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Top Management Support Moderates the Relationship Between Task Complexity and Emotional Labor Towards Cognitive Work Engagement

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Abstract: This study examines the relationships among task complexity, emotional labor, cognitive work engagement, and top management support in the construction industry. Drawing on the Job Demands–Resources (JD–R) framework, the study investigates whether emotional labor mediates the relationship between task complexity and cognitive work engagement and whether top management support moderates these relationships. Data were collected through a survey of 264 laborers and supervisors employed in public and private construction organizations in Islamabad and Rawalpindi, Pakistan. The findings indicate that task complexity significantly increases emotional labor and cognitive work engagement. Emotional labor negatively affects cognitive work engagement and partially mediates the relationship between task complexity and engagement. Furthermore, top management support significantly moderates the relationship between task complexity and emotional labor, reducing the adverse effects of complex work demands and enhancing employee engagement. The findings highlight the importance of supportive leadership in helping employees manage emotional demands and remain cognitively engaged in challenging work environments. This study extends the JD–R framework by demonstrating the combined roles of emotional labor and top management support in shaping employee engagement within project-based organizations.
Keywords: Project Complexity, Emotional Labor, Cognitive Work Engagement, Top Management Support, Construction Industry, Employee Well-being.

1. Introduction

The construction industry operates in increasingly complex and dynamic environments where employees must manage sophisticated tasks, uncertainty, stakeholder pressures, and interdependent work activities. Modern construction projects involve advanced technologies, multiple stakeholders, strict deadlines, and rapidly changing project requirements, all of which increase the complexity of employees' work responsibilities. Task complexity has therefore emerged as a significant organizational challenge, requiring employees to process large amounts of information, solve intricate problems, and make effective decisions under pressure. As project complexity increases, employees must invest greater cognitive effort to maintain performance and achieve project objectives.

Cognitive work engagement is a critical factor in organizational success because it reflects employees' mental focus, concentration, and psychological involvement in their work activities. Highly engaged employees demonstrate greater creativity, problem-solving ability, productivity, and commitment to organizational goals. In project-based industries such as construction, maintaining cognitive work engagement is particularly important because employees frequently encounter uncertainty, changing priorities, and demanding workloads. However, sustaining high levels of cognitive engagement in complex work environments remains challenging due to the growing cognitive and emotional demands of project execution. Managing complex tasks often requires more than cognitive effort alone. Employees must also regulate their emotions to meet organizational expectations and maintain effective workplace interactions. According to Hochschild (1983), emotional labor refers to the management of emotional expressions to conform to professional requirements. Employees may be required to display confidence, suppress frustration, manage stress, and maintain positive

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interactions despite challenging circumstances. Emotional labor is generally performed through two primary strategies: surface acting, which involves displaying emotions that are not genuinely felt, and deep acting, which involves modifying internal feelings to align with expected emotional displays. These emotional regulation strategies significantly influence employee well-being, job commitment, and workplace performance (Brotheridge & Lee, 2020; Zhao & Zhang, 2020).

The relationship between task complexity and emotional labor is particularly relevant in the construction industry, where employees frequently encounter demanding work situations characterized by uncertainty, risk, and interpersonal challenges. High levels of task complexity often intensify emotional demands, requiring workers to manage stress while maintaining productivity and professionalism. Although emotional labor can contribute positively to workplace effectiveness and service quality, excessive emotional regulation may deplete psychological resources, resulting in emotional exhaustion, reduced cognitive engagement, and lower job performance. Consequently, understanding the mechanisms through which emotional labor influences cognitive work engagement is essential for improving employee effectiveness and organizational outcomes.

Top management support represents an important organizational resource that can help employees cope with both cognitive and emotional demands. Supportive leadership provides employees with access to resources, guidance, recognition, empowerment, and opportunities for professional development. Previous studies have demonstrated that effective management support enhances emotional resilience, improves work performance, and reduces workplace stress (Chen & Ployhart, 2021; Emmerik & Kluijtmans, 2008; Huang & Hu, 2019; Liu & Choi, 2022; Shafiq et al., 2023). Within construction projects, senior leaders play a critical role in creating supportive work environments that enable employees to manage demanding tasks while maintaining high levels of engagement. Through effective communication, resource allocation, and employee support, top management can strengthen employees' capacity to cope with workplace challenges and sustain their psychological investment in work.

The theoretical foundation of this study is grounded in Emotional Labor Theory (Hochschild (1983) and the Job Demands–Resources (JD–R) framework. Emotional Labor Theory explains how employees regulate emotions to meet workplace expectations and how such emotional regulation may affect psychological outcomes. The JD–R framework suggests that job demands, such as task complexity, require sustained physical and psychological effort and may lead to strain when adequate resources are unavailable. Conversely, job resources, including top management support, help employees cope with demanding work conditions, reduce stress, and promote engagement. Together, these theoretical perspectives provide a useful framework for understanding how task complexity, emotional labor, cognitive work engagement, and top management support interact within construction environments.

