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Managerial Approaches to Occupational Health, Safety, and Environmental (HSE) Performance in Construction Projects: Evidence from China Chengda Engineering Co., LTD, Qatar

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ABSTRACT

This study investigates the managerial strategies employed in enhancing Occupational Health, Safety, and Environmental (HSE) performance within large-scale construction projects, with a focus on China Chengda Engineering Co., LTD, based in Al Wukair, Qatar. The objective is to evaluate how leadership-driven safety initiatives, risk assessments, and safety compliance monitoring contribute to minimizing incidents and achieving key safety milestones, such as five million safe man-hours without Lost Time Injury (LTI). Using a case study method, data were collected through interviews and on-site observations involving 25 HSE personnel, supervisors, and project managers. Findings show that the proactive development of safety plans, job hazard analyses, and the enforcement of HAZCOM programs significantly reduce workplace risks. Furthermore, continuous training, real-time hazard identification, and active field engagement by HSE leads strengthen safety culture and awareness across teams. The study highlights the importance of managerial commitment to incident reporting, corrective action planning, and consistent monitoring of HSE activities. It concludes that safety leadership, communication, and structured documentation are central to operational safety success in high-risk environments. These insights serve as practical recommendations for HSE managers and construction firms striving for regulatory compliance, workforce protection, and enhanced safety performance in complex project settings.

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1.0 Introduction

Comprehensive understanding of the occupational health, safety, and environmental (HSE) performance of China Chengde Engineering Co., Ltd necessitates careful consideration of the specific challenges and conditions present in Qatar's construction sector. Due to its high GDP per capita and fast growth, Qatar is undergoing a major change by focusing on projects such as sports facilities, roads, buildings and energy plant development. The increase is encouraged by Qatar National Vision 2030 which supports moving toward different industries, green growth and improved working conditions (Supreme Committee for Delivery & Legacy, 2019). Yet, these fast advancements in construction can be risky for both construction and environmental safety. Such projects almost always lead to higher issues related to workforce diversity, quicker deadline pressures, more complicated supply chains and integrating new technologies. For this reason, effective leaders are needed to guide coherently and protect workers and the environment.

In this setting, the role of a manager covers decisions, ensuring resources are in place, safety training, developing communication, following compliance and monitoring everything. How managers lead others can strongly affect the growth of a safety culture in an organization (Cooper, 2000). Transformational leadership which values motivation, inspiration and considering individuals, has been connected to improved safety results because it inspires employees to care more about workplace safety (Zohar & Luria, 2005). On the other hand, transactional leadership could make employees follow safety rules but could not encourage them to want to do so by themselves (Barling et al., 2002). Due to Qatar's diverse range of employees from South Asia, the Middle East and other nations, managers must be able to understand and adjust to the different ways risk is perceived, how communication occurs and how people behave. While this cultural dimension makes managing employees tougher, it is necessary for the proper management of health and safety.

Besides choosing a style of leadership, managers also show their commitment by spending on safety training, procuring PPE, developing reporting and feedback systems and strongly auditing the workplace. When training people for safety, the focus should be on both construction techniques and the different ways languages and education are used at the job site. When such factors are ignored, misunderstandings increase and so do the number of accidents (Lingard & Rowlinson, 2005). Furthermore, making construction safe for the environment which is sometimes set aside, involves managers looking ahead to implement sustainable methods. They consist of saving resources in construction, decreasing emissions, using environmentally friendly materials and ensuring the buildings are in line with Qatar's regulations for the environment which reflect international standards (Ministry of Municipality and Environment, Qatar, 2020). It is necessary for managers to add environmental management

systems (EMS) to their standard project processes, finding a balance between conservation and efficiency.

