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BEYOND SAFETY OUTCOMES: IMPACT OF SAFETY CULTURE ON WORKERS' ENGAGEMENT WHILE USING SAFETY CLIMATE AS A MEDIATOR

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ABSTRACT

Purpose: The study evaluated the mediating role of safety climate for better worker engagement in the construction industry.

Design/Methodology: The target area of the study comprised construction firms in developing countries like Pakistan. The data were collected on the independent variable safety culture, dependent variable, i.e., worker's engagement, and safety climate as mediating variable, by administering 250 questionnaires to workers at the selected construction site. Data were analyzed using Smart-PLS 3.2.7.

Findings: The results revealed that safety climate mediates the relationship between safety culture and workers' engagement.

Implication: This study contributes to the knowledge of policymakers and managers in the construction industry, thus fostering effective safety culture and worker engagement in the construction projects.

Originality: Prior literature has exmained the antecedents related to safety culture like management commitment and environmental factors. However, there is very limited research focusing on the factors impacted by safety culture in Pakistan. Hence this research focuses on the influence of safety culture on worker engagement in construction industries of Pakistan with the mediating impact of safety climate.

Keywords: *Safety culture, Safety Climate, Worker engagement, Pakistan*

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INTRODUCTION

Managing and controlling occupational health and safety at construction sites is challenging due to the dynamic nature of the construction business (Loushine et al., 2006). As the construction industry employees comprise skilled and unskilled workers performing on-ground construction activities, the performance of these workers influences the project's success in terms of cost, quality, duration, and safety (Hoonakker & Duivenbooden, 2010; Gouett et al., 2014). Workers usually shift between job sites, thus making construction sites unstable in terms of safety (Zhou et al., 2015). The construction sector risks workers' safety and health due to the complex nature of work at construction sites.

Accidents caused by inadequate safety performance have a variety of causes. However, human error is a core cause which takes the form of poor administration of workers, lack of staff training, inadequate industry operating standards and working environment (Misiurek et al., 2017). Concurrently, the mortality rate in the construction industry is five times higher than in the manufacturing industry. Compared to other firms, the risk of injury in construction industry is 2.5 times higher (Sawacha et al.,1999). Furthermore, many personnel lack enough safety awareness in the construction industry and possess misperceptions about risks associated with such circumstances (Choudhry et al., 2007). Consequently, the workers' faith, vision, perception, and behavior affect the safety system's execution and performance. As a result, workers' participation and engagement can impact the safety management system. The incentive to participate in various safety initiatives can strengthen the workers' beliefs, values, and vision (Ryan et al., 2021).

Approximately 4.7 million construction workers are employed in Pakistan, and according to the Pakistan Bureau of Statistics for 2018-19, construction-related accidents account for 15.4 percent of all industrial injuries. In the construction industry, the main impediments include a single source of input for evaluating safety culture and poor compliance with safety practices. The safety culture is defined as the culture of any organization that influences its members' beliefs, attitudes, and behavior in terms of their safety engagement. The workers' willingness to improve safety systems can facilitate the safety management system (Abdullah & Wern, 2012). Similarly, providing workers with a safe working environment can boost positive engagement. As a result, the safety climate is a crucial indicator of positive worker engagement and safety performance (Masood et al., 2011).

Therefore, the objective of this study is to examine the impact of safety culture on workers' engagement via safety climate. The safety literature indicates the effect of safety culture on safety climate and the impact of safety climate on workers' employment (Sukamani et al., 2021; Geisler et al., 2019). Hence, the current study used safety climate as a mediator between safety culture and workers' engagement. Furthermore, this study selected primary constructs affecting workers' engagement,

to develop a model and hypotheses. The empirical analysis carried out in this study clarified the mediating role of safety climate for improving workers' engagement.