Despite the growing body of literature on task complexity, emotional labor, and work engagement, these constructs have often been examined independently. Previous studies have generally focused on the direct effects of project complexity on employee outcomes or have investigated emotional labor and work engagement separately. Limited research has explored emotional labor as a mediating mechanism linking task complexity to cognitive work engagement, particularly within project-based industries such as construction. Furthermore, the moderating role of top management support in these relationships remains insufficiently understood Huang and Hu (2019); Torkildsen and Lira (2021). Addressing these gaps is important because employees working in complex project environments frequently face both cognitive and emotional challenges that can affect their engagement and performance.

Accordingly, this study investigates the relationships among task complexity, emotional labor, cognitive work engagement, and top management support within the construction industry. Specifically, the study examines how task complexity influences emotional labor and cognitive work engagement, evaluates the mediating role of emotional labor, and assesses the moderating effect of top management support. By examining these interconnected relationships, the study contributes to a deeper understanding of employee behavior in complex project environments and extends existing knowledge regarding the mechanisms through which organizational resources influence employee engagement.

The findings are expected to provide both theoretical and practical contributions. Theoretically, the study extends the application of the JD–R framework and Emotional Labor Theory within the construction context by integrating task complexity, emotional labor, cognitive work engagement, and top management support into a single framework. Practically, the study offers insights for construction managers and organizational leaders seeking to reduce emotional strain, strengthen employee resilience, and enhance cognitive work engagement. Ultimately, the research contributes to the development of management practices that help organizations navigate project complexity while maintaining a productive, engaged, and resilient workforce.

2. Literature Review

2.1 Task Complexity

Task complexity has become an increasingly important topic in organizational and project management research due to the growing integration of advanced technologies, complex procedures, and dynamic environmental conditions across industries. Modern projects often require employees to process large volumes of information, coordinate multiple activities, solve complex problems, and make decisions under conditions of uncertainty. As organizations operate in increasingly competitive and rapidly changing environments, understanding the effects of task complexity on employee behavior, performance, and project outcomes has become essential. Previous research suggests that the successful execution of complex projects depends not only on technical expertise but also on organizational resources, leadership effectiveness, and employees' ability to adapt to changing work demands.

The foundation of task complexity research was established by Baccarini (1996) and Williams (2002), who identified technical and structural complexity as the two primary dimensions of project complexity. Technical complexity refers to difficulties associated with technology, specialized knowledge, and technical processes, whereas structural complexity involves the number of interconnected activities, stakeholders, and relationships within a project. Williams (2002) further argued that project complexity increases as interdependencies among tasks become more extensive, creating challenges for planning, coordination, communication, and decision-making. These early contributions provided an important framework for understanding how different forms of complexity influence project management and employee performance.

Contemporary perspectives on project complexity increasingly draw upon Complexity Theory and Systems Theory. Complexity Theory emphasizes adaptability, learning, and flexible decision-making in environments characterized by uncertainty and non-linear relationships. In contrast, Systems Theory focuses on the interconnected nature of project components and highlights the importance of understanding interactions among organizational processes, stakeholders, and resources. Together, these theoretical perspectives suggest that project complexity should not be viewed solely as a technical challenge but also as an organizational and behavioral phenomenon that influences employees' cognitive and emotional experiences. Consequently, organizations are required to adopt adaptive management practices and provide sufficient support mechanisms to help employees navigate increasingly complex work environments.

In project-based industries such as construction, task complexity is particularly pronounced due to the involvement of multiple stakeholders, regulatory requirements, technological innovations, resource constraints, and environmental uncertainties. Construction employees frequently face demanding situations that require continuous problem-solving, coordination, and decision-making while maintaining project quality and safety standards. These conditions increase both cognitive and emotional demands, potentially affecting employees' engagement, well-being, and job performance. As complexity increases, employees must invest greater mental effort to maintain focus and effectively perform their responsibilities. Therefore, task complexity has emerged as an important antecedent of employee attitudes and workplace behaviors, making it a critical variable for understanding emotional labor and cognitive work engagement within construction environments Baccarini (1996) and Williams (2002).

2.2 Emotional Labor

Emotional labor is an important component of workplace behavior that involves regulating and managing emotions to meet organizational expectations and professional requirements. The concept was first introduced by Hochschild (1983), who defined emotional labor as the process through which employees manage emotional

expressions during workplace interactions. In many occupations, employees are expected to display specific emotions, such as confidence, empathy, patience, and professionalism, regardless of their actual feelings. Emotional labor is commonly performed through two strategies: surface acting, which involves displaying emotions that are not genuinely felt, and deep acting, which involves modifying internal feelings to align with expected emotional expressions. These emotional regulation processes significantly influence employee well-being, job satisfaction, and workplace performance.

The importance of emotional labor has increased in contemporary work environments characterized by high levels of complexity, uncertainty, and interpersonal interaction. Employees working in sectors such as healthcare, customer service, technology, and construction are frequently required to regulate their emotions while managing demanding tasks and stakeholder expectations. Gao and Zhang (2024) identified deep acting as an effective emotional regulation strategy that helps employees cope with challenging work situations. Their findings suggest that effective emotional management reduces workplace stress, improves employee engagement, and enhances overall productivity. Similarly, Nubuor (2024) reported that emotional regulation strategies strengthen employee commitment and adaptability even under increasing job demands.