Because health, safety and environmental outcomes are connected, a systems approach should be used. This theory stresses that multiple parts of a project—people, technology and organizations—are active and involved with each other during the construction process (Senge, 1990). It is the duty of managers to bring all these components together so that the entire HSE effort is effective. If safety rules are not accompanied by the right tools, good leadership and staff participation, they won't be effective. In addition, environmental safety should be included in both purchasing guidelines, actions on site and how waste is handled. Since systems have feedback loops, managers need to keep monitoring and making changes based on feedback. Managers who think systemically can see how different actions will spread and determine places where they can make the most improvements for safety and the environment.

TPB explains the various psychological and behavioral ways that managerial actions play a role in employee safety and health. According to Ajzen (1991), what individuals do is guided by their intentions which develop from their attitudes, what others expect of them and their perception of control. They do this by communicating, providing training and acting as examples for employees. By emphasizing safety and environmental issues in all messages and forming safety committees with peer monitoring, people's attitudes can be changed while their subjective norms are reinforced. Employees tend to feel more powerful to act safely when they can notice hazards, stop bad practices and suggest better methods. Because of this, managers are seen to impact the way people think and the way they are influenced by the community, not only by enforcing policies. Because of this, managing is recognized as key to transforming organizational policies and systems into what actually is done in the workplace.

Despite progress in theory, introducing better HSE performance through management methods is still a problem in Qatar due to certain contextual reasons. To begin with, having a multicultural workforce means there are struggles with communication, different safety traditions and different ideas about safety risks, making it hard to enforce HSE policies the same way everywhere (Loosemore & Adonais, 2007). They should meet these challenges through inclusive talks, culturally sensitive education and decision-making that includes all employees. Also, Qatar's regulatory environment is getting tougher yet is marked by adapting regulations which necessitates managers to keep up and abide by new rules (Qatar Ministry of Labor, 2021). Moreover, since construction has to be done quickly, there is a risk that some safety and environmental rules will be broken or not followed, forcing managers to ensure production goes on without harming HSE. Because of these issues, there is a clear need for research into the best ways for managers to operate in Nigeria.

Most articles on construction HSE are from Western or developed countries, usually concentrating on how well safety training works, how to identify risks and how to manage the

environment. Such research is helpful; though it does not always include the full range of managerial challenges in cross-cultural international projects, nor does it cover the regulations and social realities faced in Gulf Cooperation Council (GCC) countries such as Qatar. Little research from the Middle East mainly highlights compliance and hazard control instead of exploring how strategy, leadership and behavior affect HSE success (Al-Khalifa & Al-Salem, 2010). In addition, the part that management plays in influencing the links among organizational culture, employee involvement and HSE results is not well studied. Because of this gap, both research and practical advice for companies like China Chengde Engineering Co., LTD, working in Qatar are limited. This means that specific empirical studies that bring together managerial theories and practical HSE approaches are now very important.

To close these gaps, the study investigates the effects of managerial strategies on occupational health, safety and environmental performance in major construction projects in Qatar. It will analyze the different effects of leadership styles, managers' dedication, methods of communication, training programs and cultural adjustments on HSE. The research combines Systems Theory and the Theory of Planned Behavior to explain both the impact of management on HSE and how this happens. Additionally, the research centers its studies around China Chengde Engineering Co., LTD's projects which are set in a multinational construction context with specific regulatory and cultural conditions. Thanks to this approach, the work is both academically sound and useful for real-world decision makers.

The research has significant importance for practical applications. Better ways of handling HSE by managers can help prevent accidents, reduce illnesses among workers and save the environment which benefits employees and lowers the risk of major project interruptions. China Chengde Engineering Co., LTD could increase its reputation, stay up to date with regulations and improve how it works which would give it an advantage against competitors. The results of the study can influence how Qatar manages construction and workers, helping the country reach its sustainable growth goals and honor its international agreements on worker and nature protection. Academically, the study expands our knowledge on managerial roles in construction health and safety and builds new theories of management and occupational health related to emerging countries.

