Chauhan, U.S., Saikia, S. and Johari, S., 2024. Identifying mitigation measures for conflicting situations on Indian construction sites. In: Sandanayake, Y.G., Waidyasekara, K.G.A.S., Ranadewa, K.A.T.O. and Chandanie, H. (eds). *Proceedings of the 12th World Construction Symposium*, 9-10 August 2024, Sri Lanka. pp. 779-788. DOI: https://doi.org/10.31705/WCS.2024.62. Available from: https://ciobwcs.com/papers/

MITIGATION MEASURES FOR CONFLICTING SITUATIONS ON INDIAN CONSTRUCTION SITES

Uttam Singh Chauhan[1], Sudarshan Saikia[2], and Sparsh Johari[3]

ABSTRACT

This study focuses on conflict in construction workers and the identification of mitigation measures to effectively control conflicts. The Analytic Hierarchy Process (AHP) technique was used in the study to rank various alternatives by their relative efficacy as viewed by construction industry representatives. Upon initial review of the literature, it became apparent that eight significant conflict areas have been identified: delayed payments, insufficient training, discrimination, inadequate resources, excessive workload, unclear site circumstances, time constraints, and lack of safety measures. There were recommendations in the form of specific and distinct mitigation measures, which have been christened M1 to M11 for the respective areas. These tactics were chosen to ensure that the root causes will be treated sufficiently for several reasons. An offline questionnaire was distributed, and more emphasis was placed on the comparative assessment of the proposed mitigation measures. This had the advantage of providing a holistic view of the efficiency of each method described by construction project managers, site engineers, and safety officials managing sites. From the AHP analysis, training and resource management solutions were rated the highest regarding their effectiveness in conflict management. Considering the above results, the study offers lessons on whom and where to focus preventive measures and interventions to achieve better organisational workplace relations and operational effectiveness in construction settings. This study benefits the construction industry by providing a parameter and source for enhancing the conflict resolution framework and ensuring a safer and more efficient building environment.

Keywords: *Analytical Hierarchy Process (AHP); Conflict; Conflict Mitigation Measures; Construction Workers.*

1. INTRODUCTION

Conflict is inevitable in human relations, which can be contained in various severity and spheres of the construction industry. Conflicts in construction projects could result from several factors, including a clash of stakeholders' interests, misunderstanding of project specifications, differences in goals or objectives, and competition for limited resources. If these concerns are not dealt with, this results in time delays and cost overheads and

[1] Undergraduate Student, Department of Civil Engineering, Indian Institute of Technology Guwahati, India, c.uttam@iitg.ac.in
[2] Post-graduate Student, Department of Civil Engineering, Indian Institute of Technology Guwahati, India, s.saikia@iitg.ac.in
[3] Assistant Professor, Department of Civil Engineering, Indian Institute of Technology Guwahati, India, sparshjo@gmail.com

strains the relations between the various project stakeholders, greatly affecting the project's success (Yu et al., 2010).

Conflict thus remains a continuous and significant issue within construction, which over time results in undesirable effects, most prominently on productivity, timelines, and results of projects. The root of this problem is multi-faceted, as it involves behavioural, contractual, and technical concerns. Poorly defined tasks and changes in building plans often contribute to increased disputes (Mitkus & Mitkus, 2014). Conflicts need to be resolved because identifying the causes of the conflicts in the first place is essential for implementing efficient management measures (Iyiola & Rjoub, 2020).

Conflict regulation is one of the key aspects that, when practised, enables organisations to provide the best working conditions for the employees, enhancing the workers' productivity. Comparable to other settings, it is imperative to identify systematic and systemic antecedents of conflicts in construction. This has deemed it fit to formulate the proper conflict management framework for the construction industry, as this social unit has its peculiarities and challenges (Nielsen et al., 2023).

This research aims to investigate conflict at the workplace and specifically in construction sites to establish how that conflict can be effectively managed. Hence, the study identified the mitigation measures of conflicts and subsequently, which mitigation measures are more prevalent to mitigate conflicts have been identified. The study offers recommendations regarding the problem and evaluates the efficiency of proposed solutions. The research aims to improve construction site conditions to become safer, more productive, and free of conflict.

