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Mediating Effect of Employee Engagement on the Relationship Between Working Conditions and Performance in UAE Construction

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Abstract

Amid growing concerns over labour productivity and workforce well-being in the construction sector, understanding how workplace conditions translate into performance outcomes has become critical. This study investigates how working conditions influence employee performance in the UAE construction sector, with employee engagement examined as a mediating variable. A quantitative approach was employed, collecting data from 368 migrant construction workers, and the analysis was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM). The findings reveal that working conditions have a significant direct effect on both employee engagement ($\beta = 0.712$, $p < 0.001$) and employee performance ($\beta = 0.470$, $p < 0.001$). Employee engagement also significantly influences performance ($\beta = 0.441$, $p < 0.001$) and mediates the relationship between working conditions and performance (indirect effect $\beta = 0.314$, $p < 0.001$). The presence of both significant direct and indirect effects confirms that employee engagement exerts a partial mediation effect, indicating that while engagement enhances the impact of working conditions on performance, working conditions alone still directly influence performance. The model explains 71.1% of the variance in employee performance, demonstrating high explanatory power. These results suggest that construction firms must address multiple

dimensions of working conditions which are environmental, physical, organizational, and psychological to foster engagement and improve overall workforce outcomes.

Keywords: Employee Engagement, Working Conditions, Employee Performance, Construction Industry

1. Introduction

The construction sector is one of the cornerstones of the United Arab Emirates' (UAE) economic development, employing a large share of the workforce, particularly migrant labourers (Elsayed, 2024). Construction workers play a vital role in shaping the nation's infrastructure, yet they often operate under demanding and suboptimal working conditions that can negatively impact their performance and well-being (Alhajeri, 2011; Alhelo, Alzubaidi, & Rashid, 2023). Despite legal reforms and improved labour regulations in the UAE (Mattar et al., 2024), the industry continues to face challenges in translating these policies into daily workplace practices that support high employee performance (Albattah, Shibeika, & Sami Ur Rehman, 2021).

While favourable working conditions are essential for maintaining workforce stability and productivity, evidence shows that they alone do not guarantee improved performance outcomes (Jaber, 2020). Recent studies emphasize the importance of employee engagement, defined as the emotional and psychological commitment workers exhibit toward their roles, as a mediating factor that enhances the influence of working conditions on performance (Adeleye & Bello, 2025). In high-demand sectors like construction, where tasks are physically intensive and often carried out under extreme environmental conditions, engagement can be a critical buffer that sustains motivation and reduces burnout (Anwar et al., 2025).

Several workplace challenges continue to hinder performance outcomes in the UAE construction industry. Poor working conditions are often associated with low employee morale, higher absenteeism, and elevated turnover rates (Alhajeri, 2011; Albattah et al., 2021). Excessive workloads and inadequate resource allocation contribute to job dissatisfaction and increased stress among workers (Alhelo et al., 2023), while a lack of recognition and insufficient managerial support weakens motivation and commitment to their roles (Jaber, 2020). Critically, the failure to prioritize employee engagement results in low discretionary effort and suboptimal job performance, as workers feel disconnected from their tasks and organization (Adeleye & Bello, 2025). Moreover, the absence of clear and actionable strategies aimed at simultaneously improving working conditions and engagement further diminishes the effectiveness of any performance enhancement initiatives (Ling, Dulaimi, & Ho, 2012).

These issues are exacerbated by a gap between labour policy and practical implementation. Although the UAE has introduced regulations to safeguard worker rights and well-being (Mattar et al., 2024), many construction firms struggle to integrate these requirements into their organizational culture and day-to-day practices (Elsayed, 2024). As a result, the benefits of improved labour laws are not fully realized, and many construction workers continue to experience conditions that hinder their potential.

In an industry marked by rapid development and intense competition for skilled labour, construction companies face mounting pressure to attract and retain qualified employees (Ling et al., 2012). Engaged workers are more likely to remain with their employers, adhere to safety standards, and deliver high-quality work. Conversely, disengaged employees

contribute to workforce instability, inconsistent output, and increased operational costs (Alhelo et al., 2023).

The broader implications of this issue are closely aligned with the UAE's national economic agenda, which prioritizes building a resilient, sustainable, and productive workforce (Elsayed, 2024). As the country continues its transition toward a diversified and knowledge-based economy, enhancing employee performance in key sectors such as construction becomes essential. Improving both working conditions and employee engagement not only supports immediate organizational goals but also advances the UAE's long-term vision of competitiveness and economic sustainability (UAE Ministry of Economy, 2023).

To address these challenges, this study aims to develop and validate a conceptual framework that captures the relationship between working conditions and employee performance, with employee engagement acting as a mediating variable. By focusing specifically on construction workers in the UAE, the research seeks to provide practical, evidence-based insights that can inform workplace policies and interventions in the sector.

2. Literature Review

2.1 Working Conditions Impact on Employee Performance in Construction

Working conditions are a central determinant of employee performance, especially in labour-intensive sectors such as construction. In the context of the United Arab Emirates (UAE), construction workers often operate in complex environments shaped by diverse environmental, physical, organizational, and psychological factors. These components interact to influence how workers experience their jobs and ultimately how effectively they perform.

