is more focused on the journey and process of creating safe work environments than on the goal of zero accidents. There is a need for further empirical investigation into the behaviors and perspectives of such commitments [6]. Safety researchers needed to pay greater importance to ZAV.

Another concept with a broader approach is Vision Zero (VZ). It encompasses workplace safety and employee health and wellbeing, typically linked to the Zero Harm (ZH) notion. There needs to also look at the obstacles businesses may encounter in keeping ZAV or VZ 'alive' over time, even when the need to improve health, safety, and wellbeing (HSW) appears less pressing. The latter is linked to the dilemma of keeping VZ as part of the company's business plan to avoid becoming a new, more extensive occupational safety and health silo.

Therefore, this new approach has an important role in good safety culture. In this context, the study aims to explain Vision Zero (VZ) approach and its positive potential effects on the construction industry. The new proposed model should include behavior-based safety concepts to improve health, safety, and wellbeing (HSW) in construction site environments, safety systems, safety culture, and climate.

2. A New Safety Strategy: Vision Zero

The European Commission recently published a new EU Strategic Framework (2021-2027) that aligns with the four goals stated in paragraph one. The strategic framework focused on three cross-cutting key objectives: anticipating and managing change in the new world of work, improving workplace accident and illness prevention, and increasing preparedness for any potential future health crises, all in line with a VZ approach to work-related deaths. VZ (https://visionzero.global/why-vision-zero) is a transformative

approach to prevention that incorporates the three pillars of safety, health, and wellbeing at all levels of work. This strategy is based on the new EU Health and Safety Strategic Framework 2021-2027. The two first preconditions for achieving the zero work-related deaths target by 2030 are increased awareness and capacity building [1, 7]

It is unknown to what extent this safety bias can be detected in companies committed to ZH, which from theory, appears to include health. On the other hand, although numerous ZH enterprises obtained a high degree of risk control in the area of safety, they still have a long way to go in health and wellness. In order to achieve excellence in HSW, VZ for HSW is the goal and dedication to build and maintain a safe and healthy work environment and avoid any accidents, injuries, and diseases connected to the workplace. VZ should be viewed as a journey, a process leading to the ideal, which is commonly described in words like zero accidents or zero harm. VZ is a value-based strategy, which means employees should not have a detrimental impact on workers' HSW and should, if at all feasible, assist them in maintaining or improving their HSW and developing self-assurance and competencies, and employability.

The classic safety method may address various topics differently, including ZAV and ZH. The conventional method accepts zero accidents as an unattainable aim. Furthermore, safety and health are seen as two distinct realms. HSW, on the other hand, is a journey and a value for ZH. Safety, health, and wellbeing are all intertwined practically and ethically (Figure 1). For the ZAV, safety is a journey, and health and safety are inextricably linked. Another trend is that safety is viewed as an operational concern. Safety is a critical problem for the ZAV, whereas HSW is a strategic challenge for the ZH. Finally, the workplace is typically a static setting in which safety management leads to constant development. However, in ZAV and ZH it is regarded as a complex ecosystem in which behavioral and technical innovations are critical for substantial safety and HSW gains. The traditional strategy focuses on accident prevention. ZAV tries to produce safety at work, whereas ZH wants to create safety, health, and wellness.

Safety is connected with prescription paperwork from an ethical perspective and is only held by a few champions in the traditional safety strategy. Management of safety is always logical. Experts plan and prescribe safety measures. Part of the problem is worker behavior and human mistakes; therefore, specialists focus on accident prevention. Workers in ZAV, on the other hand, are empowered to provide solutions and are a part of the solutions. Experts and all company members collaborate on safety, focusing on accident prevention and promotion. All organization members become inspired, alive, and invested in safety. It is quite close to the zero-accident vision approaches from the HSW standpoint. HSW, on the other hand, focuses on the prevention and promotion of HSW in the workplace and life. HWS leadership is a rational and ethical concern. Job needs and resources are also taken into account by transformational leadership.

In the conventional sense of networking and co-creation, best practices in the industry stimulate safety improvements. Internal processes such as plan, do, check, and act activities and inherently on the basis of values trigger safety improvement. The ZAV, on the other hand, has a safety policy that is openly based on values. Individuals both within and outside the firm can benefit from learning from one another's experiences in order to improve safety. Adopting and adopting best practices from other organizations and industries and benchmarking on leading indicators and best practices can enhance safety. HSW is also quite similar to the ZAV method. Furthermore, HSW improvement is sparked by adopting best practices from other VZ companies and industries [8].