2. LITERATURE REVIEW

2.1 CONFLICTS

The causes of conflict are behavioural issues and clashes made by contracts, technological challenges, changes in site conditions, delays, and claims involving modification (Sabri et al., 2022). These adverse effects of worker conflict have been acknowledged as a causal factor of safety issues on construction sites. It has implications for the workforce's well-being, leading to accidents in executing work activities in unfavourable work environments (Kim et al., 2022). Biswal et al. (2023) stated that conflicts in construction projects can arise from limited resources, such as insufficient time, money, labour payment, quality of technical specifications, availability of information, administration, and management. Other common problems include misunderstanding and having varying ideas, ways, aims, and purposes. The literature review shows the crux of the matter is a close relationship between disputes and time overruns in building projects. Conflicts affect project management strategies and could cause complications, slowing the process (Tariq & Gardezi, 2022).

2.2 CONFLICT MITIGATING MEASURES

Workers' dissatisfaction often arises from payment delays, which can substantially impact project schedules. By incorporating sophisticated financial management systems and escrow services, the availability and timely cash disbursement may be guaranteed. Well-defined payment terms of a contract, which outline precise timetables, deadlines, and conditions, help reduce uncertainties and disagreements. Consistent monitoring and

supervision are essential for tracking progress and promptly rectifying deviations. This ensures financial transparency and fosters worker confidence (Samaraweera et al., 2019). Training is crucial for sustaining elevated levels of craftsmanship and ensuring safety on building sites. Customised training programs designed by industry professionals or educational institutions guarantee that employees stay with the most recent methods and safety procedures. Mentorship programs utilise the expertise of experienced employees to establish a supportive learning environment that improves the overall skills of the workforce and promotes a culture of continuous professional growth (Vignoli et al., 2021). To address discrimination, it is crucial to cultivate an atmosphere characterised by inclusivity and regard for others. Conventional sensitivity training and seminars can teach workers and management about the significance of cultural diversity and inclusion. Confidential reporting systems and a solid and effective anti-discrimination policy guarantee that employees may report problems without any apprehension of negative consequences, thus fostering justice and equality across the workplace.

Inadequate resources can severely impair a project's effectiveness and result in worker dissatisfaction. Performing comprehensive initial appraisals of project requirements and ongoing reassessments enables flexible resource allocation. By employing state-of-the-art inventory and resource tracking technology, one can guarantee the availability of the appropriate resources at the required time and location, enhancing workflow efficiency and minimising periods of inactivity (Tereso et al., 2004). Excessive workload is a notable concern that can adversely affect health and reduce productivity. Implementing explicit guidelines for overtime, which delineate remuneration rates and terms, guarantees the prevention of worker exploitation and the maintenance of work within safe thresholds. Ensuring fair distribution of work and enforcing required breaks are crucial for preserving both physical and mental well-being, improving overall efficiency and worker contentment (Kuroda & Yamamoto, 2019). Flexibility and proactive management are necessary due to the unpredictable nature of building sites. Expanding worker training to incorporate adaptive skills and problem-solving helps equip the workforce to handle unforeseen developments. Effective coordination and frequent communication between project managers and workers enable prompt adaptation to change in site circumstances, guaranteeing the smooth progress and safety of the project (Ayres & Malouff, 2007). The imperative to adhere to project deadlines frequently leads to hasty work, compromising the outcome's result and security. Implementing efficient project management strategies, such as completing tasks in phases and setting realistic deadlines, enables a balance between the urgency of meeting timeframes and the requirement for completeness. Regular audits and progress reviews enable timely modifications and ensure the achievement of project milestones without placing excessive strain on staff (Cheng et al., 2012). Maintaining worker safety necessitates constant attentiveness and strict compliance with rigorous safety measures. Regular training sessions on safety protocols, periodic safety audits, and providing safety equipment are vital. Involving employees in safety dialogues and motivating them to participate in safety strategising actively empowers them and fosters a culture that prioritises safety (Burke et al., 2006).

3. METHODOLOGY

3.1 IDENTIFICATION OF MITIGATING MEASURES

The study began with a comprehensive literature analysis, which was done to identify and define common conflict scenarios that occur at construction sites. The eight conflicting scenarios, including Payment Delays (PD), Lack of Training (LT), Discrimination (DC), Insufficient Resources (IR), Overwork (OW), Unclear Site Conditions (USC), Time Pressure (TP), and Lack of Safety (LS), have been extracted from the study conducted by Biswal et al. (2023). Concurrently, the literature research gathered viable ways to reduce each conflict. These sources included academic publications, industry reports, and case studies. A list of mitigating measures was developed, taking expert advice into account. All 11 mitigating measures are designated as M1 through M11, as indicated in Table 1.

