

RESEARCH ARTICLE

Extension of time claim effectiveness in Malaysian construction projects: An empirical mixed-methods study of legal clarity, economic flexibility and psychological safety

E.M. Mazlan^{1,2}, A. Mohd Sarman^{1,2*}, A. S. Ramzi¹, N. Abdullah¹, S.S. Kamarudin¹, G. Wei³

¹Faculty of Engineering, Universiti Malaysia Sabah, 88400, Sabah, Malaysia

²Advanced Construction Technology (ACT) Research Unit, Faculty of Engineering, Universiti Malaysia Sabah, 88400, Sabah, Malaysia

³JiLin Agricultural Science and Technology University, No.77 Hanlin Road, Jilin Economic and Technological Development Zone, Jilin City 132101, China

Abstract – Ineffective administration of Extension of Time (EOT) claims remains a persistent governance challenge in construction projects, often resulting in disputes, cost overruns, and suppressed risk communication. Despite the existence of formal contractual provisions, many practitioners are reluctant to submit legitimate EOT claims due to legal ambiguity, punitive financial mechanisms, and perceived reputational risks. This study aims to empirically examine how legal framework clarity, economic flexibility, and psychological safety jointly influence the effectiveness of EOT claims in Malaysian construction projects. A mixed-methods approach was adopted. Quantitative data were collected through a structured questionnaire survey administered to 250 construction professionals from public and private sector organizations in Malaysia, and analysed using descriptive statistics, correlation analysis, multiple regression, and moderation analysis. Qualitative data were obtained from 15 semi-structured interviews with project managers, legal officers, and senior contractors, and analysed using thematic analysis to contextualize behavioural and organizational influences. The quantitative findings indicate that legal framework clarity is the strongest predictor of EOT claim effectiveness, followed by psychological safety, while economic flexibility significantly moderates the relationship between legal clarity and claim outcomes. Qualitative results reveal that fear of stigmatization, blame-oriented organizational cultures, and rigid penalty regimes suppress legitimate EOT claims, particularly among certain stakeholder groups. The study contributes by providing context-specific empirical validation of socio-legal and behavioural theories in construction contract administration, demonstrating that formal legal provisions alone are insufficient without supportive psychological and economic environments. Practically, the findings inform contract drafting, organizational governance, and policy reforms aimed at improving transparency, fairness, and risk communication in EOT administration.

Article History

Received : 23 November 2025

Revised : 20 January 2026

Accepted : 3 February 2026

Published : 30 June 2026

Keywords

Contract administration

Extension of time

Construction contract

Project risk management

Psychological barriers

Organizational behaviour

1. Introduction

Extension of Time (EOT) provisions are a fundamental component of construction contract administration, intended to ensure equitable risk allocation and protect contractors from delays beyond their control. In practice, however, EOT administration frequently becomes contentious, inconsistent, and prone to disputes. Globally, 50–70% of construction projects experience schedule overruns due to environmental uncertainty, material shortages, or administrative delays [1], [2]. In Malaysia, such delays contribute to cost overruns averaging 15–20% of the total project cost, with EOT-related disputes representing a recurring source of contractual conflict [3]. Although standard forms of contract such as FIDIC, PAM, and JKR contain detailed EOT provisions, their practical effectiveness is often undermined by interpretive ambiguity, bureaucratic approval processes, and adversarial enforcement cultures. Consequently, EOT mechanisms designed to facilitate transparency and fairness may instead discourage timely disclosure of delays, thereby exacerbating project risks and financial exposure. Existing studies on EOT practices have predominantly adopted legalistic or procedural perspectives, emphasising compliance with contractual notice requirements and entitlement conditions. While such approaches clarify formal rights and obligations, they tend to overlook the human and organisational dimensions that shape how contractual provisions are enacted in practice. Empirical evidence suggests that project managers frequently delay or avoid submitting justified EOT claims due to concerns about reputational damage, perceived managerial incompetence, or fear of punitive responses from clients and superiors [4]. Moreover, rigid financial penalty structures, including liquidated damages and inflexible incentive mechanisms, may unintentionally suppress early risk reporting rather than promote proactive delay management [5] - [6]. These limitations indicate that EOT outcomes cannot be fully explained by legal provisions or economic rationality alone, highlighting the need for a broader analytical perspective that incorporates behavioural and organisational factors.