Environmental factors encompass the external surroundings in which construction work is performed, including weather conditions, exposure to noise, dust, lighting, and the overall safety of the job site. In the UAE, extreme heat, humidity, and other climate-related challenges significantly affect workers' energy levels, concentration, and safety. Poor environmental conditions not only reduce physical well-being but also lower morale and increase turnover rates (Anwar et al., 2025). Ensuring a safe and health-conscious work environment is essential, particularly as heat-related illnesses and work-related musculoskeletal disorders (WMSDs) continue to pose risks on construction sites.

Physical factors refer to the tangible, structural, and ergonomic aspects of the workplace, such as the quality of tools and machinery, workspace layout, and access to resources. A framework supporting safe physical environments such as sufficient lighting, ventilation, and appropriate equipment has been found to reduce injuries and improve productivity (Alhelo, Alzubaidi, & Rashid, 2023). A well-maintained and ergonomically supportive site allows workers to execute tasks more efficiently and with fewer errors or health risks. This physical support structure is especially critical given the demanding nature of construction tasks and the physical strain they impose.

Organizational factors involve workplace policies, managerial structures, job design, and the

broader cultural and operational environment. Strong leadership, transparent communication, and supportive supervision are essential in aligning team objectives and promoting accountability. Alhajeri (2011) emphasized that effective health and safety governance, paired with strong internal policy adherence, is a necessary foundation for operational success and employee well-being in UAE construction projects. Furthermore, firms that invest in internal systems for fair performance appraisal, feedback, and skills development are more likely to retain a stable and high-performing workforce (Mattar et al., 2024).

Psychological factors relate to employees' emotional and mental experiences at work, including their stress levels, resilience, sense of belonging, and job satisfaction. Psychological strain is particularly pronounced among migrant construction workers in the UAE, many of whom report emotional isolation and limited avenues for upward mobility (Elsayed, 2024). When psychological safety and recognition are absent, workers may feel disengaged or demoralized. Conversely, workplaces that foster respect, inclusion, and open communication contribute to stronger emotional commitment and lower rates of burnout (Adeleye & Bello, 2025).

Taken together, these four dimensions, environmental, physical, organizational, and psychological that form the foundation of effective working conditions. When optimized, they lead to improved job satisfaction, reduced absenteeism, and enhanced employee performance. However, neglecting these areas can result in disengagement, lower output, and safety incidents. In the UAE construction industry, where the workforce is predominantly migrant and often faces both physical and social challenges, providing comprehensive and supportive working conditions is not only beneficial but essential to achieving sustainable productivity.

Table 1. List of working condition items

Dimension	Item	Description	Source
Environmental	Heat and climate exposure	Extreme heat and humidity in UAE affect energy levels, concentration, and health.	Anwar et al. (2025)
	Noise, dust, and lighting	Excessive exposure impairs comfort and focus, increasing fatigue and errors.	Anwar et al. (2025)
	Worksite safety	Hazards due to environmental layout and insufficient safeguards.	Anwar et al. (2025)
Physical	Ergonomic workspace and tools	Access to proper tools, well-structured workstations, and safety equipment enhances efficiency.	Alhelo, Alzubaidi, & Rashid (2023)
	Infrastructure and resource access	Availability of materials and space impacts task completion and worker comfort.	Alhelo, Alzubaidi, & Rashid (2023)
Organizational	Leadership and supervision	Supportive managers improve accountability, safety, and performance alignment.	Alhajeri (2011)
	Internal policy and governance	Strong health, safety, and operational policies contribute to worker retention and performance.	Mattar et al. (2024)
	Communication and feedback systems	Transparent communication fosters trust and clarifies performance expectations.	Mattar et al. (2024)
Psychological	Stress and emotional resilience	High workloads, isolation, and lack of emotional support affect mental health.	Elsayed (2024)
	Recognition, inclusion, and belonging	Inclusive culture and respect contribute to emotional engagement and reduce burnout.	Adeleye & Bello (2025)

Table 1 presents ten working condition factors affecting employee performance in the construction sector, grouped into four categories: environmental, physical, organizational, and psychological. That are used in the modelling analysis

2.2 Employee Performance in Construction Work

Employee performance is a fundamental driver of organizational success, particularly in labour-intensive sectors such as construction. In the United Arab Emirates (UAE), where the construction industry is pivotal to the country's rapid development and heavily reliant on migrant labour, optimizing employee performance is essential for timely project delivery, resource efficiency, and sector-wide sustainability.

In the UAE construction context, employee performance is generally determined by three interrelated dimensions: output, productivity, and effectiveness. Output refers to the volume of work completed within a given timeframe, such as the number of tasks executed or milestones achieved. Productivity reflects the efficiency with which resources like time, labour, and materials are used to achieve work outcomes, while effectiveness concerns the

quality, accuracy, and safety of the work performed. These metrics are especially important in high-pressure environments like the UAE, where project deadlines and cost control are critical (Albattah, Shibeika, & Rehman, 2021).