Research has consistently shown that emotional labor can produce both positive and negative outcomes. On the positive side, effective emotional regulation contributes to improved workplace relationships, enhanced service quality, and greater employee effectiveness. However, excessive emotional labor may lead to emotional exhaustion, burnout, and psychological strain. Majeed et al. (2023) found that inadequate emotional support and insufficient training increase employees' vulnerability to emotional fatigue, particularly in emotionally demanding professions. Likewise, evidence from healthcare settings demonstrates that employees who experience prolonged emotional demands are more likely to suffer from stress and burnout when organizational support mechanisms are weak.

The relationship between emotional labor and work engagement has also received considerable attention in recent years. Xanthopoulou et al. (2022) found that employees operating under supportive leadership are better able to manage emotional demands and maintain higher levels of engagement. In contrast, inadequate organizational support increases emotional strain and reduces employee motivation. Similarly, Chen et al. (2021) emphasized the role of leadership support in facilitating emotional regulation within technology-driven and agile project environments. Their findings suggest that leadership support provides employees with psychological security, resources, and guidance that enhance their ability to cope with emotional demands.

Within the construction industry, employees regularly encounter stressful situations involving uncertainty, time pressure, stakeholder conflicts, and project risks. These conditions increase emotional demands and require employees to engage in emotional regulation while maintaining performance and professionalism. Consequently, emotional labor represents an important mechanism through which task complexity may influence employee outcomes. Understanding the role of emotional labor is therefore essential for explaining variations in cognitive work engagement and for identifying organizational practices that help employees effectively manage workplace demands. This study consequently examines emotional labor as a key mediating mechanism linking task complexity and cognitive work engagement.

2.3 Top Management Support

Top management support (TMS) is widely recognized as a critical organizational resource that influences employee attitudes, behaviors, and performance outcomes. It refers to the extent to which senior leaders provide employees with the resources, guidance, recognition, and encouragement necessary to perform their jobs effectively. In increasingly complex work environments, top management support plays a vital role in helping employees cope with workplace demands and maintain high levels of motivation and engagement. Effective leadership creates a supportive organizational climate that promotes employee well-being, facilitates problem-solving, and strengthens organizational commitment.

The importance of top management support is highlighted within the Job Demands–Resources (JD–R) framework, which identifies organizational resources as key factors that help employees manage job demands and sustain work engagement (Schaufeli & Bakker, 2004). Supportive leadership can reduce workplace stress by providing employees with clear direction, timely feedback, adequate resources, and opportunities for

professional development. As a result, employees are better equipped to manage both cognitive and emotional challenges while maintaining productivity and job satisfaction.

Recent studies provide substantial evidence regarding the positive effects of top management support on employee outcomes. Majeed et al. (2023) reported that employees were better able to handle complex work situations when managers provided emotional support, adequate resources, and constructive feedback. Their findings demonstrated that management support improves employee engagement and performance by reducing workplace stress and strengthening employees' coping capabilities. Similarly, Ayertey Nubuor et al. (2024) found that top management support plays a central role in addressing complexity-related challenges within construction projects. Employees who perceived stronger leadership support experienced lower levels of stress and higher levels of engagement compared to those working under less supportive management structures.

Evidence from construction and engineering projects further demonstrates the value of top management support. Liu and Choi (2024) found that managerial support helps employees cope with stakeholder pressures, regulatory challenges, and project uncertainty by providing psychological and emotional resources. Likewise, Xanthopoulou et al. (2022) showed that leadership support moderates the adverse effects of emotional labor by helping employees manage emotional demands more effectively. Employees who receive strong managerial support are generally more resilient and better able to maintain work engagement despite challenging work conditions.

In technology-driven and agile project environments, top management support has also been identified as a critical mechanism for managing complexity and sustaining employee performance. Chen and Ployhart (2021) reported that employees demonstrate higher commitment and effectiveness when leaders provide strategic guidance, decision-making authority, and emotional encouragement during demanding project phases. These findings suggest that top management support functions not only as a resource that directly improves employee outcomes but also as a protective factor that buffers the negative effects of workplace stressors.

Given the complex and demanding nature of construction projects, top management support is particularly important for helping employees manage both cognitive and emotional demands. Supportive leadership can reduce emotional strain, enhance employee resilience, and strengthen engagement in challenging work environments. Therefore, top management support is expected to play a moderating role in the relationship between task complexity, emotional labor, and cognitive work engagement, making it an essential component of the present study.

2.4 Cognitive Work Management

Cognitive work engagement refers to the degree of mental focus, concentration, and psychological involvement that employees devote to their work activities. It represents an important dimension of overall work engagement and reflects employees' willingness to invest cognitive resources in accomplishing organizational objectives. Cognitive engagement enables employees to remain attentive, absorb work-related information, solve problems effectively, and maintain persistence when facing challenging tasks. In increasingly complex work environments, cognitive work engagement has become a critical determinant of employee performance, innovation, and organizational success.

The concept of work engagement was extensively developed by (Schaufeli & Bakker, 2004), who identified vigor, dedication, and absorption as its primary dimensions. Vigor reflects high levels of mental energy and resilience, dedication represents employees' sense of significance and enthusiasm toward work, and absorption refers to deep concentration and immersion in work activities. Together, these dimensions contribute to cognitive engagement by enabling employees to sustain attention, maintain motivation, and effectively perform their responsibilities despite workplace challenges.