Using seven golden standards, VZ is gaining popularity as a long-term commitment plan to accomplish ZA and ZH in the workplace (Table 1). In most companies, safety comes first, with employee health and wellbeing receiving significantly less attention. VZ should be considered as a holistic vision in which work-related health, safety, and wellbeing are addressed, and synergies across these areas are recognized and exploited. There is sufficient evidence to establish that tiredness, stress, and work organization factors are critical determinants of safety behavior and performance in general.

Figure 1. The VZ approach [7]

Many sectors face a significant problem in widening ZAV to a ZH approach where wellbeing becomes a more important subject. Integration into corporate development and creating a larger ZH culture are significant obstacles to businesses committed to VZ. In this challenging domain, there is a definite need for empirical study [9,10].

OSH education at colleges plays a vital role in fostering safe work environments and building sites. It is mentioned in the European Community's OHS plan and the Member States' OHS strategies [11]. OSH education is required for professionals to build the necessary safety culture. Architects, interior architects, city planners, and people with legal responsibilities for designing, planning, and implementing construction projects

will need OSH skills, knowledge, and attitudes. Before graduating from universities, professionals who will work in high-risk industries must have the same OSH capabilities. In order to provide a safe culture for the university education system, it is vital to develop appropriate, participatory learning techniques and resources.

Table 1. Seven Golden Rules for 'Vision Zero'[12]

Rule 1	Demonstrate leadership commitment by making safety a top priority on every agenda, functioning as a role model for OSH issues, and responding quickly to harmful situations and behavior.
Rule 2	Use a systematic risk assessment to identify hazards and dangers, including maintenance and repairs, and review work accidents, illnesses, and near misses.
Rule 3	Set safety goals by setting your own OSH goals, reviewing progress, making adjustments as needed, and developing preventative programs.
Rule 4	Ensure a safe system by enhancing all managers' accountability and implementing a safety management system.
Rule 5	Use safe and healthy technology by considering OSH when ordering new machinery or plant, operating all machines safely, routinely inspecting safety installations, and ensuring safe access and egress.
Rule 6	Improve qualification through education – since competency necessitates education – identifying the essential qualifications for each job and developing a training and instruction plan.
Rule 7	Invest in people by involving your staff, utilizing their ideas on improving safety, recognizing good safety performance, instilling confidence, and cultivating a preventative culture.

The types of teaching methods used at universities and the sharing of experiences and resources are critical to the "Vision Zero" process. Any workplace (building sites, mining quarries, offices, etc.), organization, or industry in any part of the world can benefit from Vision Zero. A new action in university safety education is required to ensure that all actors realize their responsibility to follow the rules and norms. Safety experts have been organized in professional organizations since the 19th century, which encourages vocational courses in occupational safety [13,14,15,16,17,18]. In reality, in the 1070s, HS courses were organized in schools and graduate programs, and safety sciences were born as an academic specialty [10]. These courses are essential for university departments whose graduates are entitled to work as occupational safety specialists supporting the "Vision Zero" projects. Ensuring safety in the construction industry, where the most significant losses are incurred in architecture, is essential in this training. In this sense, educating people who know the potential of vision zero and have not yet entered the construction industry with this awareness and correcting the misconceptions of those in the industry will play an essential role in reducing the percentage of accidents in this area.

3. Vision Zero for Construction Safety

The construction sector is in the leading position among the sectors with the highest percentage of human-induced labor use in the world. Due to the working conditions and the deficiencies in complying with the OHS rules, there are thousands of occupational accidents around the world every year. As a result of this, the construction design and management regulations require health and safety regulations from the beginning of the design. The construction safety does not start in the construction phase, it starts in the conceptual design and preliminary design phases.

OSHA (Occupational Safety and Health Administration, 2021) [11] and BLS (Bureau of Labor Statistics Latest Numbers, 2021) [19] publish the statistics about the construction accidents every year that includes construction accidents with injury, fatal construction work accidents, ratios of workers with OHS training, costs due to work accidents. According to these statistics;

- In accidents that resulted in death, one out of every 5 workers works in the construction industry.
- The majority of tower crane deaths are related to the fall of construction materials.
- Approximately 6% of the total construction worker population experiences occupational accidents resulting in death.
- 40% of fatal occupational accidents at construction sites are caused by falling from height.
- Nearly 50% of fatal accidents in construction are caused by hitting, falling, jamming and electric shocks of construction materials.