Table 1: Conflict mitigating measures

Sl. No.	Mitigating Measures	Sources
M1	Implementing financial management tools, escrow services, regular monitoring, and increased supervision is essential for streamlining payment workflows, tracking progress, and correcting unsafe behaviour	Ishrat (2020)
M2	Conducting regular safety audits to identify and rectify potential hazards	Rozenfeld et al. (2010); Anandraj & Vijayabaskaran (2020)
M3	Establishing regular training programs for workers to enhance their skills and knowledge. Collaborating with industry experts or educational institutions to design practical training modules	Schwatka et al. (2019); Hussain et al. (2020)
M4	Implementing mentorship programs where experienced workers guide and train their less-experienced counterparts	Afolabi et al. (2019)
M5	Promoting a continuous learning culture among the workers	Cheng et al. (2004)
M6	Comprehensive evaluation of project requirements, the use of technology for efficient resource management, and the integration of rigorous planning with timely adaptation	Bellamy et al. (2001); Lam (2005)
M7	Promoting equal workload distribution among workers, preventing excessive burdens, and enforcing breaks and rest periods to avoid burnout and enhance overall well-being	Maiti (2008); Yi & Chan (2013)
M8	Promoting open communication between project managers and workers addresses resource issues and establishes confidential reporting mechanisms for discrimination incidents among workers.	Gillard & Johansen (2004); Lee et al. (2021)
M9	Incentives ensure that workers are compensated as they achieve specific project goals.	Meng and Gallagher (2012); Ogwueleka and Udoudoh (2018)

Sl. No.	Mitigating Measures	Sources
M10	Crafting contracts with explicit and detailed payment terms. Specifying payment schedules, deadlines, and conditions, reducing ambiguity and potential disputes	Koc and Gurgun (2022)
M11	Establishing clear policies regarding overtime work, ensuring that it is reasonable, compensated, and follows safety regulations	Goldenhar et al. (2003)

3.2 PRIORITISING THE IDENTIFIED FACTORS

The Analytic Hierarchy Process (AHP) was employed to prioritise mitigation measures by leveraging survey results, facilitating the systematic decision-making process. This entailed establishing a hierarchical structure to accurately represent the connection between the goal, the criteria, and the sub-criteria. The objective is to ascertain the most efficient resolution for minimising conflicts on building sites. The survey found eight primary indices correlating to the key conflicts. Sub-criteria refer to eleven secondary indicators that reflect methods of reducing the impact of each primary conflict category. These indicators are illustrated in Figure 1.

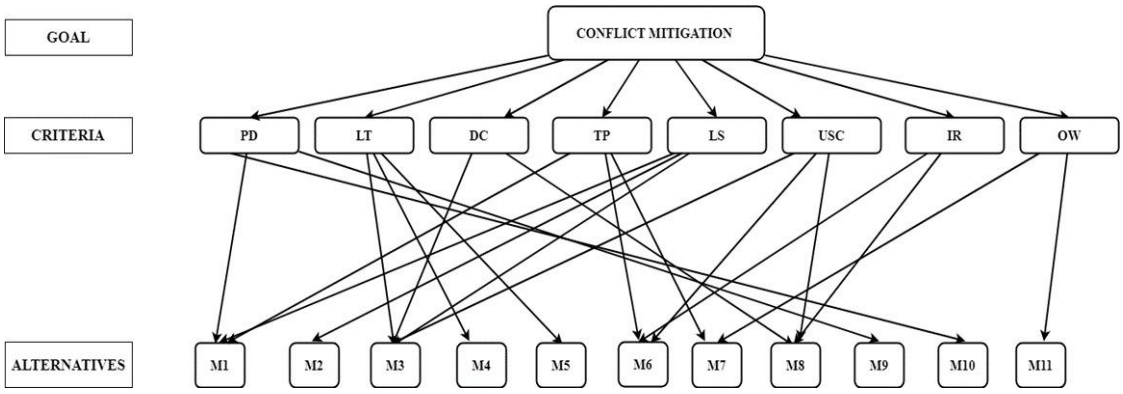

Figure 1: The AHP hierarchy model

Individual experts were tasked with developing pairwise comparison matrices at each level, where they provided opinions on the relative relevance of each component in effectively mitigating conflicts.

