

BOOK OF ABSTRACTS

**2023
CONSTRUCTION
SAFETY
CONFERENCE**

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Lawrence, Kansas, USA



NCCS
The Craig and Diane Martin
**NATIONAL CENTER FOR
CONSTRUCTION SAFETY**



Book of Abstracts

2023 Construction Safety Conference

Safe Built Environment: Harnessing Potential of Management Techniques and Digital Technologies

Edited by

Dilip A. Patel and Lukman E. Mansuri

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Conference Chair's Message



Dear participants:

The casualty rate in the construction industry has remained high. To address this issue, Craig and Diane Martin established the National Center for Construction Safety (NCCS) at the University of Kansas (KU). The mission of the Center is to advance construction safety through research, instruction, and community services. The construction safety conference is an annual event that the NCCS hosts to serve the community by disseminating construction safety knowledge.

After the first construction safety conference co-organized with the National Academy of Construction (NAC) in 2022, the 2023 (2nd) Construction Safety Conference (CSC 2023) intends to bring practitioners and scholars together to advance construction safety. This year we have 13 invited speakers including two keynote speakers Ross Myers (CEO of Allan Myers) and Dr. Carlos Bertha (Professor at US Air Force Academy). Furthermore, CSC 2023 has seven academic research presentations from the US, India, and Jordan. We hope attendees can understand the practical construction safety issues and solve them using state-of-the-art construction safety knowledge.

Wishing you a safe and enjoyable conference in Lawrence, Kansas.

Best regards,

Chien-Ho Ko, PhD, PE

Conference Chair, CSC 2023

Craig and Diane Martin National Center for Construction Safety

University of Kansas

Scientific Chair's Message



Dear participants,

I am delighted to extend my warmest greetings to all of you attending the 2023 Construction Safety Conference at the University of Kansas, USA. It is my honour to welcome esteemed academicians, professionals, undergraduate, postgraduate, and doctoral candidates, as well as industry experts to this significant event.

I would like to express my heartfelt gratitude to the organizing committee for their tireless efforts in making this conference a reality. Their dedication and commitment have ensured that we have a platform to exchange knowledge, learn from one another, and inspire progress.

Wishing you a fruitful and memorable conference.

Sincerely,

Dr. Dilip A. Patel

Scientific Chair, CSC 2023

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Failure is Inevitable, Injury is Preventable: A Proposed Cognitive Model for Teaching and Training in Occupational Safety and Health

Awwad J. Dababneh¹

Abstract: This paper is about improving Instructional Design (ID) for safety education through the use of a simple and comprehensive Safety Cognitive Model (SCM). Well-structured cognitive models make teaching and learning easy, produce deep understanding, and are appealing to learners. The proposed SCM contains no new safety knowledge, but the novelty of it is in the way it organizes and presents the information. This paper has three parts. The first is a discussion and essential background on learning and the importance of having a comprehensive and unified cognitive model for safety. The second is a “pictorial essay” including ten original illustrations that constitute the proposed safety cognitive model. The third part includes a summary of the results of several evaluations done during the developmental phases, including a recent experts’ evaluation of the model as it is presented in this paper. The results of the developmental evaluations helped guide incremental changes to the model over multiple years. The most recent evaluation of the model is an expert’s evaluation. Twenty-three safety professionals were asked to review the SCM and they were asked to fill in a survey and to provide any additional comments and personal thoughts. Experts indicated that the model was not entirely novel, but it organized all the basic safety principles in an integrated and simple model. The findings of the developmental research were helpful, but cannot be declared conclusive because of the continuous evolution of the model. Independent evaluations of the model are needed, and further improvements are encouraged. This paper is written for experienced safety professionals, as it assumes knowledge of safety basics.

Keywords: Safety Training, Safety Cognitive Model, Training Efficiency, Evaluation of Training.

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Women Professionals in Construction Industry: Barriers and Approaches to Improve Wellbeing, Safety and Health

Vimlesh Prabhu Desai¹ and Lysette D'souza²

Abstract: The construction industry's male-dominated image, working ethos, and environment have led to an abysmal representation of women professionals in the workforce. The industry, second largest employer in India, contributing 9% to India's GDP has a mere 2% representation of women professionals (architects, site engineers, quantity surveyors, planning engineers, safety professional, etc.) in employment. Manpower shortage continue to challenge the industry and poses opportunity for women and employers alike. In this context, the paper aims to identify and evaluate the barriers and approaches to improve wellbeing, safety and health of women professionals at project sites thus increasing their share in employment. A mixed approach of questionnaire survey, interviews and focused discussion was adopted. The top three barriers identified were – Long working hours and a culture that working long demonstrates work commitment, Remote and changing work locations of project sites impacting family life and Inflexible work hours; while the top three approaches were – Providing appropriate sanitary facilities, Separate and clean restrooms and Evaluating performance based on output rather than hours put in. Results suggest that men and women shared a common perception on all barriers and approaches except for three. The findings will aid in advocating for women's wellbeing, safety and health at construction sites and spread the word about the value of gender mainstreaming.