A review of the literature reveals three interrelated gaps. First, psychological and cultural influences, such as stigma, anxiety, and power asymmetries, remain underexplored in empirical EOT research, despite their recognised importance in organisational decision-making. Second, socio-legal factors, including administrative discretion, governance quality, and perceived procedural fairness, are often discussed conceptually but rarely examined through integrated empirical

models. Third, while economic incentives and penalties are widely acknowledged as influential, their interaction with legal clarity and behavioural conditions has received limited empirical attention, particularly in developing and middle-income construction contexts. Addressing these gaps is critical for advancing both theory and practice, as ineffective EOT administration not only increases disputes but also undermines transparency, collaboration, and project learning. Accordingly, this study aims to empirically examine how legal framework clarity, psychological safety perception, and economic flexibility jointly influence the effectiveness of EOT claims in Malaysian construction projects. Using a mixed-methods design, the study investigates both the statistical relationships among these factors and the underlying behavioural mechanisms that shape stakeholder decision-making. Rather than claiming radical theoretical novelty, this study's contribution lies in its context-specific empirical validation and refinement of established legal, economic, and behavioural theories in construction contract administration. By integrating quantitative and qualitative evidence, the study demonstrates that EOT effectiveness is contingent not only on formal contractual provisions but also on supportive organisational cultures and balanced economic structures. The findings offer practical implications for contract drafting, organisational governance, and policy reform aimed at improving fairness, transparency, and risk communication in construction projects.

1.1 Literature Review

Extension of time provisions are a central mechanism within construction contract governance, designed to balance risk allocation between contracting parties when delays arise from causes beyond the contractor's control. Prior research consistently highlights that ineffective EOT administration is a major contributor to disputes, claim escalation, and adversarial relationships in construction projects [1]- [2]. While standard forms of contract such as FIDIC, PAM, and JKR provide detailed procedural requirements for EOT entitlement, empirical studies indicate that formal compliance does not necessarily translate into effective or equitable outcomes [3]. Much of the existing EOT literature adopts a doctrinal or procedural orientation, focusing on notice requirements, entitlement conditions, and legal interpretation. These studies have been valuable in clarifying contractual obligations; however, they often treat contract administration as a mechanistic process, assuming rational actors who respond predictably to legal rules. Such assumptions overlook the organisational, behavioural, and governance conditions under which EOT clauses are enacted in practice, particularly in complex and uncertainty-driven project environments. Recent governance-oriented studies suggest that contractual effectiveness depends not only on clause clarity but also on institutional quality, administrative discretion, and trust among project stakeholders [5]. This shift in perspective indicates that EOT performance should be understood as an outcome of broader governance systems rather than isolated legal provisions. From a legal standpoint, EOT claims are traditionally grounded in doctrines such as force majeure, prevention principle, and frustration of contract. These doctrines provide the normative basis for granting time relief when delays are attributable to excusable events beyond the contractor's control [7]. Nevertheless, empirical evidence from developing and middle-income economies indicates that the practical application of these doctrines is frequently constrained by bureaucratic inefficiencies, administrative opacity, and inconsistent interpretation [3], [8]. Several studies highlight that excessive formalism in EOT administration, characterised by rigid documentation requirements and discretionary approval hierarchies, can undermine procedural fairness and delay resolution [5]. Fauzan et al. [8] argue that legal determinism, where contractual compliance is prioritised over collaborative problem-solving, often transforms EOT from a risk-management mechanism into a source of conflict. Consequently, legal clarity alone may be insufficient to ensure effective EOT outcomes if governance structures discourage transparency and early disclosure. These findings suggest that legal frameworks must be evaluated not only for their textual clarity but also for how they are operationalised within organisational and administrative contexts.

Economic considerations play a critical role in shaping EOT-related behaviour. Delay-related financial mechanisms—such as liquidated damages, incentive bonuses, and penalty clauses are intended to align stakeholder interests and encourage timely project delivery. However, prior studies demonstrate that poorly designed or excessively punitive financial structures may produce unintended behavioural consequences [6]. Tang et al. [6] show that incentive contracts lacking transparent performance metrics can encourage opportunistic behaviour rather than efficiency. Conversely, behavioural economics research suggests that balanced and proportionate financial arrangements can promote cooperation, timely risk disclosure, and constructive negotiation [12]. In the context of EOT, rigid penalty regimes may discourage contractors from submitting legitimate claims, leading to delayed risk reporting and greater cost escalation over time. Despite recognition of these dynamics, existing empirical studies often examine economic incentives in isolation, without considering how they interact with legal clarity or organisational behaviour. This analytical separation limits understanding of how financial structures function within a broader governance system that influences EOT effectiveness.

An emerging stream of literature emphasises that contract administration is not purely rational or procedural but is significantly influenced by psychological and social factors. Whillans et al. [4] identify “extension request avoidance” as a behavioural phenomenon in which professionals, particularly women, hesitate to request legitimate extensions due to fear of stigma and reputational damage. These findings challenge conventional assumptions that contractual entitlements are exercised whenever they are legally justified. Theoretical frameworks such as Bandura's Social Cognitive Theory [9] and Ajzen's Theory of Planned Behaviour [10] provide explanatory insights into this behaviour. Perceived self-efficacy, social norms, and anticipated reactions from authority figures shape whether individuals act upon formal entitlements. In construction settings characterised by hierarchical structures and blame-oriented cultures, psychological safety becomes a critical determinant of communication behaviour [11]. Organisational studies further demonstrate that environments

fostering trust and openness are associated with higher levels of disclosure and learning, whereas punitive cultures encourage risk concealment [11]. Despite these insights, behavioural constructs remain underrepresented in quantitative EOT research, and their interaction with legal and economic variables has rarely been empirically tested.