3.2.1 Data Collection

Participants were given paper-based surveys to collect data. The data was acquired using a questionnaire survey, where experts provided pairwise comparisons of criteria and alternatives.

3.2.2 Data Analysis

The eigenvalue approach was utilised to ascertain the weights for every criterion and sub-criterion. Consistency ratios were analysed to validate the precision of judgments. The prioritisation weights obtained from the AHP were used to rank the mitigation options according to their effectiveness.

3.2.3 Validity and Reliability

To ensure the study's validity and reliability, a pre-test of the questionnaire was conducted with a small group of construction experts. The feedback from the pilot test was used to improve the survey. Subsequently, a comprehensive analysis was conducted to assess the reliability of the AHP model. Subsequent adjustments were made to ensure a consistency ratio below 0.1, thereby ensuring the dependability of decision-making.

3.2.4 Consistency Check in AHP

The Consistency Ratio (CR) calculation is used to evaluate the coherence of the pairwise comparisons provided by participants. An evaluation of the matrix's Consistency Index (CI) about the Random Index (RI) is conducted, as proposed by Saaty (1987). The formula $CR=\frac{CI}{RI}$ is used, with the random index derived from a sample of randomly generated pairwise comparison matrices. The formula for computing the consistency index is $CI=\frac{\lambda max-n}{n-1}$. Here, λ_{max} refers to the eigenvalue of the matrix, while *n* represents the number of items being compared. A Consistency Ratio (CR) below 0.1 is a reliable indicator of consistency in pairwise comparisons. Participants are kindly asked to adjust their evaluations if the CR exceeds the acceptable limit. This comprehensive methodology ensures the reliability of the decision-making process, enhancing the credibility of the results and providing a systematic approach to resolving disputes on construction sites.

4. RESULTS AND DISCUSSION

A recognition of the potential of eleven mitigation measures to address workplace conflicts has been evaluated by the utilisation of the AHP. The effectiveness of all these measures was quantified statistically from the respondents' ratings, giving this approach a clear focus on where to invest efforts and how to enforce measures (M1 to M11). As shown in Table 2, the weights and sequences of all measures are given below.

Table 2: Weights of each mitigating measure

Mitigation measures	PD 0.17	LT 0.15	DC 0.03	IR 0.18	OW 0.12	USC 0.03	TP 0.10	LS 0.22	Weights
M1	0.28	0	0	0	0	0	0.17	0.22	0.11
M2	0	0	0	0	0	0	0	0.32	0.07
M3	0	0.29	0.18	0	0	0.45	0	0.47	0.16
M4	0	0.52	0	0	0	0	0	0	0.08
M5	0	0.19	0	0	0	0	0	0	0.03
M6	0	0	0	0.58	0	0.20	0.53	0	0.16
M7	0	0	0	0	0.19	0	0.66	0	0.09
M8	0	0	0.82	0.42	0	0.35	0	0	0.11
M9	0.32	0	0	0	0	0	0	0	0.05
M10	0.40	0	0	0	0	0	0	0	0.07
M11	0	0	0	0	0.81	0	0	0	0.10