THEORY AND HYPOTHESES

Construction safety ensures the wellbeing and safety of workers at a construction site. Consequently, it is necessary to ensure the worker's wellbeing, as construction safety could improve the industry's profitability and performance (Ranasinghe et al., 2020). In comparison with other industries, the chances, and the number of accidents in the construction industry are higher. Although, in the construction sector, the fatality rate is higher than in any other industry, , the construction sector plays a vital role in economic growth. As per statistics, it is quite evident that it is a highly dangerous and hazardous field (Zhou et al., 2015). The construction sector involves several hazardous processes, including laborers working at heights, the highest exposure to hazardous construction materials, various lifting tasks, and the use of heavy machinery.

A contrast cross-sectional investigation was conducted by McCabe et al. (2017) in Canada. In 2008, 911 proposed questionnaires were collected from construction workers. Similarly, in 2014 and 2015, questionnaires were collected from 802 workers. Upon comparison, it was observed that the participant's safety status improved as their awareness increased, indicating that the region's safety program is effective. Because of the safety climate factors, there was a 15-20% variation in the safety outcomes. Interpersonal conflicts also have a significant impact on safety outcomes.

The research was carried out to find out the standard of safety regulation, information, and compliance, along with initiatives to improve the wellbeing and fitness of workers in the Nigerian construction industry. According to the study findings, while workers' safety awareness was average, their adherence to safety procedures was poor. The findings showed a positive relationship between consent of health measures and industry worker’s safety, implying that the poor levels of acceptance with safety conditions result in improper safety. However, the correlation was evaluated for its consequences, and the outcomes were non-significant. The findings revealed that compliance alone is insufficient to ensure worker’s safety (Adebiyi et al., 2020).

The construction industry is expanding rapidly in developing countries, including Pakistan. Approximately nine percent of Pakistan's total labor force is employed in the construction industry, which contributes significantly to the country's gross domestic product. Unfortunately, the current national laws and regulations that apply to the industry do not apply directly to it (Jiskani et al., 2020). Workers' health and safety conditions have deteriorated in Pakistan because of the ineffective implementation of safety rules. There were insufficient basic safety measures in the construction sector of Pakistan as indicated by an average performance index about safety that was 0.52 in the country's construction industry. Ninety-eight percent of construction accidents are caused by unsafe acts, poor safety conditions, and worker carelessness. In comparison with the rest of the world, Pakistan's OHS laws and

regulations for the construction industry are not appropriate. Furthermore, several construction firms do not have basic safety policies (Memon et al., 2017).

The safety culture is explained as the general culture of any industry that influences the beliefs and attitudes of its participants about their work engagement. The willingness of employees to improve the safety process can effectively update the safety management standards (Abdullah & Wern, 2012). Wachter (2014) investigated the possibility of a link between safety culture and worker engagement. In the construction industry, difficulties such as the prevalence of unskilled laborers, dangerous work methods, and a high turnover rate were deemed prevalent (Fang & Wu, 2013). The results of the structural equation model, on the other hand, revealed ways in which the company regulates safety, along with its safety operations as well as motivations, subcontractor involvement, field safety, or accountability impositions in opposite to unsafe behavior. These are some variables that encapsulate the safety culture. Pungvongsanuraks and Chinda (2010) proposed and defined a method for evaluating the primary factors influencing safety culture and linked improvements. Similarly, they linked safety culture consolidation as a basis for an improved pattern in the construction safety setting, both in terms of culture and performance (Fang & Wu, 2013; Kartam, 1995).

The structural equation modeling approach was used to investigate safety culture assessment factors. The findings revealed that a supportive environment and management commitment and explorations of work hazards significantly influenced safety culture. In contrast, work stress has the minimum impact on those working in the thermal power industry (Tehrani et al., 2019). Trinh et al. (2020) investigated how a strong safety culture interacts with the complexity of development work to improve safety engagements. The study's findings revealed that the project's technological and environmental complexities negatively impacted safety performance. The negative influence of safety culture is less severe, wherein safety culture is restricted.

