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The Impact of Safety Priorities on the Economic Management of Projects: A Review

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ABSTRACT

A systematic study for analyzing the foundational concerns of safety economics was presented in this study. Firstly, safety, its historical background, and the accidental issues in construction were explored. Then, for the sake of this research, safety economists are defined as a multidisciplinary topic that examines the interrelationships and covariation of economics with safety. The cost of safety serves as a bridge between economics and safety in the field of safety economics. The definition of safety economics highlights its function in the choice of safety measures and the amount of money spent on manufacturing. Reviewing the literature highlighted the concerns regarding the economic safety including awareness and tackling the conflicts between safety and economics. At the end, a section highlighted the importance of safety economics in construction was provided.

1. INTRODUCTION

Due to factors including constant shifts in project sites and conditions, construction is widely regarded as one of the most exciting and innovative fields [1]. And payment problems due to improper cash-flow planning by both parties; contractors and clients. These payment problems lead to work stoppages and conflicts [2]. Several studies have proposed identifying and disseminating best practices in safety management as a strategy for enhancing construction sector safety and efficiency, encouraging this sector to go above regulatory requirements [3]. According to a review of current practices and a series of well-structured surveys, Ready to fully was fueled by a strong sense of cooperation in terms of staffing and financial resources, as well as the safety officer's knowledge and experience. A stronger organizational structure and higher safety evaluation ratings have been attributed to the use of the safety management systems (SMS). A shortage of human resources, short tenures in the workforce, and high employee turnover rates, on the other hand, were major roadblocks to the widespread use of safety management systems (SMS) in Hong Kong. Useful uses include the following: Findings were regular while suggestive of the long-term evolution of safety management practices in Hong Kong's construction sector and long-term safety improvement [4]. As a result, the Impact of accidents on building sites has become a significant problem worldwide [5]. Meanwhile, economic implies that the resources of safety are limited while the resources placed for one investment are not possible for the other [6]. However, investing in safety has two sides, one is reducing accidents and the other is increasing in the costs of production. The analysis of economy can provide the decision-making on optimization of the losses avoidance cost or investment prevention, resulting in a viable, healthy, sustainable, and profitable organization [7]. Therefore, this research aims at reviewing the various aspects of safety economics and elaborate on related concerns.

2. SAFETY DEFINITION

Safety can be thought of as a reasonable approach to removing injury-causing agents. The dictionary definition of "safety" is "the state of being safe from hurting or causing harm, injury, or loss." Safety is the absence of risk [8]. Variability in performance and capacity to adjust to both expected and unforeseen circumstances [9] safety refers to keeping the danger of unintended harm to a bare minimum. Safety-II is more interested in "why things go right" than I am in "why things go wrong." The goal of safety science in this scenario would be to make it more likely of desired and appropriate results as much as feasible. Because outside (safety) processes and standards do not naturally follow human and industrial activities, Outside (safety) protocols and controls must be used to achieve those aims, whether the goal is to minimize losses, reduce hazards, or boost planned and acceptable results [10]. An accident or incident is avoided by taking all required procedures to prevent dangers, according to this study's definition of "safety".

3. HISTORY OF SAFETY

In West Europe, North America, and Australia, important modifications in Occupational safety and health (OSH) regulations occurred over the decade from 1970. One of the most important characteristics of OSH was the formation of worker representation. The reality that worker participation in the field of safety has a long successful tradition was often neglected in comments at the time and since [11] When it comes to the struggles for shorter work hours, greater salaries,