Keywords: Barriers, Construction, Health, India, Safety, Strategies, Wellbeing, Women

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Enhancing Construction Site Safety: Natural Language Processing for Hazards Identification and Prevention

Shrutika Ballal¹, K. A. Patel² and D. A. Patel³

Abstract: Construction sites are well known for the inherent risks that negatively impact the safety and well-being of workers. Identifying and minimising these hazards is critical for preventing accidents and creating a safe working environment. Traditional techniques of hazards identification in construction rely on visual assessments and professional expertise, which can be time-consuming and subjective. The goal of this research is to identify traits that indicate potential dangers in the construction industry by extracting meaningful information from accident narratives. This will be achieved through the application of a rule-based iteration approach, using the Natural Language Toolkit (NLTK) for keyword extraction and text tokenization. It is a branch of artificial intelligence and computational linguistics concerned with the interaction of computers and human language. The research methodology involves the utilization of NLTK and the application of a rule-based iteration approach to extract hazards from construction-related accident narratives. The proposed approach includes gathering accident narratives, pre-processing data, and textual analysis with NLP tool for information extraction and training the algorithm with identified attributes. The textual analysis eventually leads to the extraction of significant sources of dangers that cause accidents. The study contributes to the developing subject of construction safety management by utilizing the capabilities of NLP to enhance hazard detection, resulting in safer construction practices and lower occupational hazards. The findings emphasise the accuracy with which NLP approaches detect dangers, allowing construction professionals to proactively decrease risks and enhance overall safety on construction sites.

Keywords: Keyword extraction, NLP, Risk, Safety, Text mining.

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Enhancing Safety in the Construction of Small Modular Reactors (SMRs) and Microreactors (MRs) through Improving Guidelines and Involving Digital Technology Tools

Muhammad Kamran¹, Chengyi Zhang², Danish Kumar³, Sevilay Demirkesen⁴, Huimin Li⁵

Abstract: The construction phase of nuclear construction projects presents various risks and hazards, putting workers in potentially dangerous situations. Safety guidelines provided by Occupational Health and Safety Administration (OSHA) aim to address construction safety concerns, but limitations persist, especially in context of workers safety and the transportation of Small Modular Reactors (SMRs) and Micro Reactors (MRs) in the nuclear construction domain. This research focuses on identifying issues related to safety guidelines in nuclear construction and aims to develop new guidelines and strengthen existing ones. Through a critical literature review, key factors influencing safety in nuclear construction were identified. A questionnaire survey was prepared in line with those identified key safety factors and distributed among 40 professionals from the United States, to gather feedback on these factors in countering safety issues and developing new guidelines in the context of nuclear construction. The findings reveal a lack of specific guidelines concerning the safe transportation of SMRs and MRs, as well as a gap in understanding accidents during the construction and transportation phases of nuclear projects. The results of this research contribute to enhancing safety protocols and addressing the unique challenges faced in nuclear construction. The research has also highlighted the importance of digital technology tools such as Artificial Intelligence (AI), Augmented Reality (AR), Virtual Reality (VR), and Unmanned Aerial Vehicles (UAVs) as emerging digital tools, which could be helpful to counter safety concerns linked to SMRs and MRs in future.

Keywords: Nuclear construction, safety guidelines, MRs, SMRs, workers, OSHA guidelines

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The Impact of Ageism on the Mental and Physical Health of Construction Workforce

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Abstract: Despite the growing emphasis on workplace diversity and inclusion, ageism remains prevalent in various industries, including construction. Through an extensive review of literature and a United States national-level survey, this paper investigates the adverse impacts of ageism on the overall well-being of the construction workforce, focusing on their mental and physical health. The questionnaire was distributed among individuals working in the construction industry sector who were randomly selected and received 72 responses. The data obtained were analysed statistically using binomial logistic regression in modelling the relationship between ageism, mental and physical health of the construction workforce. The research results indicate that ageism has a statistically significant ($p < .001$) positive relationship between both mental and physical health of the construction workforce. The results, therefore, show that ageism has an impact on the mental and physical well-being of workers in the construction industry. Furthermore, the results show that individuals in the construction workforce who experience ageism are more likely to have their mental health and physical wellbeing impacted compared to those who don't experience ageism. Consequently, the results highlight the need for proactive measures to combat age discrimination and promote a healthier and more inclusive work environment for construction workers of all ages.

Keywords: Ageism, mental health, physical health, construction workforce, construction industry.

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Suicides among construction occupations in the UK

Billy Hare¹, Kenneth Lawani² and Gail McEwen³

Abstract: Studies on mental health are increasingly complementing those on safety and physical health within the construction research community, with suicide numbers being an indicative measure of mental health. In the UK, deaths by suicide are approximately 470 per year, which dwarfs fatal accident numbers. The aim of this paper is to review the evidence base about suicide and construction workers. The methods consisted of two approaches: combining secondary data from UK statistical databases to create a suicide rate per 100,000 for construction occupations; and a systematic literature review to help explain the suicide rates observed. Trend analysis of suicide rates, from 2015 to 2021 shows construction occupations to be approximately three times that of the combined non-construction occupations, and steadily rising, whereas non-construction rates have remained relatively steady. Unskilled workers have the highest rate, around seven times managers and professional occupations. Potential reasons for this, found in the literature, included managers/professionals' greater propensity to shift beliefs about suicide stigmas, and skilled workers being more likely to report substance abuse; - rather than hide it, thereby increasing opportunities to discuss and resolve such issues to reduce suicide risk. However, the socio-economic risks associated with unskilled workers means being poor is certainly not good for their mental health. The analysis presented in this paper informs industry policy and practice by uncovering a previously unknown upwards trend in suicide rates among UK construction workers, along with a focused list of evidence-based factors to inform further research on why this phenomenon is occurring.

Keywords: Suicide, Mental Health, Occupation, Unskilled

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