In the construction sector of Pakistan, there is a lack of commitment, skills, and teamwork influence safety engagement (Farooqui et al., 2008). Furthermore, in prior literature, just some enablers of safety culture were used which impacted safety performance. Such indicators include employees' perceptions of workstation safety, the status of safety committees, employee engagement, knowledge, training, investigation, safety policies, and their attitude toward safety. Some of these indicators are used in survey-based research in developing nations like Nepal to determine the safety culture (Fang et al., 2015).

Safety climate evaluation taps into workers' behavior and belief about safety on the job, not their effective reaction to safety on the job. The study asks workers to be "observers along with rapporteurs of the shared perceptual phenomenon" (Kines et al., 2011). Compared to other organizational goals, the safety climate shows the importance of health and safety in the firm to the employees (Zohar, 2010). According to research, when a project's safety climate is good, team members are less likely to engage in risky behaviors that might lead to injuries and accidents (Martinez-Corcoles et al., 2011; Hofmann & Stetzer, 1996). The safety climate is a critical aspect in

improving the safety engagements of a construction industry that involves safety management for safety supervision (Li et al., 2017).

In a construction team, a safe environment is an essential factor for safety management system implementation in an organization. In Iran's cement industry, a study was conducted to understand the relationship between worker safety performance and the organization's safety climate (Borgheipour et al., 2020). The research results revealed that promoting safety information at all levels of the organization plays a significant role in developing safety planning and implementing safety policies. In South Korea, a questionnaire-based investigation of safety engagement and climate was conducted. The research results revealed that improving safety performance reduces human health injuries and accidents (Lee et al., 2020). The safety performance of the construction sectors could be enhanced by improving the safety climate. Safety communication plays a vital role in increasing safety engagement while strengthening the safety climate. The research recommended significant centralization of organizations whereby site managers would be communicating with the workers.

Furthermore, communication channels can help to bridge the communication gaps. The study revealed that communication among individuals is essential in managing and improving the safety climate. (Liao et al., 2014).

When it comes to workplace accidents, workers' behavior and perceptions are significantly correlated. Many studies have demonstrated that dangerous behavior on the part of employees is a significant contributing element in 85 percent of all accidents (Delp et al., 2015). The self-perception of workers is a substantial aspect in evaluating the safety climate in a construction team. Upon following the safety procedures, workers enjoy their jobs (Li et al., 2017). The study's findings revealed that the professionals dealing with workplace atmosphere with greater degrees of a safety climate have better levels of peril acknowledgment and hazardous situation insight. Furthermore, peril acknowledgment execution interceded the impact of safety culture on hazard discernment. As a result, safety culture influenced the execution of hazard acknowledgment, which influences the levels of hazard discernment.

Work engagement is defined and measured in terms of vigor, dedication, and absorption and refers to a state in which individuals have high levels of energy and a strong identification with their work (Schaufeli & Bakker, 2004). As a result, it is no surprise that employee retention is linked to work engagement (Halbesleben & Wheeler, 2008; Shuck, Reio, & Rocco, 2011). Social support from superiors and co-workers appears to be two crucial variables for increasing work engagement (Bakker et al., 2014). Most construction industries in developing countries, including Pakistan, have been accredited with poor engagement and improper safety. The lagging indicator for safety records is inappropriate in the absence of legislative authorities such as OSHA and creates a space for leading indicators, e.g., safety climate and safety culture (Zahoor et al., 2015). As a result, recent safety activities are essential for establishing and relying on a safe environment in the construction sector. A

construction sector's safety climate is a significant factor in establishing a safety management system within that organization (Masood et al., 2011).