and better working conditions in the early years of the Occupational Safety and Health Administration (OSHA), employees' safety and health have played a significant role. Workers' rights to a healthy and safe workplace have shaped OSHA's history. Strikes against job conditions were more common in the early decades. For example, governmental involvement in worker safety and health greatly increased under the New Deal. 1970 Occupation Health and Safety Law was the result of decades of lobbying by hundreds of thousands of employees and their unions in the 1960s. Beginning in the late 1970s and continuing to this day [12]. Occupational safety and health are an interdisciplinary field dedicated to ensuring the safety and health of those who spend most of their time on the job. Even though the need for workplace health and safety has kept consistent, the working environment and general circumstances in today's society are always changing. However, significant advances in science and technology in several fields have resulted in a plethora of new challenges [13] Growing challenges include psychological threats, stress at work, and non-communicable diseases, such as cardiovascular and respiratory illnesses and malignancies. More than 374 million individuals are hurt or become ill on the job each year. The Report estimates that lost workdays due to occupational safety and health issues account for over 4% of global GDP and 6% in some countries. "We are witnessing dramatic changes in our places and ways of working, as well as a more effective prevention for proven dangers. According to Manal Azzi, ILO's Technical Specialist on Occupational Safety and Health, "we need safety and health institutions that reflect this, alongside a general culture of preventive that fosters shared responsibility." The paper takes a futuristic view by focusing on four critical disruptive forces. All of them, it's noted, also come with room for growth and progress. First, technological advancements like digitization, robots, and nanotechnology can impact people's mental health and introduce novel materials with as-yet-unknown health risks. When used correctly, it can also assist in limiting exposure to potential dangers, streamline training, and improve the quality of workplace inspections. Young workers have a much higher incidence of occupational injury, and elderly workers require adjustments to working conditions to ensure their safety. Women, who are increasingly present in the labor market, are disproportionately affected by musculoskeletal illnesses and are more prone to non-traditional work arrangements. Thirdly, dangers associated with development and climate change include air pollution, heat stress, developing diseases, and varying weather and temperature patterns, all of which can reduce employment opportunities. At the same time, sustainable development and the green economy will bring about additional employment opportunities. A shift in how work is organized can provide the flexibility that encourages more people to enter the labor force, but it can also lead to psychosocial problems (such as insecurity, compromised privacy and rest time, or inadequate OSH and social protections) and long hours at the office [14]. Many approaches for improving and developing the occupational safety and health (OSH) climate have evolved during the last few decades. The traditional notion of occupational safety and health management centered on meeting technical standards, resolving ergonomic issues, risk assessment, and implementing procedures and regulations. Modern society's management feels that following procedure and monitoring safe work activities is insufficient. It is essential to establish a regulatory mindset and an atmosphere of safety in the workplace to guarantee perfect compliance employee protection and safety. As a result, in today's enterprises, OSH is an interdisciplinary discipline. That includes not only the study of technical issues and characteristics of the workplace, but also the development of awareness among employees. The study of regulatory climate is important for learning how a regulatory function functions in practice, and it has a significant influence on regulatory processes like social collaboration. Interaction, task planning, problem-solving, choice, motivation, and devotion are all critical considerations [15].

4. ACCIDENTS IN CONSTRUCTION SITES

The term "accident" is defined by Webster's Dictionary (2007) as "an incident that happens by chance without apparent reason; or, given alternative circumstances, may have caused any individual to be damaged [16]. Occupational accidents are defined as an occurrence that occurs during or as a consequence of employment and results in a fatal or non-fatal injury. Employees in the construction sector are exposed to a wide range of reasons. that contribute to different types of incidents. According to Khanzode et al. [17], Health and safety improvement funds can to used to subsidize investments in areas where quick paybacks are impossible and contractors are reluctant to put money upfront. Both the Oregon Worksite Redesign Grants program and the Ohio Occupational Safety Loan Program are good examples of state-level programs supported by workers' compensation dollars [18]. The building business in Ohio has benefited from this scheme to a great extent [19]. A further option is to have insurance providers reward contractors with bonuses or premium reductions if they are responsible for the effective implementation of initiatives. The West Virginia University initiative Fall-Safe is an auditing program for fall hazards. The contractors will conduct frequent internal audits of their fall prevention program. Third-party auditors check in on them every three months. By taking part, contractors can save five percent on their annual workers' compensation premiums with St. Paul Insurance Company. Accidents and occupational injuries are more likely to occur on construction sites because of the risks and the nature of the job itself activities doing it by personnel. Construction, refurbishment, and destruction of buildings all include operations that need the use of a variety of procedures, machinery, and equipment, all of which expose personnel to a variety of risks and dangers [20]. Construction jobs are repetitious, and personnel must move around a lot on the job, which increases the chances of an accident occurring [21]. This dilemma is exacerbated when constructing buildings with intricate designs [22]. Furthermore, increasing design complexity tends to increase the chance of accidents occurring on the job site, such as falls [23, 24]. As previously said, building sites include a broad variety of equipment and complex tools that are only operated by skilled personnel. In building sites, however, improper equipment handling by untrained people resulted in several accidents and injuries [25]. Another cause of accidents is a shortage of efficient connection and cooperation between personnel and management [26, 27]. When the majority of employees are from other nations and are unable to communicate in the local language, the situation becomes much more problematic [28]. This linguistic barrier might be a contributing factor in construction accidents. As a result, safety teams have a hard