Recent studies have highlighted the importance of cognitive work engagement across various organizational settings. Gao and Zhang (2024) emphasized that effective cognitive management practices, including knowledge sharing, continuous learning, and time management, strengthen employees' ability to cope with

demanding work conditions. Their findings suggest that employees who effectively manage cognitive demands demonstrate higher levels of commitment, engagement, and job performance. Similarly, Ayertey Nubuor et al. (2024) reported that cognitive engagement is essential for managing complex construction projects, where employees must coordinate multiple activities, solve unexpected problems, and interact with diverse stakeholders.

The Job Demands–Resources (JD–R) model provides an important theoretical explanation for cognitive work engagement (Bakker & Demerouti, 2007). According to this framework, job resources such as organizational support, leadership guidance, and professional development opportunities enhance employee engagement by helping individuals cope with demanding work conditions. Conversely, excessive job demands may deplete employees' psychological resources and reduce their capacity to remain cognitively engaged. Therefore, maintaining an appropriate balance between job demands and organizational resources is essential for sustaining employee engagement.

Previous research also suggests that cognitive work engagement is influenced by both emotional and organizational factors. Majeed et al. (2023) found that supportive work environments, training opportunities, and effective managerial practices help employees maintain cognitive focus during high-pressure situations. Similarly, Liu and Choi (2024) demonstrated that employees who receive strategic guidance, emotional support, and timely feedback from management are better able to manage their cognitive workload and remain engaged in complex projects. These findings highlight the important role of leadership support in fostering employee concentration, commitment, and performance.

Emotional labor also plays an important role in shaping cognitive work engagement. Employees who effectively regulate their emotions are generally better able to allocate cognitive resources to work-related activities, whereas excessive emotional strain may lead to mental exhaustion and reduced engagement. Xanthopoulou et al. (2022) found that employees who receive emotional support and possess strong emotional regulation capabilities are more likely to maintain focus and productivity in demanding work environments. Likewise, Chen et al. (2021) reported that leadership support enhances cognitive engagement by reducing emotional burdens and helping employees manage rapidly changing project requirements.

Within the construction industry, cognitive work engagement is particularly important because employees regularly face uncertainty, time pressures, technical challenges, and stakeholder demands. Maintaining high levels of mental focus and commitment is therefore essential for ensuring project success and organizational performance. Given the cognitive and emotional demands associated with complex project environments, understanding the factors that influence cognitive work engagement is critical. Consequently, cognitive work engagement serves as the primary outcome variable in this study, linking task complexity, emotional labor, and top management support within a unified theoretical framework.

2.5 Theoretical Orientation for the study

This study is grounded in the Job Demands–Resources (JD–R) framework (Bakker & Demerouti, 2007) and Emotional Labor Theory Hochschild (1983). The JD–R framework proposes that employee outcomes are shaped by the interaction between job demands and job resources. Job demands require sustained physical and psychological effort and may lead to stress and exhaustion when excessive, whereas job resources help employees cope with demands and maintain engagement. In the context of construction projects, task complexity represents a significant job demand, while top management support functions as an important organizational resource. Emotional Labor Theory further explains how employees regulate their emotions to meet workplace expectations and how such regulation influences psychological well-being and work-related outcomes.

2.6 Hypothesis Development

Task Complexity and Cognitive Work Engagement

Construction projects are inherently complex, involving multiple stakeholders, technical challenges, uncertainty, and interdependent activities. Employees working in such environments are often required to devote substantial mental effort to planning, coordination, and problem-solving. Although excessive complexity may create stress, challenging tasks can also stimulate learning, motivation, and psychological involvement in work. Employees who successfully manage complex assignments often experience a stronger

sense of accomplishment and engagement. Previous studies suggest that challenging job demands can enhance employee engagement when individuals possess adequate resources to cope with those demands ((Hakanen et al., 2008); Maylor (2010)).

H1: Task complexity significantly influences cognitive work engagement.

Task Complexity and Emotional Labor

Task complexity not only increases cognitive demands but also intensifies emotional demands. Employees working on complex projects frequently encounter uncertainty, stakeholder conflicts, time pressures, and unexpected challenges that require emotional regulation. According to Emotional Labor Theory, employees often suppress negative emotions and display professionally appropriate behaviors despite stressful circumstances Hochschild (1983). As project complexity increases, employees are likely to invest greater emotional effort in maintaining workplace effectiveness and interpersonal relationships.

H2: Task complexity significantly influences emotional labor.

Emotional Labor and Cognitive Work Engagement

Emotional labor plays an important role in shaping employee engagement. While effective emotional regulation may help employees maintain professional behavior and workplace relationships, excessive emotional labor can deplete psychological resources and contribute to emotional exhaustion. Employees experiencing high levels of emotional strain may have fewer cognitive resources available for concentration and task performance. Previous studies have reported that emotional exhaustion negatively affects employee engagement and workplace effectiveness (Brotheridge & Lee, 2003).

H3: Emotional labor significantly influences cognitive work engagement.