If the project team members and workers are kept engaged in an organization, the performance will improve (Barrick, Thurgood, Smith & Courtright, 2015). Employees engaged in their work appreciate it, making them more involved in their tasks and increasing productivity. According to Harvard Business Review, firms with more engaged employees have a much greater success rate than those with less active employees, and these involved employees have a more incredible urge and dedication to their task than less engaged employees (Bakker & Demerouti, 2008)

This study sought to evaluate the influence of safety climate and safety culture on the work engagement of workers in the construction industry. The working environment and the organization's safety culture vary from domain to domain. Therefore, this study proposed a combined, interdependent, and integrated interconnection between the safety culture, safety climate, and worker engagement. As no study was found regarding the mediating variable, the current research explored the interaction of safety culture and worker engagement with a mediating influence of safety climates in the construction site. Consequently, the important factors under consideration in this study comprised safety culture, safety climate, and workers' engagement. Therefore, we hypothesized that:

H1: Safety culture has a postive impact on safety culture

H2: Safety climate has a postive impact on workers' engagement

H3: Safety.climate mediates the relationship between safety culture and workers' engagement.

METHODS

Pilot Testing

The potential of any test to give the same accurate results when applied many times for testing is indicated by its reliability. The Cronbach Alpha (α) was evaluated in the pilot testing for 38 responses using SPSS Statistics 26 to determine the reliability test for current research variables. Its consequence level was elaborated in ranges from 0 to 1. The present study results are considered reliable and significant where the value of α is above 0.7. After the evaluation, a reliable instrument was established to analyze the different variables of our study. The results explained that the value of Cronbach alpha for constructs was greater than 0.7 and specified the reliability of all variables to employ for the study, as shown in Table 1. The value of Cronbach Alpha for workers' engagement (WE) was 0.934. According to the previous literature, if the Cronbach Alpha coefficient of all the constructs in a study is above 0.90, it reflects that collected data needs to be observed. There is a need to explore the entire variables critically again. Contrarily, in the current study, only WE showed a higher value of Cronbach Alpha, which exhibits significant reliability..

Participants and data collection

The research focused on the construction firms in Pakistan obtaining responses from homogeneous people to achieve the forecasted hypotheses in a more extort way than for heterogeneous people (Muehling,1987). Moreover, the questionnaire was translated into Urdu to address the language barrier. This research approached 250 respondents and obtained 203 complete responses. The final study maintained 203 available questionnaires for review after omitting incomplete responses. Table 2 describes the features of the participants. The estimation of the age of the respondents is one of the significant components of demographics.

Consequently, different age ranges were outlined in five groups to gather respondents' information. Moreover, the education level was divided into four groups: illiterate, basic, primary, and secondary. At the same time, the experience level was split into five groups. The data were analyzed using Smart-PLS 3.2.7 software (Ringle, Wende, & Becker, 2015).

Measures

The study consists of three parts: (1) safety culture, (2) safety climate, and (3) workers' engagement survey. All measures were translated into Urdu and back-translated to ensure the equivalence of the measures.

Safety Culture Questionnaire

To determine the influence of safety culture on the worker's engagement, a 5-statement instrument was used. An example of a measuring statement of relational safety culture included, "Typically my supervisor is available when I have a question or an issue" (Sukamani et al., 2021). Responses of participants were recorded and evaluated on the Likert scale of 5-points from strongly disagree (1) to strongly agree (5).

Safety Climate Questionnaire

The safety climate influence on the workers' engagement was measured using 5 instrument. The example statement for the safety climate questionnaire was, "The company offers workers with legal contracts, accident, and medical care" (Sukamani et al., 2021). Responses of participants were recorded and evaluated on the Likert scale of 5-points from strongly disagree (1) to strongly agree (5).

Workers' Engagement Questionnaire

Workers' engagement is subsequently linked with climate safety. Worker engagement was evaluated by using a 9-statement instrument. The questionnaire has statements that include, "I feel that I am satisfied with energy level at my work" (Schaufeli et al., 1978). Responses of participants were recorded and evaluated on the Likert scale of 5-points from strongly disagree (1) to strongly agree (5).