time discussing potential issue sites and accidents in the workplace [25]. The use of drugs and alcohol on construction sites is another factor that may contribute to the disproportionately high incidence of debilitating injuries and fatalities. Drug and alcohol abuse in one's personal life may have serious consequences on one's capacity to work safely. Substance misuse causes slowed response times, impaired judgment, and a slew of other problems [29]. When narcotics are misused at work and employees do tasks while under the influence, the negative consequences are amplified significantly. Given that construction entails heavy machinery, complicated personnel, and possible public hazard, the fact that the construction business has an extremely high drug usage rate is concerning. Most notably, in construction, job assignments are often unexpected, worker crews are continually changing, and employees are distracted from securely accomplishing duties by the work environment [29]. Climate change, variances in building materials, and sector-specific characteristics are some of the additional challenges presented by the construction business [30]. These characteristics have led to the occurrence of incidents such as downfall, getting beaten up by items, electric shock, it is cut between slides, Colliding with falling accessories, and so on, according to a critical study of research undertaken by Ling et al. [31]. According to research by Mohammed and Ishak [32], the three most prevalent forms of accidents at Malaysian construction sites are falling, tripping on an item, and being hit by a falling object. Furthermore, according to the findings of the investigation, 53.53 percent of construction-related incidents were deadly, while the remaining 46.47 percent were non-fatal. Hamid et al. [33] identified the most important reasons for building incidents in Malaysia are:

(1) Management fail (29.2%), such as insufficient inspection, ineffective safety regulations, and a shortage of safety education initiatives.

(2) Unsafe technique (faulty work process) (26.4%), mostly due to incorrect work procedure.

(3) Inadequate use of individual protective gear and worker irresponsibility contribution to the incident reason (12.5%).

(4) Dangerous equipment (9.7%).

(5) Workplace conditions (11.1%).

(6) Construction is a dangerous business (11.1%).

They also said that in Malaysia, a lack of respect for safety regulations has resulted in increasing exposition of workers and the common people to dangerous situations at building work, leading to a high rate of incidents. The Malaysian construction sector is dominated by migrant workers from Bangladesh, Indonesia, Pakistan, and other countries which have different cultures and languages. Accident statistics show that majority of these migrant workers are involved in construction accidents [32]. The safety and health officers must be fully supported by the contractors to implement safety and health at construction sites effectively. Also, to increase site safety, senior management must show a positive commitment and assist.

5. SAFETY ECONOMICS

People throughout the globe have been acutely aware of the barter between economy and safety. This demonstrates the significance of striking a balance between economics and safety and health. This sort of choice is best served by safety economics, which examines how safety and microeconomics interact. Although total cost and cost evaluations have been employed in safety management, they aren't the only techniques to consider safety.

In this paper, it is stated that safety economies are a wide-ranging educational issue that concentrates on the interrelationships and co-evolution of economics and safety for the comparison of economies and safety. economies, safety, and safety economies are all depicted graphically in Figure 1. to better understand the concept of safety economics. Figure 1 portrays a scenario in which safety and economics are unconnected, and the connections between the two are ignored while making decisions. In the aftermath of the Fukushima tragedy in 2011, Germany, for example, even by end of 2022, all nuclear generation facilities will be closed down [34]. The conclusion is primarily concerned with nuclear power's safety dangers and ignores its economic benefits. The basic level of safety economics is depicted in Figure 1b. The link between safety and costs, like a Safety design based on distance, is roughly explored at this point [35]. There are four components to the diagram (numbered 1, 2, 3, and 4). Section 1 illustrates an economy sans safety, where safety isn't a factor. Section 4 relates to safety without economics, implying that safety has no economic consequences. The junction of the two rings depicts the interdependencies between safety and profitability (Sections 2 and 3). In this stage, safety economics can be understood in two ways: the Economic Dimensions of Safety (EDS) ((e.g., considering safety budget in safety decision-making) and the Safe Dimensions of Economy (SDE) (e.g., considering safety distance in the layout design of chemical plants). Section 3 presents the SDE, which incorporates safety concerns into economic assessments to achieve long-term sustainability and durability. Section 2 presents the EDS, which includes economic considerations into safety assessment to reduce the cost of safety-related decisions. safety economies are developed by combining safety technology and economies (Section 2), which can also be thought of as a discipline subject to resolution-making, as shown in Fig. 1c. The safety economics research objectives may have an impact on people and/or any economic organization interested in safety. The purpose of a safety economy is to assist individuals in making better safety investment choices while remaining inside acceptable risk boundaries. From an SDE perspective, It could be understood as balancing the prices of risks and financial advantages, while from an EDS perspective, it can balance the expense of reducing dangers with the safety interest. The important challenge, whether using EDS or SDE, is the key difficulty in portraying the interrelations between economics and safety, or the relationship between the two.