The Mediating Role of Emotional Labor

The JD–R framework suggests that job demands influence employee outcomes through psychological mechanisms. In construction environments, task complexity may increase emotional demands, which subsequently affect employees' cognitive engagement. Employees facing highly complex tasks often experience increased emotional pressure associated with uncertainty, workload, and stakeholder expectations. These emotional demands may partially explain how task complexity influences engagement outcomes. Therefore, emotional labor is expected to function as an important mediating mechanism between task complexity and cognitive work engagement.

H4: Emotional labor mediates the relationship between task complexity and cognitive work engagement.

The Moderating Role of Top Management Support

Top management support represents a critical organizational resource that can help employees cope with demanding work conditions. Supportive leadership provides guidance, resources, recognition, and emotional encouragement that reduce workplace stress and enhance employee resilience. According to the JD–R framework, organizational resources can buffer the negative effects of job demands on employee outcomes. Employees who perceive strong support from senior management are likely to manage emotional demands more effectively and maintain higher levels of cognitive engagement despite complex work conditions (Chen & Ployhart, 2021; Liu & Choi, 2024).

H5: Top management support moderates the relationship between task complexity and emotional labor in influencing cognitive work engagement.

Figure 1 presents the conceptual framework illustrating the relationships among task complexity, emotional labor, cognitive work engagement, and top management support.

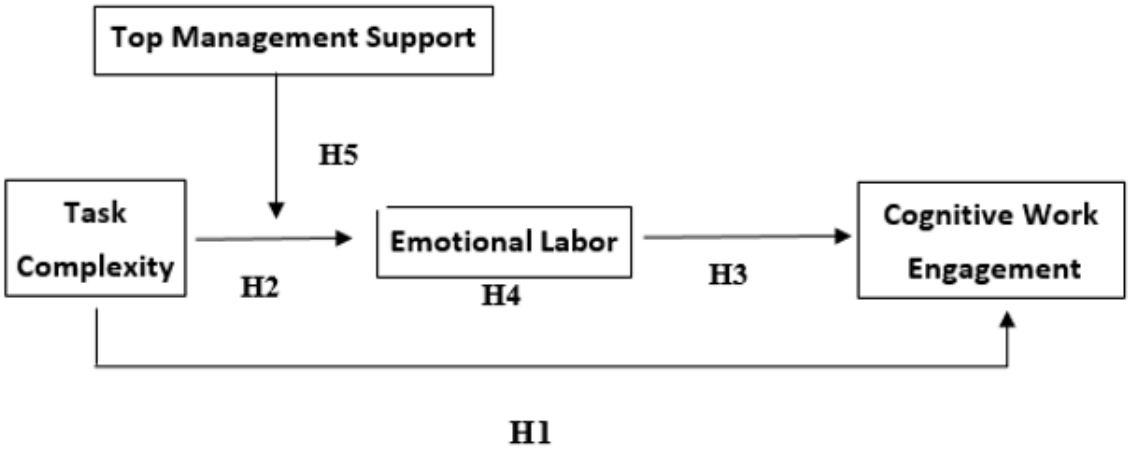

Figure 1: Conceptual framework of hypothesis development

3. Method

3.1 Population and Sample Size

The target population of this study consisted of laborers and supervisors employed in public and private construction companies operating in Islamabad and Rawalpindi, Pakistan. These cities were selected because they represent major centers of construction activity and provide access to a diverse workforce involved in complex construction projects. Including both laborers and supervisors enabled the collection of perspectives from employees occupying different organizational roles and responsibilities.

The required sample size was determined using the Krejcie (1970) sampling approach, which is widely used in social science research. Based on this approach, a total of 264 valid responses were obtained and included in the final analysis. The sample size was considered adequate for examining the relationships among task complexity, emotional labor, cognitive work engagement, and top management support.

3.2 Data Collection and Measures

Data were collected using a structured questionnaire administered through both physical distribution and online Google Forms. This mixed distribution approach was adopted to improve response rates and increase coverage of construction professionals across the selected study locations. Participation was voluntary, and respondents were assured of the confidentiality and anonymity of their responses.

All study constructs were measured using previously validated scales adopted from the literature. The questionnaire consisted of closed-ended items measured on a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. The survey instrument measured four constructs: task complexity, emotional labor, top management support, and cognitive work engagement. Details of the measurement scales and their sources are presented in Table 1.

Table 1: Data collection and measurement

Construct	Source of Scale	No. of items
Task Complexity	He et al. (2015)	12
Emotional Labor	Kruml and Geddes (2000)	06
Top Management Support	Premkumar et al. (1994)	04
Cognitive Work Engagement	May et al. (2015)	03
Total		25

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3.3 Reliability and Validity

The reliability and validity of the measurement model were assessed before testing the structural relationships. Internal consistency reliability was evaluated using Cronbach's alpha and Composite Reliability (CR). All constructs exceeded the recommended threshold value of 0.70, indicating satisfactory reliability. Convergent validity was assessed using factor loadings and Average Variance Extracted (AVE). The results showed that all factor loadings were significant and exceeded the recommended threshold, while AVE values were above 0.50, confirming adequate convergent validity. These findings indicate that the measurement scales reliably and accurately captured the constructs of task complexity, emotional labor, top management support, and cognitive work engagement.