These dimensions are closely influenced by working conditions and organizational support systems. For example, a lack of proper tools or unclear performance expectations can reduce output and delay project timelines. Alhajeri (2011) emphasized that performance in construction projects is significantly impacted by the adequacy of equipment, communication quality, and access to safety measures. Similarly, Mattar et al. (2024) found that legislative changes and resulting organizational uncertainty can affect task execution and workforce efficiency if not properly managed.

Performance monitoring in construction projects typically relies on both quantitative and qualitative approaches. Key Performance Indicators (KPIs) are commonly used to track measurable outputs such as task completion rates, safety compliance, quality control, and adherence to project schedules. These indicators help organizations link individual performance to broader project goals and promote accountability among workers and supervisors (Jaber, 2020). However, quantitative data alone may overlook contextual factors affecting individual contributions.

Therefore, qualitative assessment tools such as supervisor feedback, peer reviews, and 360-degree evaluations are increasingly employed to capture nuanced insights into employee strengths, engagement levels, and development needs. Alhelo, Alzubaidi, and Rashid (2023) support the use of comprehensive performance reviews that factor in interpersonal dynamics, leadership quality, and team cohesion—especially in culturally diverse construction teams.

Technological solutions are also reshaping performance management practices in UAE construction firms. Mobile reporting systems, real-time dashboards, and performance analytics platforms allow for continuous monitoring of workforce progress. These tools improve alignment between individual tasks and overall project requirements, while predictive analytics can highlight emerging performance risks or training gaps (Elsayed, 2024; Anwar et al., 2025).

Despite these innovations, challenges persist particularly in ensuring fairness and inclusivity in performance evaluation. Adeleye and Bello (2025) caution that subjective assessments or inconsistent application of standards may disproportionately affect migrant workers, who already face structural and linguistic barriers. As such, companies must ensure transparency in evaluation processes, provide training for supervisors, and encourage active participation from employees to create a fair and effective performance culture.

Table 2. List of employee performance attributes

Attribute	Description	Source
Task Completion Efficiency	Timely and accurate completion of tasks or milestones assigned to the worker.	Jaber (2020); Ihedigbo et al. (2023)
Work Quality	Accuracy, consistency, and adherence to construction standards and specifications.	Alhelo et al. (2023); Adeleye & Bello (2025)
Productivity Rate	Output produced in relation to input (time, labour, materials).	Abrey & Smallwood (2014); Albattah et al. (2021)
Adaptability	Ability to adjust to new tasks, technologies, or changes in work environment.	Anwar et al. (2025); Elsayed (2024)
Safety Compliance and Awareness	Observance of safety procedures and proactive risk management.	Chi et al. (2013); Alhajeri (2011); Jung et al. (2020)

Table 2 shows five employees performance attributes used in the modelling analysis.

2.3 Employee Engagement in Construction

In the context of the United Arab Emirates (UAE) construction sector, employee engagement has become a crucial mediating factor in explaining how working conditions influence performance outcomes. Engagement is defined as the psychological commitment, motivation, and involvement an employee has toward their work that significantly determines how construction workers perceive and respond to their job environment. Given the UAE's reliance on migrant labour in physically demanding roles, fostering engagement is essential to maintaining both productivity and workforce stability (Othman et al., 2019; Asif, 2022).

The mediating role of employee engagement is particularly evident in environments where working conditions vary greatly. Supportive factors such as safe job sites, adequate equipment, transparent leadership, and effective communication tend to enhance employee engagement, which in turn improves job satisfaction and performance. On the other hand, when working conditions are harsh or poorly managed, workers are more likely to become disengaged, leading to absenteeism, reduced output, and higher turnover (Jaber, 2020; Alhelo, Alzubaidi, & Rashid, 2023).

Leadership plays a pivotal role in shaping employee engagement within construction projects. Supervisors and managers who demonstrate inclusive, supportive, and responsive leadership styles help boost morale, create a sense of belonging, and reinforce motivation among workers. This is particularly important in UAE construction sites, where teams are often multicultural and hierarchically structured. Studies indicate that poor leadership and weak managerial support are major barriers to sustained engagement, particularly under high-pressure project conditions (Albattah, Shibeika, & Rehman, 2021; Wu, Zhang, & Zhang, 2025).

Organizational culture and team dynamics also have a significant impact. A work culture that emphasizes safety, respect, and inclusion contributes to psychological well-being and trust,

encouraging workers to engage more deeply with their tasks. Elsayed (2024) notes that engagement in construction is closely tied to how well organizations accommodate the diverse social and emotional needs of their migrant workforce. Similarly, Meswantri and Ilyas (2018) argue that emotionally supportive environments boost employees' connection to their job roles and foster resilience under stressful conditions.

Additionally, job design is a key element in promoting engagement. Construction roles that offer autonomy, variety, and meaningful challenges tend to yield higher engagement levels. Workers who are allowed to contribute ideas, develop skills, and take ownership of their tasks demonstrate greater discretionary effort, which is directly linked to performance and innovation (Mattar et al., 2024; Othman et al., 2019).