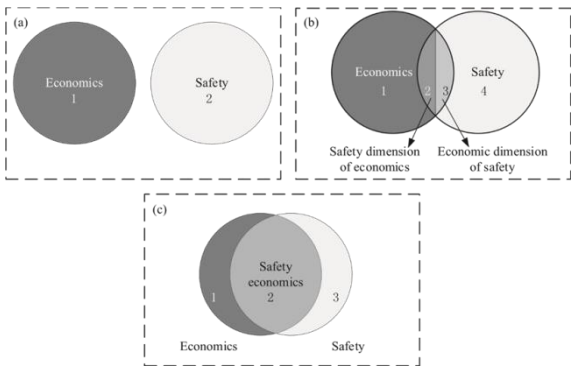

Figure 1. The connections between safety, economies, and safety economy

6. LITERATURE REVIEWS

The research on safety economics dated back to the 1960s with the consideration of it as a prime dimension of safety [36]. He proposed two main tasks of the safety economics as: 1) developing optimum penalties and rewards combination for balancing the costs of safety measures in the bargaining and competition framework, and 2) obtaining a balance between the safety provision costs and the safety itself. Thereby, the aim of the safety economics is the production of safety in an inexpensive appropriate way as possible.

Swinbank [37] studied the issues of economics for balancing the benefit and costs of food industry. A revision of the economics and statistics of railway safety in developed country was carried out by Evans [38] who found that the safety can be improved by the improvement in the financial operator's health. Also, research on the health care provided the safety economic research. For example, the safety value research in health care with use of surveys was summarized by Perry-Duxbury et al. [39]. This implies that the safety values method may have been or can be used in the domain name safety. Also, a viable work for the safety economics is the review work carried out by Niven [40] for the application of health economics. In addition, cost-effectiveness analysis can be assisted by the work carried out the cost-effectiveness threshold in health care [41, 42]. Yoon et al. [43] carried out a study for the investigations of the current state of the occupational health and safety management system (OHSMS) in the industry of construction and it impact on the rates of accidents. The accident rates from 2006 to 2011 of a certified construction companies by OHSMS were analysed. The desultory indicated that the rate of accidents decreased by 67% and the rate fatal reduced by 10.3% among the top 100 construction companies in South Korea over the studied period. Elias et al. [44] investigated 79 various sized contractors. They found that the cost benefit of improving and commitment to health and safety outweighs the accident or adverse safety costs at 62% benefit to 38% loss. Also, the findings by Philips [45] suggested a signicant cost saving with commitment to health and safety. However, Young [46] stated that the attempts of linking economic to safety in the SMEs is normally characterized by confusion and absurdity. the difficulties of performing economic security evaluations Disposable, material, and financial resources, efficient organizational structures of production and business administration, and the quality of human resources all contribute to a company's economic security. Timely product sales and encashment decreased inventory carrying costs, and early detection and mitigation of business risks are all necessary conditions [47]. Santos et al. [48] analysed the safety risks and their economic impacts in a large construction company. A dam construction case study in Portugal was selected for minimizing accidents costs. The evaluation of the after risks was conducted through tools of simulation pf various construction phases related to the planned tasks. The simulation provides the peaks of high risks levels the simulation allows the analysis to identify peaks and levels of high risks resulting in a systematic evaluation of the risks. This allows preventative measures to be established reducing the overall construction accident costs and enhancing the safety. The implementing implies additional costs in terms of safety policies and prevention systems though when associated with accident, the safety lower costs than a lack of prevention.