DATA ANALYSIS AND RESULTS

Measurement Model

As shown in Table 1, the standardized loadings of the measurement variables demonstrate a satisfactory level of individual variable reliability in the final structural model. Cronbach's alpha process evaluates the internal consistency of the instrument used for data collection. For AVE, Fornell and Larcker (1981) suggested a score of 0.5 as an acceptable level. The results also confirms the convergent validity as AVE scores of all latent construct are above 0.5.

Table 1: Item Loadings, Cronbach Aplha, CR, and AVE

Variables	Item	Loading	Cronbach Alpha	Composite Reliability	AVE
Safety Culture	SCU 1	0.720	0.820	0.874	0.584
	SCU 2	0.813			
	SCU 3	0.741			
	SCU 4	0.646			
	SCU 5	0.878			
Safety Climate	SC 1	0.870	0.870	0.906	0.661
	SC 2	0.727			
	SC 3	0.898			
	SC 4	0.797			
	SC 5	0.760			
Workers' Engagement	WE 1	0.636	0.934	0.945	0.660
	WE 2	0.819			
	WE 3	0.864			
	WE 4	0.792			
	WE 5	0.896			
	WE 6	0.745			
	WE 7	0.858			
	WE 8	0.819			
	WE 9	0.934			

Discriminant validity explains "the extent to which constructs are distinct from each other" (Haire et al. 2017). Discriminant validity was assessed using the Fornell and Larcker (1981) approach. The square root of AVE for latent constructs must be higher than correlations among all other constructs. Table 2 shows that diagonal values are higher than the correlation values of all other constructs, thus confirming the discriminant validity of the model.

Table 2: Discriminant Validity of Constructs

	1	2	3

Safety Culture (SCU)	.764		
Safety Climate (SC)	.734	.813	
Workers' Engagement (WE)	.736	.811	.812

Structural Model

Table 3 summarizes the results of hypotheses testing. The results supported all three hypotheses were supported as shown in Table 5. These results suggest that safety culture (SCU) influences workers' engagement (WE) in the construction industry. There is a positive association between safety culture and safety climate, and results supported Hypothesis 1 ($\beta = 0.743$, $p < .001$). Hypothesis 2 predicted a positive relationship between safety climate and workers' engagement ($\beta = 0.588$, $p < .001$). We followed the procedure recommended by Preacher, Rucker, and Hayes (2007) to perform the mediation analysis. According to their approach, to achieve mediation, emphasis should be on the indirect effect. If it is significant, the mediation is achieved otherwise there is no mediation (Memon, Cheah, Ramayah, Ting, and Chuah, 2018). Hypothesis 3 predicted that safety climate mediates the relationship between safety culture and workers' engagement. Table 5 shows significant support for the mediation path ($\beta = 0.437$, $p < .001$).

Table 3: Results of Hypotheses Testing

Relationships	Beta	STEDV	t-value	Decision
SCU→SC	0.743	0.003	25.650**	Supported
SC→WE	0.588	0.006	8.509**	Supported
SCU→SC→WE	0.437	0.056	7.845**	Supported

DISCUSSION

The current study finds the mediating impact of safety climate among safety culture and worker engagement. Concurrently, the results show that safety culture influenced worker engagement and safety climate. Furthermore, the results indicate that positive safety culture in any organization reduces work stress and improves health status. These two factors are critical for worker engagement in safety management. Concurrently, the findings reveal that an encouraging environment, management commitment, and an analysis of work risks had a more significant influence on safety culture and worker engagement.

In contrast, work pressure has the most negligible impact on those working in the construction industry. Similarly, Wachter (2014) investigated the possibility of a link between safety culture and worker engagement. Positive safety culture in any organization can reduce work stress and improve health status, and these two main factors are critical for worker engagement in the safety system (Farooqui et al., 2018).