Recognition and development opportunities are also vital. When construction workers receive regular acknowledgment for their efforts and are offered paths for career advancement, they are more motivated to perform at their best. Recognition satisfies emotional needs for achievement and appreciation, while upskilling and growth initiatives strengthen long-term commitment (Alhajeri, 2011; Anwar et al., 2025; Asif, 2022).

Moreover, the physically and psychologically demanding nature of construction work in the UAE that marked by long shifts, heat exposure, and safety risks, makes emotional resilience and engagement critical to sustaining performance. Engaged employees are more likely to manage stress effectively, maintain focus, and support team productivity. As Adeleye and Bello (2025) emphasize, proactive engagement strategies such as regular assessments, feedback systems, and responsive interventions are essential to protect workers' well-being and optimize output.

Table 3. List of employee engagement elements

Element	Description	Source
Leadership Support	Engagement increases when supervisors offer clear guidance, feedback, and emotional backing.	Wu, Zhang, & Zhang (2025)
Recognition & Appreciation	Feeling valued for one's contributions strengthens emotional commitment and work performance.	Asif (2022); Anwar et al. (2025)
Autonomy & Job Design	Workers are more engaged when roles allow decision-making, skill use, and task variety.	Mattar et al. (2024); Meswantri & Ilyas (2018)
Career Development Opportunities	Access to training, upskilling, and clear promotion paths boosts long-term engagement.	Alhajeri (2011); Adeleye & Bello (2025)

Table 3 shows four employee engagement elements used in the modelling analysis

3. Formulation of Conceptual Framework

The conceptual framework of this study as Figure 1 is developed to investigate the influence of working conditions on employee performance, with employee engagement acting as a

mediating variable. It includes ten working condition factors categorized into four groups, environmental, physical, organizational, and psychological, alongside five attributes of employee performance and four core elements of employee engagement. This framework is grounded in three well-established theoretical models: the Job Demands-Resources (JD-R) Model, Social Exchange Theory (SET), and Kahn's Theory of Engagement. Together, these theories provide a robust foundation for analysing the dynamic interaction between work environment, engagement, and performance, particularly in the context of the UAE construction industry.

Working conditions, as the independent variable, encompass the environmental, physical, organizational, and psychological contexts that define the day-to-day realities of construction work. According to the JD-R Model, every occupation has unique job demands and job resources. High job demands, such as heavy workloads, physical exertion, and safety hazards, can result in burnout and health issues, while job resources—such as supervisor support, rest breaks, and safe equipment, promote motivation and sustained engagement (Lesener, Gusy, & Wolter, 2019). In labour-intensive fields like construction, balancing demands with adequate resources is crucial to maintaining productivity and well-being.

Employee performance, the dependent variable, is assessed through indicators such as output, productivity, and effectiveness. Based on Social Exchange Theory, when employees perceive that their employer provides fair treatment, resources, and support, they reciprocate with increased commitment, effort, and job performance (Ahmad et al., 2023). This reciprocal relationship highlights the importance of nurturing favourable working conditions to improve individual and organizational outcomes.

Employee engagement, the mediating variable, reflects an individual's psychological presence, energy, and involvement in their work tasks. Drawing from Kahn's Theory of Engagement, employees become fully engaged when they experience psychological meaningfulness, safety, and availability in the workplace. These elements are particularly critical in the UAE construction industry, where migrant workers face unique emotional and physical demands, language barriers, and culturally diverse environments. Engagement, therefore, serves as a critical channel through which supportive working conditions are translated into higher performance (Singh & Kumar, 2025).

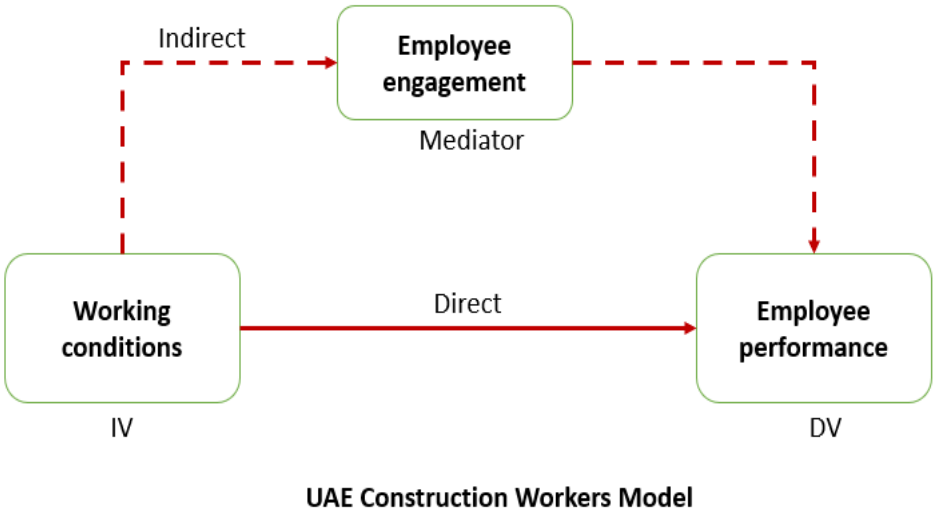

Figure 1. Conceptual Framework Model

4. Methodology

This study investigates the impact of working conditions on employee performance, with a particular emphasis on the mediating role of employee engagement among construction workers in the United Arab Emirates (UAE). To achieve this, a conceptual model was developed to examine both the direct effect of working conditions on employee performance and the indirect effect through employee engagement. A quantitative research design was employed, as it is suitable for testing hypothesized relationships using statistical analysis (Hair et al., 2017; Memon et al., 2021).