In addition, many research works have studied the safety management. Liang and Wang [49] found that the management of safety is very significant in construction and economics of companies. He stated that the safety management can be achieved through several collaborating ways including the fortification of the safety management work of the construction office management, obligation characteristics of each engaging task with construction, and government supervision reinforcement. Charehzehi and Ahankoob [50] recognized some critical elements or accidents including errors in the safety management, improper system of training, inappropriate approach of monitoring, and element of humans. Thus, they presented 6 stages of consistent safety improvement. These involved making safety direction, peril distinguish, evolution and surveying of opportunities, safeguard selection, discovery recording, and finding refreshment in connection with the condition of work. Generally, this means developing the performance of safety and achieving more security condition in construction needs more attention for discovering damageable risks. Sunindijo Sunindijo et al. [51] In order to build a strong safety culture, the management team must conceptualize the management of safety. Mir and Mahto [52] stated that the industry of construction is one of the most unsafe industries in which workers are more exposed to accidents. They argued that the operational safety is very inadequate since it lacks preparation, advancement, information of management and reporting at sites, and safety principles. Mohammed et al. [53] indicated that the management of safety is connected to strategies, methods, goals, capacities, and arrangements that control risks and hazards in socio-specialized systems. The wellbeing, impression, and mindfulness of workers towards safety represent essential part in the development of construction industry. This could be achieved through valuable safety framework, less mishap, and more training.

7. DISCUSSION

Safety economics is seen as a multidisciplinary issue that combines safety and economics in this research. While the notion is that it is a minor aspect of either safety or economy, it is crucial in both safety management and economic choice. By examining the incentives for safety economics this section discusses the significance of safety economics in the management of safety and the formulation of economic solutions.

Unsafety can lead to undesirable outcomes. Fatalities, economic losses, environmental damage, reputational damage, and other costs may be incurred as a result of an unwelcome event. As a result, to prevent this, safety (safety precautions) might be regarded as a product or service. expenses, although acquiring these safety measures incurs costs as well. Economic action like the adoption of modern knowledge may give financial advantages, but it may also present safety concerns, leading to possible costs. As a consequence, expenses may be used to connect safety and economics. with the major goal of safety economics being to model the costs of unsafety and safety interventions. In safety research, outgoings are usually divided into two groups: "economy expenses," which can be immediately expressed in money, and "non-economy expenses," such as fatalities and environmental damage, which cannot be easily monetized. In safety economics, both economy and none economy expenses may be priced. While

the cash worth of non-economy expenses cannot be quantified exactly, it may be deduced from priceable issues. To assess the worth of human life, techniques like the people resource method, the worth of human living, and the desire to accept technique, for example, might be utilized [54]. In the United States, the costs to society from workplace fatalities and injuries are high. Economic costs are intended to quantify the opportunity cost to society due to injuries and deaths, although doing so is sometimes problematic. Because of this, they are valuing these expenses, which yields a wide variety of estimations [55]. Cost assessment and other economic evaluation methodologies may be used to improve safety management and economical investing decisions based on monetary costs.

OHS stakeholders seldom factor in the financial Impact of workplace accidents when making investment choices aimed at reducing them [56]. The economic impacts on safety may be divided into three groups [54].

- Determining and measuring the financial costs of incidents.
- Comprehending the business-safety relationship.
- Accomplishing a barter between safety and other company objectives.

Regarded process safety economics to assist the organization takes the best (or "optimal") choices. Furthermore, the economics of functional safety might be used as a future forecasting tool for people or companies, addressing concerns such as identified risks, value concepts, and hazard tolerance, among other things. As a result, in the economics of operational safety, the concept of cost is critical [57] The expenditures are mostly made up of costs for safety accident-related measures and expenditures (virtual and actual). Safety should be considered in economic operations, in addition to applying economics to safety, because safety Danger could be a barrier to financial organizations' tall progress [54]. Take the notion of "safety via designing," for example [58]. to increase intrinsic safety and ensure long-term profitability, safety problems are considered throughout the designing stage of modern technology or gear. Furthermore, safety may be a critical component in determining the viability. Nuclear energy facilities are an example of a modern economic venture. Though "'Safety at any cost'" was advocated for nuclear reactors in the 1980s, it may have led to dubious away processes and a rise in manufacturing costs [59].