The results of the current study indicate that a lack of awareness among workers and supervisors has a substantial impact on workers' engagement. While the age difference, qualification, experience, and lack of safety meetings and training also affect the safety culture of the construction industry. Usually, young workers (20-30) conduct careless behavior about safety as they are not much serious about safety rules and regulations. Young workers adopt shortcuts to complete their tasks on time, which causes risk (Meng & Chan, 2020). Subsequently, according to Benjamin et al. (2008), older workers, specifically those above 50, cannot sustain their workload, and are unable to switch to low physically demanding tasks because of their health concerns and low financial status. If older than 50, they continue their work, but they cannot perform their task safely, thus resulting in more injuries compared to middle age (30-40) workers.

Furthermore, according to Mohammadi et al. (2018), six factors are more significant for maintaining safety culture and safe work conditions in the construction sector, e.g., worker education level, organizing safety training, good behavior of supervisors towards safety, attention to specific risky situations, a close relationship between worker and supervisor, and proper incentives as well as penalty. Hence lack of knowledge, lack of safety education, age differences with varying levels of awareness, and lack of safety updating are all key factors that affect safety performance. Incidents due to poor safety performance may be reduced by increasing labor awareness through commitments. The accidents may be reduced if workers take all the reasonable safety precautions. In contrast, the level of experience in the construction industry is more critical in terms of safety behavior and work engagement. During work, they face various work accidents that will modify their behavior towards safety and working practices due to which they will become more conscious about work safety. According to earlier research, less experienced workers cannot solve safety issues that influence their safety performance. They are more susceptible to health injuries because of the absence of familiarity and awareness of proper construction processes and procedures (Karimi et al., 2016). Glazner et al. (2005) reported that inexperience and unsafe act results in 54.4% of health injuries in workers of construction sectors.

The results of the current study reveal that work engagement and employee commitment are primarily enhanced when workers experience a sense of safety and when the supervisor and manager pay intention to the safety of workers. Similarly, Ryan et al. (2021) explain that workers' beliefs, visions, and perceptions influence their behavior towards safety and implement a safety management system. The safety management system may be affected by worker participation and engagement. The incentive to participate in various safety initiatives can strengthen the workers'

beliefs, values, and vision. Furthermore, the probability of an accident is primarily attributed to poor individual behavior practices, the nature of the task, ignorance, and work pressure on the workforce owing to financial and time constraints.

In comparison with the rest of the world, Pakistan's OHS laws and regulations for the construction industry are woefully inadequate. Furthermore, the construction industry lacks safety policies. Trinh et al. (2020) have investigated how a strong safety culture interacts with the complexity of development projects to improve safety performance and worker engagement. The study's findings revealed that the project's technological and environmental complexities negatively impacted safety performance.

LIMITATIONS AND FUTURE RECOMMENDATIONS

The study offers both theoretical and practical contributions. This study may be among early empirical research presenting safety climate as mediators for safety culture & workers' engagement in the construction industry of Pakistan. This study was carried out to evaluate how and in which pattern socio-cognitive factors are linked with safety management aspects such as safety approaches, feedback frequency, strictness, and examine how worker's behavior influences the various risk conditions on the site such as high, modest, and low-risk conditions. This is helpful for managers to understand the worker behavior towards safety aspects. Hence, the working environment and the organization's safety culture vary from domain to domain. Therefore, this study proposes a combined, interdependent, and integrated connection between the safety culture, safety climate, and worker engagement. Exploring the mediating influence of safety climate among safety culture and worker engagement, the present study developed a model for improving workers' safety culture and engagement in the construction site.

Moreover, the investigation results helped to establish a solid framework for creating viable safety management for the executive's intercessions in the development projects of the construction industry. Essentially, the outcomes will verify the significance of the role of the board responsibility, involvement of workers, communication frequency, perspectives, capability, and strong administrative conditions, in accomplishing a positive safety environment. Similarly, it delineates the elements that add to the general safety culture and safety climate or gives detailed safety measurements to create better engagement of workers.