Primary data were collected using a structured questionnaire, carefully developed based on validated measurement scales drawn from established literature. The instrument included items that assessed four dimensions of working conditions: environmental, physical, organizational, and psychological, as well as indicators related to employee engagement and employee performance. A five-point Likert scale (ranging from 1 = strongly disagree to 5 = strongly agree) was used to ensure consistency in responses. To accommodate the linguistic diversity of the UAE's predominantly migrant construction workforce, the questionnaire was translated into multiple languages, ensuring accessibility and minimizing response bias (Zeng et al., 2021).

A stratified random sampling technique was employed to ensure broad representation across different job roles and construction categories such as labourers, supervisors, and technical workers. This sampling strategy enhanced both the representativeness and feasibility of the study. A total of 368 valid responses were collected, providing a sufficient sample size for robust statistical analysis (Hair et al., 2019).

Data analysis was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM) with SmartPLS software. This method was selected for its strength in handling

complex models, its suitability for small-to-medium sample sizes, and its predictive orientation, particularly in social science and management research (Sarstedt et al., 2020; Zeng et al., 2021). The analysis involved two key phases. The first phase, measurement model evaluation, assessed the reliability and validity of the constructs, including internal consistency using Cronbach's alpha and Composite Reliability, convergent validity through Average Variance Extracted (AVE), and discriminant validity using both the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio (Henseler et al., 2015; Hair et al., 2019). The second phase, structural model assessment, tested the hypothesized relationships between constructs, focusing on path coefficients, t-values, p-values, and effect sizes (f^2 and R^2), as well as evaluating the mediation effect of employee engagement (Chin, 2009; Cohen, 1988).

This methodological approach ensured a systematic and rigorous evaluation of the conceptual framework. It also enabled the study to generate empirical insights into how working conditions and employee engagement collectively influence performance outcomes in the UAE construction sector.

5. Model Validation

The validation of the conceptual model was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM) via SmartPLS software, a widely adopted technique for research involving complex models with latent constructs and smaller sample sizes (Hair et al., 2017; Memon et al., 2021). This method is particularly valued for its predictive orientation, flexibility with non-normal data, and effectiveness in exploratory theory building (Zeng et al., 2021). Model validation was carried out in two main stages: the measurement model assessment that is to ensure construct reliability and validity and the structural model assessment, which encompassed hypothesis testing and mediation analysis (Hair et al., 2019; Sarstedt et al., 2020).

5.1 Measurement Model Assessment

The measurement model assessment was conducted to ensure the reliability and validity of the constructs. Internal consistency reliability was evaluated using Cronbach's alpha and Composite Reliability (CR), with threshold values of 0.70 or higher indicating acceptable levels of reliability (Hair et al., 2017; Memon et al., 2021). Convergent validity was assessed through the Average Variance Extracted (AVE), where values above 0.50 confirmed that each construct explained at least 50% of the variance in its indicators (Hair et al., 2019). Indicator reliability was further examined by evaluating factor loadings, and items with loadings below 0.70 were reviewed for potential refinement or exclusion (Chin, 2009).

To establish discriminant validity, two complementary approaches were employed: the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT). The Fornell-Larcker criterion was satisfied as the square root of the AVE for each construct exceeded its correlations with other constructs, confirming the uniqueness of each latent variable (Fornell & Larcker, as cited in Hair et al., 2019). Additionally, HTMT values remained below the conservative threshold of 0.85, reinforcing discriminant validity (Henseler, Ringle, & Sarstedt, 2015).

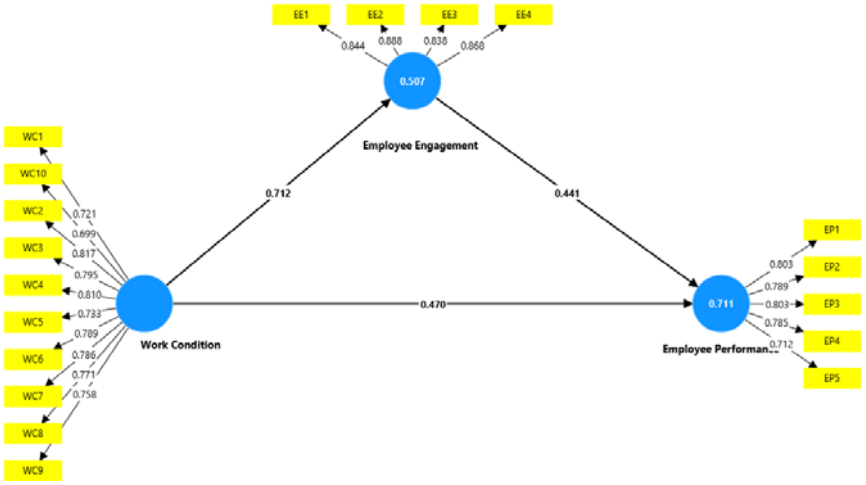

Figure 2. Model after PLS Algorithm procedure

Table 4. Results of Construct reliability and validity

	Cronbach's alpha	Average variance extracted (AVE)
Employee Engagement	0.882	0.739
Employee Performance	0.838	0.607
Work Condition	0.923	0.591