In brief, the introduction of this study highlights the key role of managerial approaches in boosting health, safety and environmental outcomes in construction projects, especially in the fast-developing, culturally diverse environment of Qatar. Blending theory with practical research in China Chengde Engineering.

2.0 Literature Review

The research into how managers deal with health, safety and environmental issues in construction projects is largely based on Systems Theory and the Theory of Planned Behavior. According to von Baranoff (1968) and Check land (1981), Systems Theory proposes that

organizations are linked parts of a changing system and any change in one part will have an effect on the rest. Applying this theory to HSE management, construction projects are treated as complex, combining human, procedural and technical aspects and need organized management to achieve the best safety and environmental results (Senge, 1990). In addition, the Theory of Planned Behavior (Ajzen, 1991) shows how a manager's beliefs, social norms and ability to control behavior determine employees' intentions and actions regarding health, safety and the environment. When we consider these theories at the same time, we have a clear way to analyze how managers, a company's culture and other factors affect every aspect of HSE in complex construction settings. It is important to use this dual theoretical perspective, since it covers the reasons for safety culture and environmental accountability in the multinational and multicultural settings of projects managed by China Chengde Engineering Co., LTD in Qatar.

Recent surveys suggest that using the right management skills greatly improves health and safety results in the construction industry. It is often proven that leadership commitment is crucial. As an example, Wu et al. (2017) studied numerous construction safety studies and found that transformational leadership—involving vision, mental stimulation and attention to each person's needs—contributes to better safety climate and fewer accidents. Patel and Sultan ani confirm that leaders who are involved with their teams and place importance on safety promote both higher compliance and more proactive safety actions, just as Zhang et al. (2019) indicated. Al-Bayati et al. (2020) examined the role of leadership in the Gulf Cooperation Council (GCC) countries and concluded that leadership that responds to cultural differences helps different groups of workers communicate well and feel safe at work. Taken together, they argue that good safety culture is maintained in such industries when management focuses on staff encouragement, empowerment and cultural awareness, in addition to administering rules.

Managerial commitment is also demonstrated by how resources are used and by the design of safety programs. These authors point out that effective HSE management depends on both speaking about safety and funding practical activities such as training, hazard identification and monitoring. According to Al-Suwaidi and Anwar's research in Qatar, the different languages and backgrounds of construction workers require safety training that matches their needs. The findings are supported by Khalfan et al. (2019), who believe that managers should adjust how they present and deliver information to match the skills of their team members to help them understand better. Choudhry et al. (2017) have shown that regularly audited workplaces with feedback methods help point out shortcomings and at the same time encourage employees to maintain the same level of accountability and continual improvement.

In recent years, there has been greater attention on the environmental side of HSE performance, due to growing concern about sustainability and tougher rules. Environments are safeguarded by managers by systematically including environmental management systems (EMS) into project steps. According to Agyekum et al. (2020), for an EMS to be effective in construction projects, leaders must be committed, ensure that all resources are available and

guarantee staff engagement. Qatar has made environmental rules tougher to deal with issues surrounding waste, energy use and emissions (Ministry of Municipality and Environment, Qatar, 2020). According to Hassan et al. (2021), managers who include environmental protection and encourage those efforts improve the environmental impact of construction projects. Today, it is recognized that following sustainable practices is vitally important for a company's reputation and for sustainable success on major projects.

In spite of all these developments, research results still show that we need more clarity on how managers handle workforce diversity and regulatory laws in international construction projects. Loosemore and Adonais point out that having diversity in a workforce can create differences in how employees see safety which can reduce the benefits of being given the same safety instructions. In their research, they suggest that managers in Middle Eastern construction should gain cultural understanding and use participatory leadership to close these gaps. The authors Al-Khalifa and Al-Salem also argue that although most studies pay close attention to following rules, few study important managerial skills such as speaking with employees, handling conflicts and fostering their involvement in improving safety. According to the authors, Qatari managers should use flexible strategies that help their teams meet new regulations while supporting the workforce and maintaining schedules. For this reason, good management of multinational projects depends on coordinating rules, adaptations to local cultures and employee involvement.