The alternative weights derived from the AHP analysis highlight the emerging strategic priorities. M3 (0.16) and M6 (0.16) were the most effective strategies, emphasizing their crucial roles in comprehensively enhancing training and managing projects. M1 (0.11) and M8 (0.11), with a strong emphasis on financial management and open communication, have shown considerable potential for making a significant impact. M11 (0.10) has proven to be highly effective in regulating overtime work, making it a crucial tool for promoting fair labour practices and ensuring safety. Strategies such as M7 (0.09), M4 (0.08), and M10 (0.07) demonstrated moderate effectiveness, suggesting they play beneficial yet less crucial roles. M2 (0.07), M9 (0.05), and M5 (0.03) were given lower priority in the AHP ranking, indicating potential areas for improvement or specific circumstances in which these strategies may be more effective. Emphasising the importance of regular, structured training programs and technology integration in project management, the prioritisation of M3 and M6 is evident. These strategies are crucial in improving skill levels and efficiently managing resources, which are fundamental for addressing worker competence and resource scarcity conflicts. M1 and M8 focus on enhancing financial transparency and overcoming communication barriers. The focus on these strategies underscores the significance of transparent and responsible economic management and the necessity of effective communication channels to address conflicts and discrimination. The emphasis on overtime policies in M11 highlights the importance of implementing fair work practices that prioritise worker safety and satisfaction. These practices have a direct impact on morale and productivity. The effectiveness of M7, M4, and M10 can be attributed to their contribution to distributing workload evenly, promoting a mentoring culture, and providing clarity on contractual terms. It is crucial to prioritise establishing a harmonious work environment and well-defined expectations. This proactive approach can effectively minimise conflicts and prevent any potential misunderstandings. M2, M9, and M5 are essential strategies focusing on safety and incentives. Although they may have a lower ranking, these strategies are vital in certain situations, such as hazardous work environments or projects with strict time constraints.

5. RECOMMENDATIONS

Implementing mitigation measures on construction sites significantly affects contracts. Enhancing financial management tools and establishing precise payment schedules should incorporate specific contract terms and conditions to ensure punctual payments and financial transparency. Contracts should include provisions for mandatory training sessions and adherence to safety regulations. Regular safety audits (M2) and extensive training programs (M3) are essential for ensuring safety and compliance. Programs aimed at mentoring and fostering a learning culture imply a dedication to continuous professional development through contractual obligations. Establishing clear regulations regarding resource allocation and task distribution in contracts is crucial to prevent conflicts arising from insufficient resources and excessive workloads. This will ensure effective resource management and equal distribution of tasks. Maintaining open communication channels through a contract is essential to encourage open communication and establish clear guidelines for overtime work. The contractual stipulations address conflicts, ensure compliance, and foster a safer and more productive work environment.

6. CONCLUSIONS

By employing the AHP, this research paper has comprehensively analysed conflicts in the construction workplace and ranked the mitigation measures. The research pointed to eight broad conflict areas and created strategies for each.

Mitigating measures have extensive influences on contracts used in building construction. For instance, one of the approaches is related to the improvement of the financial management tools (M1), where the necessity of the introduction of specific types of contracts and clauses, which will define the payment periods and other issues connected with payments between the parties is stated (M10). Contracts must contain specifications for 'required training meetings' or a reference to safety standards. This is necessary for opportunities where there is a periodic revision of safety (M2) and training general sessions (M3). The hypotheses that may be deduced from the data for mentoring (M4) and promoting the learning culture of staff (M5) suggest contractual accountability for constant professional development. Because conflicts over lack of resources and work stress are common, resource management (M6) and the distribution of tasks (M7) involve establishing provisions over the distribution of resources and the safeguards for workloads in the agreement. Policies should be used to extend contractual provisions to cover places, formal communication on the issue, and set up protocols regarding extra working hours (M8 & M11). These are contractual provisions offered to avoid claims, to receive assurances, and to prevent the formation of a less risky and the best situation at the place of work.

To ensure fewer conflicts on construction sites, it is important to make necessary changes to the contracts of the construction. Contracts have become an essential component of the legal structures governing construction conflicts due to clarifying the responsibilities and powers of the contracting parties. This is the initial instance that can be used in handling a disagreement to cut its probability of developing into bigger ones. Negligence and duty of care come under tort law; they encourage implementing policies that minimise risks. Employment law regulates the contract between employer and employee; this includes matters regarding wages and work conditions and how the employer and the employee can resolve their disagreements. It guarantees that employees' conditions of service are respected, and that justice prevails within the company to avoid workers stoning each other or drifting into strike actions.

This study examines conflict management strategies for construction sites, emphasising effective communication, well-defined conflict resolution methods, and promoting a cohesive work environment. The study presents pragmatic and implementable approaches to reduce conflicts and enhance productivity. The study is grounded in an extensive literature analysis and seeks to provide a valuable understanding of successful conflict management strategies. Nevertheless, the study is constrained by its dependence on pre-existing literature, inherent biases, and the possibility that its findings may not universally apply to all construction sites. Furthermore, the study lacks actual data or direct input from construction workers. Therefore, future studies can be conducted on the limitations of this study to validate the results.