Table 4 presents the construct reliability and validity outcomes for Employee Engagement, Employee Performance, and Work Condition. All constructs demonstrated high internal consistency reliability, as indicated by Cronbach's alpha values exceeding the recommended threshold of 0.70 (Hair et al., 2019; Memon et al., 2021). Specifically, Work Condition reported the highest alpha value (0.923), followed by Employee Engagement (0.882) and Employee Performance (0.838), confirming strong reliability across all constructs.

In terms of convergent validity, the Average Variance Extracted (AVE) values for all constructs met or surpassed the acceptable threshold of 0.50 (Fornell & Larcker, 1981; Henseler et al., 2015). Employee Engagement showed the highest AVE (0.739), indicating that a substantial proportion of variance in the observed items was explained by the latent construct. Employee Performance and Work Condition also demonstrated acceptable AVE values of 0.607 and 0.591, respectively.

These results confirm that the measurement model has satisfactory reliability and convergent validity, supporting the use of these constructs in further structural analysis.

Table 5. Results of HTMT

	Employee Engagement	Employee Performance	Work Condition
Employee Engagement			
Employee Performance	0.892		
Work Condition	0.785	0.880	

Table 5 presents the Heterotrait-Monotrait Ratio (HTMT) values, used to assess discriminant validity among the study constructs. The HTMT criterion, as recommended by Henseler, Ringle, and Sarstedt (2015), suggests that values should be below 0.90 to confirm adequate discriminant validity. In more conservative contexts, a stricter threshold of 0.85 may be used (Hair et al., 2019).

The HTMT value between Employee Engagement and Employee Performance is 0.892, which is within the acceptable limit under the 0.90 threshold, though slightly above the conservative 0.85 cutoff—indicating a strong but distinguishable relationship. The values between Employee Engagement and Work Condition (0.785), and Work Condition and Employee Performance (0.880), are both below the 0.90 threshold, confirming acceptable discriminant validity for these construct pairs.

These results support the conclusion that each construct is empirically distinct, fulfilling the discriminant validity requirement and validating their inclusion in the structural model.

Table 6. Results of Fornell Larcker criterion

	Employee Engagement	Employee Performance	Work Condition
Employee Engagement	0.860		
Employee Performance	0.776	0.779	
Work Condition	0.712	0.784	0.769

Table 6 presents the results of the Fornell-Larcker criterion, a widely used technique to assess discriminant validity in variance-based structural equation modelling. According to this criterion, the square root of the Average Variance Extracted (AVE) for each construct should be greater than its correlations with other constructs in the model (Fornell & Larcker, 1981; Hair et al., 2017). In this study, the square root of AVE for Employee Engagement is 0.860, for Employee Performance is 0.779, and for Work Condition is 0.769. These values exceed the inter-construct correlations, with Employee Engagement correlating at 0.776 with Employee Performance and 0.712 with Work Condition, while Employee Performance correlates at 0.784 with Work Condition. These results confirm that each construct shares more variance with its own indicators than with other constructs, indicating that discriminant validity is well established in the measurement model.

5.2 Structural Model Assessment

This section evaluates the structural model by examining three key aspects. First, model quality is assessed using the R-square (R^2) and f-square (f^2) values to determine the explanatory power and effect sizes within the model. Second, the results of hypothesis testing are presented, including both direct and indirect relationships, based on path coefficients, t-statistics, and p-values. Finally, the predictive relevance of the model is analysed using Q^2 values to evaluate its out-of-sample forecasting capability.

5.2.1 Model Quality

The quality of the structural model was evaluated using R-square (R^2) and f-square (f^2) values generated through the PLS-SEM algorithm. The R^2 values indicate the proportion of variance explained in the endogenous constructs, serving as a key measure of the model's predictive accuracy (Hair et al., 2019; Memon et al., 2021). Higher R^2 values suggest a stronger explanatory power of the model in accounting for the variability in employee engagement and performance outcomes.

The f^2 values assess the effect size of each exogenous variable on the endogenous variables, thereby reflecting the relative contribution strength of each path in the structural model (Sarstedt et al., 2020). Following Cohen's (1988) guidelines, f^2 values of 0.02, 0.15, and 0.35 are interpreted as small, medium, and large effect sizes, respectively. These statistical measures collectively reinforce the robustness and relevance of the proposed model in predicting employee engagement and performance within the UAE construction sector.