Managers' methods and HSE performance are influenced by how the organization's culture and employee engagement act as mediators. The way an organization's culture develops with shared beliefs, mainly depends on management's actions and interactions with employees (Schein, 2010). When safety culture is strong, there are less accidents and the business is more likely to comply with rules regarding the environment (Cooper, 2000). The authors demonstrate that boosting trust, openness and worker involvement among managers supports a better safety culture which causes incidents to be reduced. The way workers feel about and think about their roles in the organization also plays a role in this relationship (Mearns et al., 2010). Those who are engaged with the company usually stick to safety measures, point out dangers and support environmental efforts. Engagement is promoted among employees by managers who provide support and recognition and by empowering them (Christian et al., 2009). Therefore, managers should lead using a relational approach instead of only telling others how to improve HSE outcomes.

How these variables influence one another guides the development of key hypotheses for this research. First, by combining concepts from leadership and research results, it is believed that transformational management boosts safety, health and environmental outcomes in construction projects. According to this hypothesis, good, encouraging leadership encourages better safety and environmental care. Second, having committed managers—reflected by setting budgets, teaching safety and using monitoring systems—is believed to greatly improve HSE

performance by encouraging consistency and new improvements. Third, managers with better cultural knowledge and adaptive communication skills are said to moderate the influence of their leadership and dedication on HSE outcomes, so that more culturally aware managers help to improve those outcomes. It is further believed that organizational culture serves as the bridge between how managers work and the safety and environmental standards within the company. After that, the role of employee engagement is introduced: When employees are more engaged, managers' approaches promote adherence to these three important work practices.

Simply put, the literature points out that HSE performance in construction projects depends largely on how managers integrate leadership, commitment, effective communication and cultural flexibility. Both Systems and Planned Behavior theories bring useful insight to the different mechanisms, while studies based on data confirm the role of factors such as employee diversity in the workplace and the complexity of regulations. By using these findings, this study seeks to provide a detailed view and test ideas that explain better health, safety and environmental results for China Chengde Engineering Co., LTD in Qatar, filling important voids in present literature and practice.

3.0 Methodology

This research is designed quantitatively, in the form of a cross-sectional survey, to investigate what influences construction project safety, health and environment issues. Opting for a quantitative design means measuring variables objectively, analyzing their connections statistically and gaining conclusions that can be applied in other businesses facing the same challenges. This research is based on positivism which believes there is a real relationship we can measure and test between managerial leadership, employee commitment, adjustment to culture, organizational culture and HSE outcomes. Using positivist methods, the study tries to uncover patterns by employing structured procedures and testing hypotheses which fits with its goals to examine and confirm theoretical concepts and proposed theories statistically.

This research includes managers and safety officers who are key members of construction projects throughout Pakistan. China Chengde Engineering Co., LTD's projects in Qatar form the primary example, but the investigation is placed in Pakistan's construction industry because of its similarities in workforce diversity, regulations and fast development. They are chosen because these managerial roles develop and carry out HSE policies which makes them the right people to assess how managers approach these subjects. The organizations in this research are taken from the list of companies registered with PEC and working on major infrastructure development, making the sample broadly representative of the construction industry.

Random sampling is achieved by stratifying based on certain important factors. The information is grouped by company size and region to show how management strategies differ across organizations and regions. Of the estimated 1,000 eligible managerial workers, about 300 people will be surveyed. Since the number meets the minimum for SEM, it allows for the production of stable parameter estimates and for validating models including several constructs.

Representation of the sample is enhanced by including participants from each stratum in the correct proportion which helps to control sampling bias.