The current research analyzed the influence of safety culture on worker engagement with mediating variable safety climate. However, in future research, other variables may be examined. The significant way for future studies is to evaluate this proposed model in the context of private and public organizations internationally for effective and better acknowledgment and understanding of safety culture in different regions. This research should be repeated to various industries to study workers' behavioral problems. Concurrently, the current research suggests more research at other construction sites in Pakistan to study safety conditions therein. Different studies on a sector where with higher incidence of safety failures can also be conducted.

In terms of safety operations at construction sites, this research suggests that knowledge about construction accidents has to be presented and studied to avoid recurrence of incidents. Pakistan's construction sector lacks access to safety technologies. There is no current safety standard about safety material, making the construction industry more dangerous for workers. That is why the present study recommends that higher standards must be available on the implementation of safety resources, pertaining particularly to the use of helmets, prevention of heatstroke, falls, and equipment-linked injuries. Furthermore, this research suggests that the conceptualization of safety at the construction sites must be modifiable about Pakistan, where the safety policies are still poor. It is necessary to develop theories and models in operations that would be confined to a specific zone. Concurrently, these theories should be supported through particular qualities, beliefs, practices, culture, and the region's behavior.

CONCLUSION

Safety culture affects worker engagement. Safety climate plays a mediating role amongst safety culture and worker engagement. A construction organization's safety climate is an essential factor in developing a safety management system within that organization. The study's findings revealed that supervisors' and workers' perceptions and attitudes are vital influences on an organization's safety culture. Moreover, unskilled workers, their working habits, and work pressure substantially impact an organization's safety climate and safe work behavior.

On the basis of our research findings, we recommend that the construction industry worker should be made aware of safety culture and its possible consequences to sustain a healthy and productive work environment in the construction industry. In addition, this research also represents recommendations linked to information knowledge on the safety operations in the construction site. Hence, the construction industry in developing countries, e.g., Pakistan, requires significant improvements in safety regulations and policies that incorporate policies implementation. In the construction industry, safety laws should be followed with strict compliance. Furthermore, government authorities should monitor safety aspects in the construction industry. Any gaps and issues in the implementation of policy can be detected through this authority, thus ensuring safety compliance and imposition of penalties on violators.

Conclusively, the lack of understanding among workers and managers is an essential factor of influence on worker engagement, and the lack of knowledge, absence of education about the safety measures and standards, age variations with varying levels of awareness, as well as the absence of safety upgrading are all critical variables that affect safety performance. Hence, the construction industry must develop measures and policies to address safety issues arising from these factors, ensuring that an appropriate safety climate and safety culture are nurtured to prevent lapses, loss of life and injuries on the construction sites.

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APPENDIX

Table 4: Item Loadings, Cronbach Aplha, CR, and AVE

Variables	Item	Loading	Cronbach Alpha	Composite Reliability	AVE
Safety Culture	SCU 1	0.720	0.820	0.874	0.584
	SCU 2	0.813			
	SCU 3	0.741			
	SCU 4	0.646			
	SCU 5	0.878			
Safety Climate	SC 1	0.870	0.870	0.906	0.661
	SC 2	0.727			
	SC 3	0.898			
	SC 4	0.797			
	SC 5	0.760			
Workers' Engagement	WE 1	0.636	0.934	0.945	0.660
	WE 2	0.819			
	WE 3	0.864			
	WE 4	0.792			
	WE 5	0.896			
	WE 6	0.745			
	WE 7	0.858			
	WE 8	0.819			
	WE 9	0.934			

Table 5: Discriminant Validity of Constructs

	1	2	3
Safety Culture (SCU)	.764		
Safety Climate (SC)	.734	.813	
Workers' Engagement (WE)	.736	.811	.812

Table 6: Results of Hypotheses Testing

Relationships	Beta	STEDV	t-value	Decision
SCU→SC	0.743	0.003	25.650**	Supported
SC→WE	0.588	0.006	8.509**	Supported
SCU→SC→WE	0.437	0.056	7.845**	Supported