Several concerns should be addressed for adequate economic safety management as follows:

7.1 Improving safety awareness

individual's safety Consciousness and behaviors heavily influence their actions and tactics for coping with dangers in the workplace and in daily life Many conventional methods are used approaches, such as laws and regulations governing learning, skills, and safety, are commonly used to enhance employee safety awareness. Accident victims are frequently utilized in safety training to remind staff to adopt standards and safety precautions. This is the kind of stimulating thought and practical training that may raise employees' safety awareness more effectively than leadership-provided theoretical material. Furthermore, because they are not exposed to the dangers, managers may be more preoccupied with the financial gains. For example, many significant accidents have happened as a result of management pursuing financial gains while ignoring potential hazard risks. an LPG vehicle blast in Wenling, China, on June 13, 2020, resulted in 20 deaths and almost 170 injuries. Although the truck's owner has been punished 11 once by safety officials, it failed to pick appropriate precautions to reduce certain dangers. This business could be made liable for the incident. It might be necessary to recompense the victims with a considerable quantity of money for their diseases as well as the neighboring residents' economic losses as a result in terms of Properties damage. If the possible expenses had been anticipated and disclosed to the firm before the disaster, the firm or leaders might be having prioritized lengthy economic advantages above brief economic gains, putting possible incident scenarios on the back burner. As a consequence, a safety economy may act as a reminder to individuals that some catastrophic circumstances can cost a lot of money, and that prioritizing safety can ensure long-range advantages.

7.2 Optimization of safety measures

The cost of safety is not insignificant. Because there is usually a budgetary limitation for safety procedures, it is difficult to adopt them at all costs. The funds spent on one measure are not accessible for application in other measures [54]. Furthermore, the decreasing relative benefits (marginal profitability) regulate the investment in safety measures; that also is, the relative benefits (e.g., decreased hazard) obtained from a single unit of safety precaution diminish as the single measure is progressively raised [60]. As a consequence, the economics of safety may be used to optimize the advantages of safety while minimizing the waste of resources. To further aid in the selection of the most "profitable" or cost-effective safety practices, the safety economy may provide economic criteria.

7.3 Tracking the conflicts between safety and economics

Safety may seem to be an obstacle to financial action, ensuing in negative consequences for output, among other things. On the other side, chasing economic gains at any cost may raise the danger of an incident and jeopardize safety. To reduce charge buildup (static electricity) in the pipe or storing container during loading and unloading combustible chemicals, a lower flow rate may be advised. However, it inevitably reduces the efficacy of the business, resulting in financial loss. As a consequence, a balance must be struck between the velocity of flow and the danger of electrostatic discharge igniting the system. The prevention and management of COVID-19 infection is an interesting case study that highlights the difficulties between safety (health) and economics. Astringent method to mitigating the effects may result in economic consequences (e.g., the closure of a company or an increase in the unemployment rate), as well as rational validity Issues (e.g., worry and fear), A permissive attitude, on the other hand, may result in a fast spread of the disease, more deaths, and potentially societal hysteria. Authorities must make a barter relationship between the expansion of the economy and the outbreak of disease management based on hazard assessments and financial evaluation. To put it another way, these issues fall outside of either safety or economic considerations, safety economics, which mixes the two, might be a potential solution [61]. The best way to balance safety and cost is through (ALARP) As Low as Reasonably Practicable shown in Figure 2 [62].

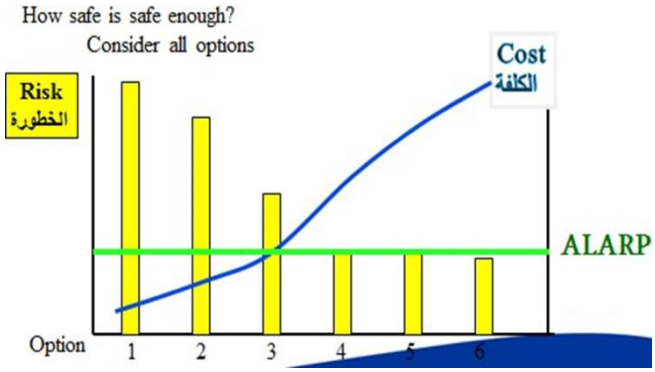

Figure 2. The better way balance safety and cost

7.4 Safety and the "license to operate" of technologies and industries

Newer technologies or businesses might be beneficial economically, but they can also bring about newer safety dangers If there isn't enough focus on safety, these dangers may become a barrier to the technology's or industry's long-term development. For example, China's chemical sector grew quickly during the last two decades, eventually becoming the world's largest in 2011 [60] In 2017, the development resulted in the creation of almost 5 million employment opportunities and 1.5 trillion USD [63]. On the other side, rapid industrialization in China has forced the closure of thousands of chemical companies, resulting in serious safety concerns. Reverse As a result of the nuclear energy phase-out program, China's chemical sector and the nuclear energy business in Europe are experiencing difficulties [21]. As a result of earlier catastrophes, such in the U.S, the Three Mile Island nuclear energy station disaster in 1979; in Ukraine, the Chernobyl nuclear energy station disaster in 1986 are both remembered., and the 2011 Fukushima nuclear power station incident in Japan, the policy was implemented. As a result, nuclear energy and the chemical Making rapid expansion necessitates a focus on safety and economics, both of which are tied to a business license.