7. REFERENCES

Afolabi, A. O., Akinbo, F. T., & Akinola, A. (2019). Improving career development through a women mentoring program in the construction industry. *Journal of Physics: Conference Series, 1378*(4). https://doi.org/10.1088/1742-6596/1378/4/042031

Anandraj, A., & Vijayabaskaran, S. (2020). Construction safety audit and analysis – A conceptual approach on needy implementation for the metropolitan city-Chennai, India. *Scholars Bulletin, 6*(8), 189–197. https://doi.org/10.36348/sb.2020.v06i08.001

Ayres, J., & Malouff, J. M. (2007). Problem-solving training to help workers increase positive affect, job satisfaction, and life satisfaction. *European Journal of Work and Organizational Psychology, 16*(3), 279–294. https://doi.org/10.1080/13594320701391804

Bellamy, J. A., Walker, D. H., McDonald, G. T., & Syme, G. J. (2001). A systems approach to the evaluation of natural resource management initiatives. *Journal of Environmental Management, 63*(4), 407–423. https://doi.org/10.1006/jema.2001.0493

Biswal, A., Husam, S., & Johari, S. (2023). Conflicting situations affecting performance of construction workers at sites. In *Proceedings of the 11th World Construction Symposium* (pp. 380–391). Sri Lanka. https://doi.org/10.31705/WCS.2023.32.

Burke, M. J., Sarpy, S. A., Smith-Crowe, K., Chan-Serafin, S., Salvador, R. O., & Islam, G. (2006). Relative effectiveness of worker safety and health training methods. *American Journal of Public Health, 96*(2), 315–324. shttps://doi.org/10.2105/AJPH.2004.059840

Cheng, E. W. L., Li, H., Love, P., & Irani, Z. (2004). A learning culture for strategic partnering in construction. *Construction Innovation, 4*(1), 53–65. https://doi.org/10.1191/1471417504ci057oa.

Cheng, E. W. L., Ryan, N., & Kelly, S. (2012). Exploring the perceived influence of safety management practices on project performance in the construction industry. *Safety Science, 50*(2), 363–369. https://doi.org/10.1016/j.ssci.2011.09.016

Gillard, S., & Johansen, J. (2004). Project management communication: A systems approach. *Journal of Information Science, 30*(1), 23–29. https://doi.org/10.1177/0165551504041675

Goldenhar, L. M., Hecker, S., Moir, S., & Rosecrance, J. (2003). The 'Goldilocks model' of overtime in construction: Not too much, not too little, but just right. *Journal of Safety Research, 34*(2), 215–226. https://doi.org/10.1016/S0022-4375(03)00010-0

Hussain, R., Pedro, A., Lee, D. Y., Pham, H. C., & Park, C. S. (2020). Impact of safety training and interventions on training-transfer: Targeting migrant construction workers. *International Journal of Occupational Safety and Ergonomics, 26*(2), 272–284. https://doi.org/10.1080/10803548.2018.1465671

Ishrat, Z. (2020). Compendious research of Escrow payment - focusing on future considerations, trends, and applications. *European Journal of Business and Management Research, 5*(4), 4–6. https://doi.org/10.24018/ejbmr.2020.5.4.347

Iyiola, K., & Rjoub, H. (2020). Using conflict management in improving owners and contractors relationship quality in the construction industry: The mediation role of trust. *SAGE Open, 10*(1). https://doi.org/10.1177/2158244019898834

Kim, S., Lee, H., Hwang, S., Yi, J. S., & Son, J. W. (2022). Construction workers' awareness of safety information depending on physical and mental load. *Journal of Asian Architecture and Building Engineering, 21*(3), 1067–1077. https://doi.org/10.1080/13467581.2021.1908899.