3.4 Common Method Bias

Because the study relied on self-reported survey data collected from a single source, common method bias (CMB) was assessed. Procedural remedies were implemented during questionnaire design, including assuring respondents of anonymity and confidentiality to reduce evaluation apprehension and response bias. In addition, Harman's single-factor test was conducted to examine the presence of common method variance. The results indicated that no single factor accounted for the majority of the total variance, suggesting that common method bias was not a significant concern in this study. Therefore, the observed relationships among the study variables are unlikely to be substantially affected by common method variance

4. Results and Discussion

4.1 Demography

Table 1 presents the demographic characteristics of the respondents. Of the 264 participants, 86.4% were male and 13.6% were female, reflecting the male-dominated nature of Pakistan's construction industry. The majority of respondents were between 20 and 40 years old, indicating a workforce composed primarily of early- and mid-career professionals.

Educational backgrounds were relatively diverse, with respondents holding matriculation, intermediate, bachelor's, and postgraduate qualifications. In terms of professional experience, most participants reported substantial industry experience, with approximately 80% having more than 10 years of work experience. The diversity in age, education, and experience enhances the sample's representativeness and provides a suitable basis for examining the relationships among task complexity, emotional labor, top management support, and cognitive work engagement.

4.2 Correlation Analysis

Table 2 presents the Pearson correlation coefficients among task complexity (TC), emotional labor (EL), top management support (TMS), and cognitive work engagement (CWE). The results indicate significant positive relationships among all study variables. Task complexity was strongly correlated with emotional labor ($r = 0.891$, $p < 0.01$) and cognitive work engagement ($r = 0.909$, $p < 0.01$), suggesting that employees facing more complex tasks experience greater emotional demands and higher levels of cognitive engagement.Similarly, top management support exhibited strong positive relationships with emotional labor ($r = 0.930$, $p < 0.01$) and cognitive work engagement ($r = 0.871$, $p < 0.01$). In addition, task complexity was positively associated with top management support ($r = 0.815$, $p < 0.01$). Overall, the correlation results provide preliminary evidence supporting the proposed relationships among the study variables and justify further hypothesis testing through structural model analysis.

Table 2: The correlation analysis of both Emotional Labor (EL) and Cognitive Work Engagement (CWE)

Variables	TC	EL	TMS	CWE
TC	1.000			
EL	.891**	1.000		
TMS	.815**	.930**	1.000	
CWE	.909**	.922**	.871**	1.000

TC = Task Complexity
EL = Emotional Labor
TMS = Top Management Support
CWE = Cognitive Work Engagement

4.3 Hypothesis Testing

Table 3 presents the results of hypothesis testing. The findings indicate that task complexity has a significant positive effect on cognitive work engagement ($\beta = 0.264$, $p < 0.001$), supporting H1. This result suggests that employees facing more complex tasks tend to demonstrate higher levels of cognitive engagement. Challenging work assignments may stimulate employees' problem-solving abilities, concentration, and psychological involvement in work activities. This finding is consistent with previous studies that suggest complex and challenging tasks can enhance employee motivation and engagement when individuals possess adequate capabilities and resources to manage work demands.

The results also support H2, indicating that task complexity positively influences emotional labor ($\beta = 0.610$, $p < 0.001$). This finding suggests that employees working in complex project environments experience greater emotional demands and are required to invest additional effort in regulating their emotions. Construction projects often involve uncertainty, stakeholder pressures, and time constraints, all of which increase emotional strain. The result supports Emotional Labor Theory (Hochschild, 1983), which argues that demanding work environments require employees to manage emotional expressions to maintain workplace effectiveness.

H3 was also supported, demonstrating a significant negative relationship between emotional labor and cognitive work engagement ($\beta = -0.348$, $p < 0.001$). This finding indicates that excessive emotional labor can reduce employees' mental focus and psychological involvement in work activities. Although emotional regulation is necessary for maintaining professional relationships and workplace performance, prolonged emotional demands may deplete psychological resources and contribute to emotional exhaustion. As a result, employees may experience reduced cognitive engagement and lower levels of concentration during task performance.

The mediation analysis further supported H4, showing that emotional labor significantly mediates the relationship between task complexity and cognitive work engagement ($\beta = -0.235$, $p < 0.001$). This result suggests that emotional labor serves as an important psychological mechanism through which task complexity influences employee engagement. While task complexity directly contributes to cognitive engagement by providing challenging and stimulating work, the emotional demands associated with complex tasks can simultaneously reduce engagement levels. This finding highlights the dual nature of complex work environments and emphasizes the importance of managing emotional demands to sustain employee engagement.

Finally, H5 was supported, indicating that top management support significantly moderates the relationship between task complexity and emotional labor in influencing cognitive work engagement ($\beta = 0.533$, $p = 0.002$). The positive moderating effect suggests that supportive leadership can reduce the adverse emotional consequences of complex work demands. Employees who perceive greater support from senior management are better able to cope with emotional challenges and maintain higher levels of cognitive engagement. This finding is consistent with the Job Demands–Resources framework, which identifies organizational support as a critical resource that helps employees manage demanding work conditions and maintain positive work outcomes.