Table 7. R-square

	R-square
Employee Engagement	0.507
Employee Performance	0.711

Table 7 presents the R^2 values, reflecting how well the model explains the variance in the endogenous constructs. The R^2 value for Employee Engagement, the mediating variable, is 0.507, indicating that 50.7% of its variance is explained by working conditions. The R^2 value for Employee Performance, the dependent variable, is 0.711, meaning that 71.1% of the variance in performance is jointly explained by both working conditions and employee engagement. These results demonstrate that the model has strong explanatory power, particularly for predicting employee performance in the construction sector.

Table 8. f-square

	Employee Engagement	Employee Performance	Work Condition
Employee Engagement		0.333	
Employee Performance			
Work Condition	1.028	0.378	

Table 8 presents the f^2 effect sizes, which measure the contribution of each exogenous variable to the R^2 value of the endogenous constructs. The f^2 value of 1.028 indicates that Work Condition has a very large effect on Employee Engagement, while the f^2 of 0.378 shows a moderate to large effect of Work Condition on Employee Performance. Additionally, Employee Engagement has a moderate effect (f^2 = 0.333) on Employee Performance. According to Cohen's guidelines, these values confirm that all the relationships in the model have substantial explanatory impact, with Work Condition being a particularly dominant predictor.

5.2.2 Hypothesis Testing

Hypothesis testing was conducted using the bootstrapping technique with 5,000 subsamples to assess the significance of the structural paths within the model (Hair et al., 2019; Memon et al., 2021). This non-parametric resampling procedure is widely recommended in PLS-SEM for testing the statistical significance of path coefficients and ensuring the robustness of the results (Sarstedt et al., 2020). The analysis evaluated the path coefficients and their corresponding p-values for each hypothesized relationship. Figure 3 presents the structural model results following the bootstrapping procedure, highlighting the strength and direction of the validated paths.

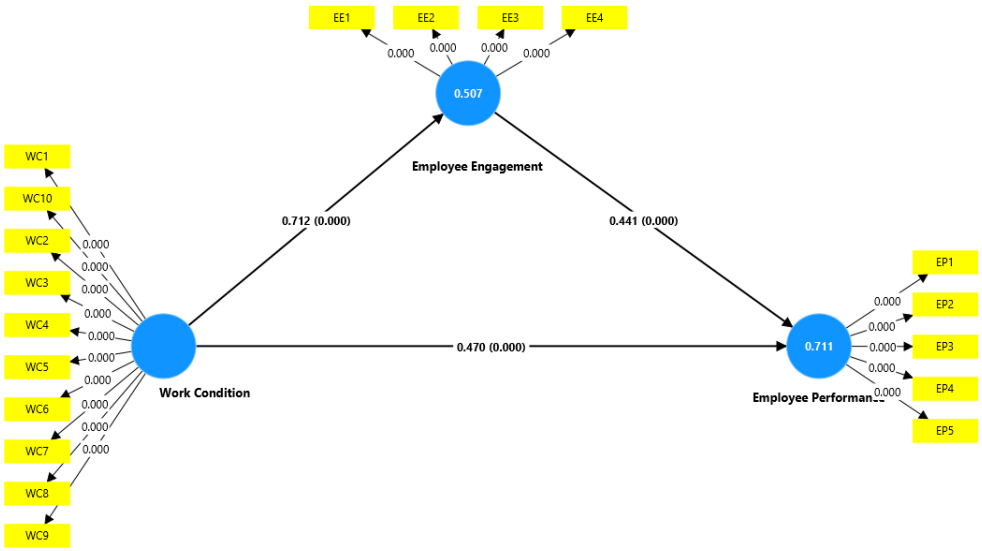

Figure 3. Model after bootstrapping procedure

The results generated from the bootstrapping procedure for both direct and indirect relationships are presented in Tables 9 and 10.

Table 9. Direct relationship

Direct relationship	Path strength	T statistics	P values
Employee Engagement -> Employee Performance	0.441	6.649	0.000
Work Condition -> Employee Engagement	0.712	15.414	0.000
Work Condition -> Employee Performance	0.470	7.448	0.000

The results presented in Table 9 demonstrate that all the direct relationships in the model are statistically significant. First, the path from working conditions to employee engagement shows a strong positive relationship, with a path coefficient of 0.712, a t-statistic of 15.414, and a p-value of 0.000. This indicates that improved working conditions significantly enhance employee engagement. Second, the relationship between employee engagement and employee performance is also significant and positive, with a path coefficient of 0.441, a t-statistic of 6.649, and a p-value of 0.000, suggesting that higher levels of engagement are associated with better performance outcomes. Finally, the direct effect of working conditions on employee performance is confirmed with a path coefficient of 0.470, a t-statistic of 7.448, and a p-value of 0.000, highlighting that favourable working conditions directly contribute to improved performance.

Table 10. Results of indirect relationship

Indirect relationship	Path strength	T statistics	P values
Work Condition -> Employee Engagement -> Employee Performance	0.314	6.147	0.000

The results in Table 10 show a statistically significant indirect relationship between working conditions and employee performance through employee engagement, with a path coefficient of 0.314 ($t = 6.147$, $p < 0.001$). This confirms that employee engagement plays a mediating role, meaning that improved working conditions not only directly enhance performance but also indirectly do so by fostering greater engagement. Together with the significant direct effects reported in Table 9, these findings provide strong empirical support for the proposed mediation model.