8. THE ECONOMIC IMPACT OF CONSTRUCTION SAFETY

Occupational accidents cost a lot in the society today [64]. Occupational fatalities in emerging nations outnumber those in industrialized nations. Because industrialized nations place a higher value on preventative (proactive) OHSM measures. Comparing Turkish occupational accident statistics to developed nations [65]. in the industrialized countries, where economic research on occupational safety and health has matured to a point of useful insight. It is vital to have epidemiological data on incidence rates of the health events of interest in order to establish the economic costs of work-related injuries and illnesses [66]. Reports Turkey has the highest death rate. OHSAS 18001:2007 is the standard [67]. OHSMSs that conform to Certification organizations may formally certify conformance to this standard. It is the most generally used international standard for building an (OHS MS) may be formally certified by certifying organizations if it adheres to a conceptual framework. OHSAS 18001:2007, the (OHS) criteria, is usually accepted as the gold standard acknowledged around the globe and is the most recent edition. This standard will be implemented by businesses representing a diverse range of industries and sizes. All costs paid to avoid occupational incidents are included in the overall cost of occupational incidents, all expenditures incurred after the incidence of workplace accidents, as well as the financial damages sustained as a consequence of these occurrences. An important cost element for a company is the reduction in human capital that comes as a result of workers being unable to participate in production operations constantly or tentatively as a result of workplace incidents [68]. Occupational accident prevention costs prevent occupational accident injuries, on the other hand, have the potential to reduce employer costs while also increasing profits [69]. According to a set of writers and organizations, the value of accidents caused by not implementing OHS measures are substantially more than the costs of OHS prevention, and thus investing in occupational accident prevention is justified for economic reasons [70, 71]. The installation of OHSMSs is not a money worry, but rather a chance for businesses, since they have a beneficial impact on company performance. Indeed, nations with the greatest levels of occupational safety also have the highest levels of competitiveness [72]. Safer, better places of work have been shown to improve employee morale and efficiency while also boosting financial results [73-75]. OHS MSs, the Same as the total quality management (TQM) strategies, are seen as an important part of ensuring employee happiness [76]. The strong link between employee happiness and employee health and productivity at work is one of the causes of the rising relevance of functionary comfort within the company [77]. Occupational safety may assist to mitigate a wide range of harmful consequences (for example, costing the company more money because of decreased productivity, more work stoppages, absenteeism, and employee turnover caused by personnel who are physically and socially exhausted [78]. When nonwage variables are taken into account, it is clear that job discontent leads to employee turnover, absenteeism, and workplace accidents [79]. Some studies and subjective evidence suggest that reducing preventative expenses get better safety performance, employee happiness, and accident cost [80]. Employers in a survey performed in Spain believe that preventative expenses are superfluous and that they do not contribute to the company's production goals, resulting in negative consequences on profitability and competitiveness.

9. CONCLUSIONS

Through the definition of safety economics, it's the role in the decision making and environment of production was summarized. This included the safety economics awareness and the issues between economics and safety. There is a lack of understanding of the costs of safety. For this reason, this study explores how OHS preventive expenditures, employee happiness, OHS performance, and incident expenditures are all interwoven. OHS expenditure cuts can result in lower incident expenditures; happier employees are the direct outcome of lower incidence expenses; better safety efficiency results in happier employees and lower incidence expenditures. The forces of the market be supplemented and long-term efficiency implied by establishing an inclusive culture of OSH through cooperation of all of the primary stakeholders in an economy (workers, companies, and governments). Furthermore, there several paths that can be explored for future research. Firstly, open access data could be produced

due to the lack of economic data, which can reduce the time of collecting data. Secondly, for efficient safety economics more research is required for the determination of indirect costs of accidents and safety. Thirdly, security economics could be researched in terms of intentional undesired events as a potential research area. Finally, models can be developed for interdependencies between multiple stakeholders and for integration of multiple economic and safety criteria through the application of multiple criteria approach of decision making.

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