To decrease these accident ratios there should be preventative planning for health and safety for every construction site. This plan consists of safety management system with a safety policy (Figure 1). However, the statistics shows that construction still has a greater rate of fatalities than other sectors. ISSA Construction's 'Vision Zero' prevention plan aims to establish a workplace where no one is injured or killed at work, nor suffers from major injuries or occupational illnesses via suitable preventative measures. To do so, ISSA Construction has established seven Golden Rules and measurements that help fulfill the stated goals. To attain these goals, ISSA Construction collaborates with ISSA Mining. Future objectives are to collaborate with all other ISSA sections on 'Vision Zero,' opening the path for global collaboration and cross-sector collaboration on a workplace with zero risk of injury.
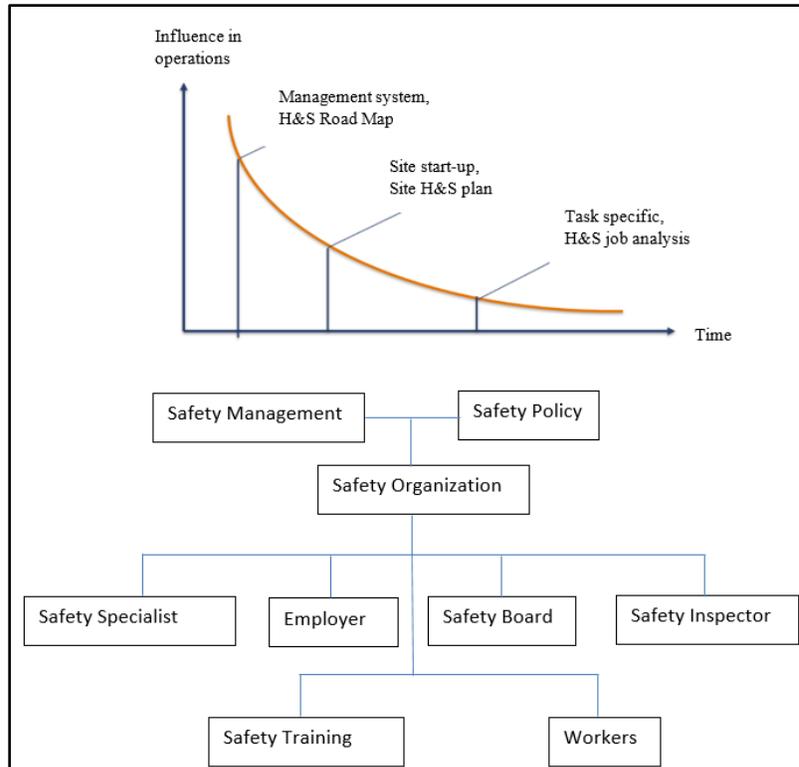
Figure 2. Preventative Planning for Health and Safety

4. Discussion and Conclusion

Vision Zero is an international movement that takes a comprehensive approach to safety to eliminate construction-related fatalities and serious injuries. This method is based on the idea that fatalities and injuries are unacceptable and avoidable. Vision Zero and Zero Accident Vision make safety a top priority on every agenda, act as a role model for OSH concerns, and respond fast to dangerous events and conduct to demonstrate leadership commitment. The rules and approaches make it possible to identify risks and dangers, including maintenance and repairs, using a systematic risk assessment, and examine work accidents, illnesses, and near misses. The goals are possible by establishing safety objectives by establishing the construction companies' own OSH objectives, monitoring progress, making necessary modifications, and building preventative measures. Increasing the managers' responsibility aims to develop a safety management system to ensure a safe system.

Moreover, When ordering new machinery, the VZ method prioritizes occupational safety. It is vital to operate every machine properly, assess installations of safety on a regular basis, and provide safe entry and egress when utilizing technology. There need

to improve qualifications by determining the needed credentials for each position and designing a training and instruction strategy - since competence implies education. Investing in the employees by including them in the process, incorporating their suggestions for enhancing safety, rewarding good safety performance, inspiring confidence, and building a preventative culture is a way to approach the Vision Zero and Zero Accident Vision in the construction industry.

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