Overall, the findings demonstrate that task complexity influences both emotional labor and cognitive work engagement, while emotional labor serves as an important mediating mechanism linking these constructs. Furthermore, top management support functions as a valuable organizational resource that strengthens employee resilience and reduces the negative effects of emotional strain. These results highlight the importance of supportive leadership and effective emotional management practices in promoting employee engagement and performance within complex construction project environments.

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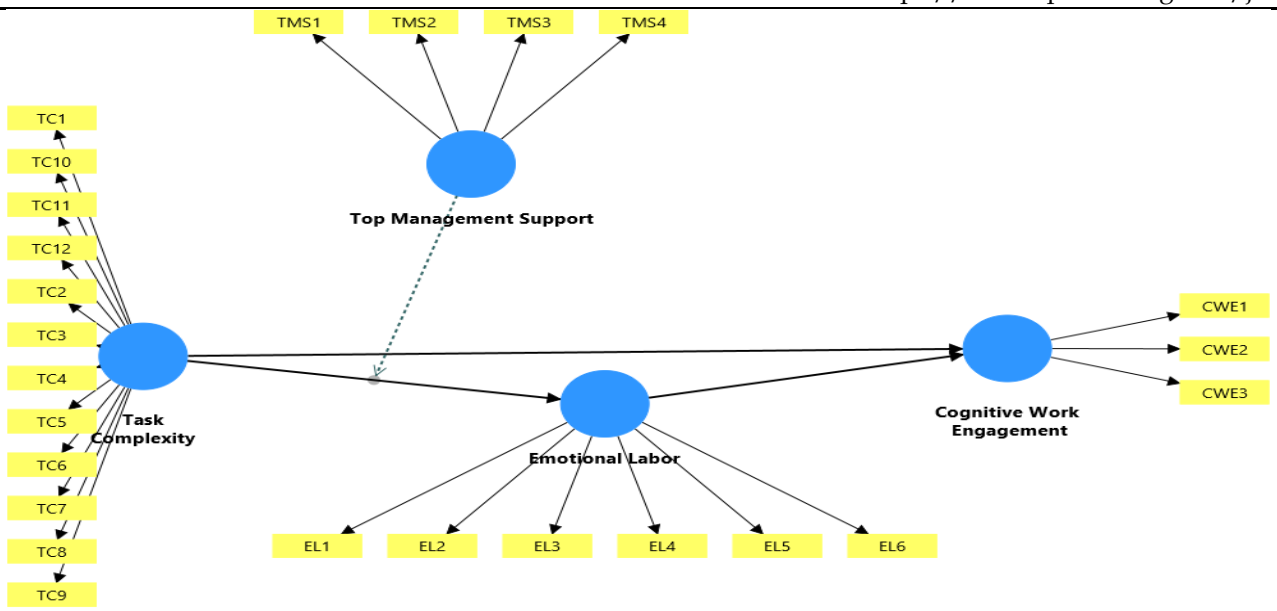

Figure 2: Structural Model of the Relationships among Task Complexity, Emotional Labor, Cognitive Work Engagement, and Top Management Support

Figure 2 presents the structural model illustrating the relationships among task complexity, emotional labor, cognitive work engagement, and top management support. The model depicts the direct effects of task complexity on emotional labor and cognitive work engagement, the mediating role of emotional labor, and the moderating effect of top management support.

The bootstrapping results presented in Table 3 provide support for the proposed hypotheses. The path coefficients, t-values, and p-values indicate that all hypothesized relationships are statistically significant. Furthermore, the confidence intervals do not include zero, confirming the robustness and reliability of the estimated relationships among the study constructs.

Table 3: Results of Hypothesis Testing and Bootstrapping Analysis

Path	β (O)	T-Value	P-Value	CI [2.5%, 97.5%]
Emotional Labor → Cognitive Work Engagement	0.610	12.222	0.0001***	[0.568, 0.789]
Task Complexity → Cognitive Work Engagement	-0.348	4.736	0.0001***	[0.159, 0.378]
Task Complexity → Emotional Labor	0.264	16.293	0.0001***	[0.539, 0.687]
TC → EL → Cognitive Work Engagement	-0.235	10.975	0.0001***	[0.345, 0.496]
TMS × TC → EL → Cognitive Work Engagement	0.533	3.071	0.002**	[0.011, 0.045]

Significance Level: **p ≤0.0001, *p ≤0.05, NS-Non-significant.

5. Implications

The results of the hypothesis testing provide significant insights into how task complexity, emotional labor, cognitive work engagement, and top management support interact in the workplace. Task complexity was found to positively affect cognitive work engagement, as indicated by a moderate positive path coefficient of 0.264. This suggests that challenging tasks contribute to employee engagement by providing intellectual stimulation. However, as task complexity increases, emotional labor also rises, which can hinder cognitive work engagement, as reflected by the negative path coefficient of -0.348 between emotional labor and cognitive work engagement. Emotional labor was found to mediate the relationship between task complexity and cognitive work engagement, with a negative mediation effect of -0.235. This highlights that while task complexity can enhance engagement, the emotional strain associated with complex tasks can reduce cognitive involvement. This finding emphasizes the need for organizations to manage emotional labor effectively to sustain employees' focus and engagement. The moderating role of top management support was particularly significant. When

management provides support, the negative effects of emotional labor and task complexity on cognitive engagement are mitigated. The positive moderating effect of top management support (β = 0.533) confirms that leadership plays a crucial role in enhancing cognitive work engagement by reducing emotional exhaustion. This reinforces the importance of supportive leadership in managing the challenges posed by complex tasks.