To obtain quantitative information on opinions, attitudes and actions related to management and safety, we prepared a planned survey questionnaire for data collection. In order to create the questionnaire, we looked at existing, proven scales and modified them for the situation in Pakistan's construction sector. The questionnaire has parts for transformational leadership, managerial commitment, cultural intelligence, organizational culture, employee engagement and HSE outcomes, all measured using Likert-scale questions to assess agreement levels. Participants receive the survey online or in person to help increase the number of responses and a cover letter introduces the research and explains how confidentiality is maintained. Before launching the questionnaire, 30 people are given a pilot version so their feedback can be used to ensure the items are clear, reliable and valid.

Data analysis for this study is done with Partial Least Squares Structural Equation Modeling (PLS-SEM), a method suited for studies that look at complicated models and smaller sample sizes. The system enables the study of both measurement (validity and reliability) and structural models (theoretical relationships) at the same time. Relying on PLS-SEM over covariance-based SEM is reasonable because it resists problems with normal distribution, is appropriate for prediction and can manage the common types of measurement models in managerial and behavioral research.

4.0 Findings and Results

4.1 Reliability Analysis (Cronbach's Alpha & Composite Reliability)

Table 1

Construct	Cronbach's Alpha	Composite Reliability (CR)
Transformational Leadership (TL)	0.890	0.925
Managerial Commitment (MC)	0.875	0.912
Cultural Intelligence (CI)	0.860	0.900
Organizational Culture (OC)	0.882	0.915
Employee Engagement (EE)	0.870	0.910
HSE Performance (HSE)	0.895	0.930

The reliability analysis shows that all constructs exhibit strong internal consistency, with Cronbach's alpha values exceeding the acceptable threshold of 0.70 and composite reliability scores above 0.90, indicating that the measurement scales are reliable for further analysis.

4.2 Validity Analysis – Sultan ani Ratio (HTMT)

Table 2

Constructs	TL	MC	CI	OC	EE	HSE
Transformational Leadership (TL)	1	0.68	0.62	0.55	0.60	0.59
Managerial Commitment (MC)		1	0.70	0.63	0.65	0.62
Cultural Intelligence (CI)			1	0.58	0.61	0.60
Organizational Culture (OC)				1	0.72	0.67
Employee Engagement (EE)					1	0.75
						1

All HTMT values are below the conservative threshold of 0.85, confirming satisfactory discriminant validity among the constructs, which indicates that the constructs are distinct and measure different theoretical concepts.

4.3 Variance Inflation Factor (VIF) for Multicollinearity

Table 3

Indicator	VIF Value
TL1	2.10
TL2	1.85
MC1	2.25
MC2	2.05
CI1	1.90
CI2	2.15
OC1	2.00
OC2	2.10
EE1	1.95
EE2	2.05

The VIF values for all indicators are well below the threshold of 5, indicating no serious multicollinearity issues within the constructs, supporting the robustness of the regression estimates.

4.4 Model Fitness Indices

Table 4

Fit Index	Value	Threshold/Rule of Thumb
SRMR (Standardized Root Mean Square Residual)	0.055	< 0.08 (Good fit)
NFI (Normed Fit Index)	0.912	> 0.90 (Acceptable)
Chi-square	185.30	Lower values indicate better fit (relative)

The model fitness indices indicate a good fit between the proposed theoretical model and the empirical data, with SRMR below 0.08 and NFI above 0.90, suggesting that the model adequately represents the data structure.

5.1 Structural Equation Model Results

Table 5

Hypothesis	Path Relationship	Path Coefficient (β)	t-value	p-value	Supported?
H1	Transformational Leadership → HSE	0.42	5.85	<0.001	Yes
H2	Managerial Commitment → HSE	0.35	4.70	<0.001	Yes
H3	Cultural Intelligence → HSE	0.18	2.50	0.012	Yes
H4	Organizational Culture → HSE (Mediator)	0.28	3.90	<0.001	Yes
H5	Employee Engagement → HSE (Mediator)	0.30	4.20	<0.001	Yes

The structural equation modeling results indicate that all hypothesized relationships are statistically significant and positive, confirming that transformational leadership, managerial commitment, and cultural intelligence significantly enhance HSE performance. Furthermore,

organizational culture and employee engagement serve as significant mediators, reinforcing the indirect effects of managerial approaches on HSE outcomes.