5.2.3 Predictive Relevance

The predictive relevance of the model was assessed using Stone-Geisser's Q^2 value, obtained through the blindfolding procedure in Partial Least Squares Structural Equation Modelling (PLS-SEM). Q^2 values assess how well the model can predict the data of omitted

("blindfolded") cases and are widely used to evaluate the out-of-sample predictive accuracy of endogenous constructs. According to Chin (2009) and Hair et al. (2019), a Q^2 value greater than zero indicates that the model exhibits predictive relevance for a specific endogenous variable. This method is particularly valuable in complex models where both theoretical soundness and empirical accuracy are necessary for validation (Sarstedt et al., 2020; Zeng et al., 2021). As such, the use of Q^2 strengthens the evaluation of this model's robustness and generalizability in the context of employee engagement and performance in the UAE construction sector.

Table 11. CCVR

	SSO	SSE	Q^2 (=1-SSE/SSO)
Employee Engagement	1592.000	1003.696	0.370
Employee Performance	1990.000	1160.218	0.417
Work Condition	3980.000	3980.000	0.000

Table 11 presents the cross-validated redundancy (Q^2) values, which assess the predictive relevance of the endogenous constructs in the structural model. The Q^2 value for Employee Engagement is 0.370, and for Employee Performance, it is 0.417, indicating that both constructs demonstrate good predictive relevance. According to Hair et al. (2019) and Chin (2009), a Q^2 value greater than zero confirms that the model has predictive power for the corresponding constructs. In contrast, the Q^2 value for Work Condition is 0.000, which is expected, as it is an exogenous variable and not predicted by any other construct in the model. These findings are consistent with guidelines presented by Cohen (1988) and Hair et al. (2017), who noted that Q^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large predictive relevance, respectively. Therefore, the model meaningfully explains variance in both employee engagement and performance within the UAE construction sector, supporting its applicability and robustness (Memon et al., 2021; Aburumman et al., 2022; Zeng et al., 2021).

Table 12. CCVM

	SSO	SSE	Q^2 (=1-SSE/SSO)
Employee Engagement	1592.000	711.854	0.553
Employee Performance	1990.000	1181.192	0.406
Work Condition	3980.000	1999.152	0.498

Table 12 displays the Q^2 values derived from the cross-validated communality (CCVM) analysis, which evaluates the model's predictive accuracy at the measurement level. The Q^2 value for Employee Engagement is 0.553, indicating a high level of predictive relevance for

this construct. Employee Performance has a Q^2 of 0.406, suggesting a moderate but meaningful predictive capability. Additionally, Work Condition shows a Q^2 value of 0.498, which reflects strong predictive relevance, particularly for an exogenous construct.

According to Hair et al. (2019) and Chin (2009), Q^2 values greater than zero demonstrate that the model has predictive relevance for a given endogenous construct. Furthermore, values above 0.35 are considered strong, between 0.15–0.35 are moderate, and values between 0.02–0.15 are weak (Cohen, 1988; Hair et al., 2017). Therefore, these results confirm that the measurement model has substantial predictive power for all three constructs, reinforcing the robustness of the model in capturing key dynamics within the UAE construction sector (Memon et al., 2021; Aburumman et al., 2022; Zeng et al., 2021).

6. Conclusion

This study investigated the impact of working conditions on employee performance in the UAE construction sector, emphasizing the mediating role of employee engagement. The objective was to understand how key elements of the work environment including environmental, physical, organizational, and psychological factors that influence performance outcomes, and how employee engagement can strengthen this relationship. A quantitative approach was adopted, using a structured questionnaire distributed to 368 construction workers across various occupational roles. The instrument measured perceptions of working conditions, engagement levels, and performance outcomes. Data were analysed using Partial Least Squares Structural Equation Modelling (PLS-SEM) via SmartPLS software.

The measurement model demonstrated strong internal consistency (Cronbach's alpha ranging from 0.838 to 0.923) and good convergent validity (AVE values exceeding 0.591). Discriminant validity was established through the Fornell-Larcker and HTMT criteria. Structural model results showed that working conditions had a significant direct effect on employee performance ($\beta = 0.470$, $p < 0.001$) and employee engagement ($\beta = 0.712$, $p < 0.001$). Additionally, employee engagement significantly influenced performance ($\beta = 0.441$, $p < 0.001$) and mediated the relationship between working conditions and performance (indirect effect $\beta = 0.314$, $p < 0.001$). The model explained 71.1% of the variance in employee performance ($R^2 = 0.711$) and 50.7% in employee engagement ($R^2 = 0.507$), with Q^2 values indicating high predictive relevance.

This study provides practical implications for construction companies in the UAE. Improving working conditions—such as enhancing site safety, supporting workers' psychological well-being, providing adequate equipment, and promoting clear leadership that can directly improve employee engagement and, in turn, boost performance. These findings highlight the need for proactive workforce management strategies that prioritize both the physical and emotional needs of construction workers to sustain productivity and reduce turnover in a labour-intensive industry.

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