5.1 Theoretical Implication

This study contributes to the literature on organizational behavior and human resource management by examining the relationships among task complexity, emotional labor, cognitive work engagement, and top management support within the construction industry. Drawing upon the Job Demands–Resources (JD–R) framework and Emotional Labor Theory, the findings demonstrate that task complexity influences employee engagement both directly and indirectly through emotional labor. By identifying emotional labor as a mediating mechanism, the study provides a deeper understanding of the psychological processes through which job demands affect employee engagement.

The findings also extend the JD–R framework by highlighting the importance of top management support as an organizational resource that mitigates the adverse effects of emotional demands. The significant moderating effect of top management support suggests that supportive leadership plays an important role in strengthening employee resilience and maintaining cognitive engagement under demanding work conditions. Furthermore, the study contributes to the limited literature examining these relationships within project-based environments, particularly in the construction sector of developing economies.

5.2 Practical Implications

The findings provide several practical implications for construction managers and organizational leaders. First, organizations should recognize that complex tasks not only increase cognitive demands but also intensify employees' emotional workload. Therefore, management should implement strategies that help employees effectively manage emotional strain while maintaining engagement and productivity. Second, organizations should invest in employee development initiatives such as emotional intelligence training, stress management programs, and resilience-building workshops. These interventions can help employees better cope with the emotional challenges associated with complex work environments. In addition, job design practices should ensure that employees have adequate resources and support to manage demanding tasks effectively. Third, the results emphasize the critical role of top management support in promoting employee well-being and engagement. Senior leaders should foster a supportive organizational climate through effective communication, employee recognition, resource allocation, and psychological support. By strengthening leadership support systems, organizations can reduce emotional exhaustion and improve employees' cognitive involvement in work activities. Such practices are particularly important in construction projects, where employees frequently encounter uncertainty, time pressure, and stakeholder-related challenges.

5.3 Limitations and future research directions

Despite its contributions, this study has several limitations that should be acknowledged. First, the cross-sectional research design limits the ability to establish causal relationships among task complexity, emotional labor, cognitive work engagement, and top management support. Future studies should employ longitudinal or experimental research designs to better examine causal mechanisms and changes over time. Second, the study relied on self-reported survey data, which may be subject to common-method bias and social desirability bias. Although procedural and statistical remedies were employed to minimize these concerns, future research may benefit from collecting data from multiple sources, including supervisors and colleagues, to enhance the robustness of findings.

Third, the study focused exclusively on employees within the construction industry in Pakistan. While this context provides valuable insights into project-based work environments, the generalizability of the findings may be limited. Future studies should examine these relationships across different industries, countries, and cultural settings to validate and extend the present findings. Finally, future research may explore additional factors that influence employee engagement under complex work conditions, including emotional intelligence, psychological capital, organizational culture, and emerging workplace technologies. Examining these variables may provide a more comprehensive understanding of how employees adapt to increasingly demanding and complex organizational environments.

6. Conclusion

This study examined the relationships among task complexity, emotional labor, cognitive work engagement, and top management support within the construction industry. Drawing on the Job Demands–Resources framework and Emotional Labor Theory, the study investigated the direct, mediating, and moderating mechanisms linking these constructs. The findings revealed that task complexity positively influences both emotional labor and cognitive work engagement. Employees facing more complex tasks demonstrated higher levels of cognitive engagement, suggesting that challenging work can stimulate concentration, problem-solving, and psychological involvement in work activities. At the same time, task complexity significantly increased emotional labor, indicating that employees must invest additional emotional effort to manage demanding work conditions.

The results further demonstrated that emotional labor negatively affects cognitive work engagement and serves as a significant mediating mechanism between task complexity and engagement. Although complex tasks can encourage employee involvement, the emotional strain associated with these demands may reduce employees' cognitive focus and psychological investment in their work. These findings highlight the importance of effectively managing emotional demands to sustain employee engagement and performance. In addition, top management support was found to play a significant moderate role in the proposed relationships. Supportive leadership helps employees cope with the emotional demands associated with complex tasks and contributes to maintaining higher levels of cognitive work engagement. This finding emphasizes the importance of organizational support systems, effective communication, and employee-centered leadership practices in complex project environments. Overall, the study contributes to the understanding of employee behavior in the construction sector by demonstrating how task complexity, emotional labor, and organizational support jointly influence cognitive work engagement. The findings provide valuable insights for managers seeking to enhance employee well-being, strengthen engagement, and improve performance in increasingly complex and demanding work environments.

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Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent

Detailed information about the study's nature and purpose was provided, and prior approval and consent were obtained from all participants.

Competing interests

The authors declare no competing interests.

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