Koc, K., & Gurgun, A. P. (2022). Ambiguity factors in construction contracts entailing conflicts. Engineering, *Construction and Architectural Management, 29*(5), 1946–1964. https://doi.org/10.1108/ECAM-04-2020-0254

Kuroda, S., & Yamamoto, I. (2019). Why do people overwork at the risk of impairing mental health? *Journal of Happiness Studies, 20*(5), 1519–1538. https://doi.org/10.1007/s10902-018-0008-x

Lam, W. (2005). Investigating success factors in enterprise application integration: A case-driven analysis. *European Journal of Information Systems, 14*(2), 175–187. https://doi.org/10.1057/palgrave.ejis.3000530

Lee, Y., Li, J. Y. Q., & Tsai, W. H. S. (2021). The role of strategic internal communication in workplace discrimination: A perspective of racial minority employees. *International Journal of Strategic Communication, 15*(1), 37–59. https://doi.org/10.1080/1553118X.2020.1855591

Maiti, R. (2008). Workload assessment in building construction related activities in India. *Applied Ergonomics, 39*(6), 754–765. https://doi.org/10.1016/j.apergo.2007.11.010

Meng, X., & Gallagher, B. (2012). The impact of incentive mechanisms on project performance. *International Journal of Project Management, 30*(3), 352–362. https://doi.org/10.1016/j.ijproman.2011.08.006

Mitkus, S., & Mitkus, T. (2014). Causes of conflicts in a construction industry: a communicational approach. *Procedia - Soc. Behav. Sci., 110*(1), 777–786. https://doi.org/10.1016/j.sbspro.2013.12.922.

Nielsen, K., Ng, K., Guglielmi, D., Lorente, L., Pătraș, L., & Vignoli, M. (2023). The importance of training transfer of non-technical skills safety training of construction workers. *International Journal of Occupational Safety and Ergonomics, 29*(1), 444–452. https://doi.org/10.1080/10803548.2022.2052624

Ogwueleka, A. C., & Udoudoh, F. P. (2018). The impact of risk and reward dynamics in incentive compensation plans in the Nigerian construction industry. *International Journal of Construction Management, 18*(3), 247–259. https://doi.org/10.1080/15623599.2017.1315545

Rozenfeld, O., Sacks, R., Rosenfeld, Y., & Baum, H. (2010). Construction job safety analysis. *Safety Science, 48*(4), 491–498. https://doi.org/10.1016/j.ssci.2009.12.017

Saaty, R. W. (1987). The analytic hierarchy process—What it is and how it is used. *Mathematical Modelling, 9*(3), 161–176. https://doi.org/10.1016/0270-0255(87)90473-8

Sabri, O., Lædre, O., & Bruland, A. (2022). A structured literature review on construction conflict prevention and resolution: A modified approach for engineering. Organization, Technology and *Management in Construction, 14*(1), 2616–2630. https://doi.org/10.2478/otmcj-2022-0006

Samaraweera, P. D. P., Perera, B. A. K. S., & Dewagoda, K. G. (2019). Management of payment delays in government-funded construction projects in Sri Lanka. In *Proceedings of the 9th World Construction Symposium* (pp. 411–421). Sri Lanka. https://doi.org/10.31705/WCS.2019.41.

Schwatka, N. V., Goldenhar, L. M., Johnson, S. K., Beldon, M. A., Tessler, J., Dennerlein, J. T., Fullen, M., & Trieu, H. (2019). A training intervention to improve frontline construction leaders' safety leadership practices and overall job site safety climate. *Journal of Safety Research, 70*(1), 253–262. https://doi.org/10.1016/j.jsr.2019.04.010

Tariq, J., & Gardezi, S. S. S. (2022). Study the delays and conflicts for construction projects and their mutual relationship: A review. *Ain Shams Engineering Journal, 14*(1), 101815. https://doi.org/10.1016/j.asej.2022.101815.

Tereso, A. P., Araújo, M. M. T., & Elmaghraby, S. E. (2004). Adaptive resource allocation in multimodal activity networks. *International Journal of Production Economics, 92*(1), 1–10. https://doi.org/10.1016/j.ijpe.2003.09.005

Vignoli, M., Nielsen, K., Guglielmi, D., Mariani, M. G., Patras, L., & Peirò, J. M. (2021). Design of a safety training package for migrant workers in the construction industry. *Safety Science, 136*, 105124. https://doi.org/10.1016/j.ssci.2020.105124

Yi, W., & Chan, A. P. C. (2013). Optimizing work-rest schedule for construction rebar workers in a hot and humid environment. *Building and Environment, 61*(1), 104–113. https://doi.org/10.1016/j.buildenv.2012.12.012

Yu, A. T., Shen, G. Q., & Chan, E. H. (2010). Managing employers' requirements in construction industry: Experiences and challenges. *Facilities, 28*(7/8), 371-382.. https://doi.org/10.1108/02632771011042473