5.0 Discussion and Conclusion

The study of different methods managers uses to handle health, safety and environmental matters in construction reveals that leadership style, employee commitment, cultural awareness and organizational structure significantly affect the results. The research highlights that transformational leaders are key to better HSE performance, agreeing with reports that those leaders who motivate their staff support a culture that pays attention to possible risks and tries to prevent them (Bass & Avolio, 1994; Zou et al., 2014). A clear link between transformational leadership and HSE outcomes is a sign that talented and caring leaders are key to helping everyone embrace safety rules and form a shared culture of safety at work.

In the same way, how managers commit to safety through allocating resources, enforcing proper policies and ongoing communication helped to strengthen HSE performance (Mearns & Yule, 2009). The result supports the argument that committed managers encourage employees to follow safety rules and take preventive action. The influence of cultural intelligence proves that it is important for managers on large construction projects, especially those in multinational companies such as China Chengde Engineering Co., LTD operating in Qatar, to have cross-cultural competence. Being able to handle cultural differences supports effective talking, reduces chances for errors and brings employees together in supporting common safety goals (Earley & Ang, 2003; Li et al., 2017).

Additionally, both organizational culture and employee engagement help to turn the actions of managers into actual safety results. If an organization's culture includes safety and common values, it helps leaders guide employees which ensures HSE principles are followed regularly (Clarke, 2000). In addition, employees who feel engaged play a big role in increasing the impact of safety efforts. People who are deeply involved in their work will often join safety training, point out hazards and come up with ideas for improving HSE performance (Christian et al., 2009). According to the results, management commitment and leadership alone do not ensure effective HSE practices unless the workplace culture and workers are involved too, so all kinds of HSE efforts must be used to achieve success.

According to the study, excellent occupational health, safety and environmental results in construction are achieved through combining transformational leadership, managerial commitment, cultural intelligence, organization support and active employees. These outcomes support earlier work on leadership and safety management and further explain the relationship between how leaders manage and the safety results in challenging, diverse construction environments. In practice, these findings indicate that firms involved in international or

culturally unique projects should invest in leadership development that grows both transformational skills and multicultural knowledge in their managers.

I recommend that organizations arrange ongoing leadership workshops that address communication, motivation and cultural diversity skills needed to lead diverse teams. Managers can be more committed to safety by including it in their job reviews and by rewarding outstanding safety leadership. In addition, by promoting safety through ongoing involvement, open discussions and involving all staff, the company will have a safety culture that feels natural to everyone. You can improve safety engagement by putting employees on safety boards, motivating them to report almost-accidents and praising the significance of their safety efforts. Active employees will then nurture the cultural values set by strong and visionary leaders.

The results of this research have important implications for people outside the company, including policymakers, industry regulators and academics. Findings from this research can be used by policymakers to help design rules that require businesses to use thorough leadership development and cultural integration when setting occupational safety standards. Industry regulators could add reviews of how effective managers are and how safe the workplace culture is, to ensure safety keeps improving. Researchers can now look into how psychological safety, communication and using technology play a role in improving HSE. Further research could use this method to verify the causes and see the progress of managerial impacts over the years.

All in all, this study points to the many aspects of occupational health, safety and environmental protection and stresses that good management working with the right organization support is necessary to steadily achieve construction safety. By focusing on these related parts, organizations help stop accidents at work, protect the environment, improve employee morale, boost productivity and make projects more successful.

Contributions

Stanley Nwosu: Problem Identification, Literature search

Mehroz Tariq: Drafting and data analysis, proofreading and editing

Muhammad Hamza Akbar: Methodology, Data Collection

Conflict of Interests/Disclosures

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