A review of prior EOT studies reveals several methodological patterns. Many investigations rely on descriptive surveys or doctrinal legal analysis, offering limited inferential insight into causal or interactional relationships. Quantitative studies often focus on direct effects of contractual or managerial variables, with minimal attention to moderation or interaction mechanisms. Qualitative studies, while rich in contextual detail, are frequently presented as standalone analyses without systematic integration with quantitative findings. Moreover, transparency in instrument development, sampling justification, and analytical assumptions is uneven across the literature. Behavioural constructs, when included, are often measured indirectly or without explicit theoretical grounding. These methodological limitations constrain the explanatory power of existing EOT research and hinder cumulative theory development. Synthesising the reviewed literature reveals three interconnected gaps. First, existing EOT research remains dominated by legal and procedural perspectives, with limited empirical incorporation of psychological safety and organisational behaviour. Second, economic incentive structures are seldom examined as moderating mechanisms that shape how legal frameworks translate into practical outcomes. Third, few studies adopt an integrated mixed-methods design that systematically combines statistical testing with qualitative explanation. Positioned within these gaps, the present study does not seek to introduce radically new theory but rather to provide context-specific empirical validation and refinement of established socio-legal and behavioural perspectives within Malaysian construction projects. By empirically testing the joint and interactive effects of legal clarity, economic flexibility, and psychological safety and by triangulating quantitative results with qualitative insights, the study advances a more holistic understanding of EOT claim effectiveness as a governance and behavioural phenomenon.

1.2 Conceptual Framework

Guided by the literature synthesis, this study conceptualises the effectiveness of EOT claims as a governance outcome shaped by the interaction among legal, economic, and behavioural conditions. Rather than treating EOT administration as a purely procedural or legalistic process, the framework adopts a socio-legal behavioural perspective, recognising that contractual outcomes emerge from both formal structures and human agency. Four core constructs are examined:

Legal Framework Strength (LFS) refers to the perceived clarity, consistency, and procedural fairness of contractual provisions governing EOT claims. This includes explicit entitlement conditions, transparent approval procedures, and predictable administrative interpretation.

Psychological Safety Perception (PSP) denotes the extent to which project stakeholders feel safe to communicate delays, raise concerns, and submit EOT claims without fear of stigma, blame, or reputational damage. This construct reflects organisational culture, interpersonal trust, and perceived support within contractual relationships.

Economic Flexibility (EF) captures the degree to which financial mechanisms within contracts—such as penalties, incentives, and compensation provisions—are perceived as proportionate, balanced, and responsive to uncontrollable delay events.

EOT Claim Effectiveness (ECE) represents the extent to which EOT claims are submitted in a timely manner, evaluated fairly, and resolved efficiently, resulting in transparent risk allocation and reduced dispute escalation.

These constructs are grounded in established legal doctrine, behavioural theory, and economic governance literature, and are operationalised to reflect practitioners' lived experiences in construction project administration.

The proposed conceptual framework posits that EOT claim effectiveness is directly influenced by both legal and behavioural factors, while economic conditions shape how legal clarity translates into practical outcomes. Legal framework strength provides the formal basis for entitlement; however, its effectiveness depends on whether stakeholders feel psychologically safe to invoke contractual rights and whether financial structures discourage or encourage early disclosure. Psychological safety is theorised as a direct antecedent of EOT claim behaviour, consistent with organisational behaviour literature emphasising the role of trust and perceived control in decision-making. Economic flexibility, in contrast, is conceptualised as a moderating mechanism that conditions the impact of legal clarity on claim outcomes. Even well-defined legal provisions may fail to produce effective EOT administration if financial penalties are excessively punitive or incentives are misaligned. This framework deliberately avoids causal overstatement and instead models associative and interactional relationships that are empirically testable within a cross-sectional mixed-methods design.

Clear and consistent contractual provisions are widely recognised as essential for reducing ambiguity and dispute in EOT administration. Prior studies demonstrate that explicit entitlement conditions and transparent procedures enhance predictability and fairness in time-extension decisions. Accordingly, stronger legal frameworks are expected to improve EOT claim effectiveness by facilitating timely submission and objective evaluation.

H1: LFS is positively associated with ECE.

Behavioural and organisational research suggests that individuals are less likely to exercise formal entitlements when they anticipate negative social or professional consequences. In construction environments characterised by hierarchical authority and blame-oriented cultures, psychological safety becomes a critical determinant of communication behaviour. Stakeholders who perceive higher levels of psychological safety are therefore more likely to disclose delays and pursue legitimate EOT claims.

H2: PSP is positively associated with ECE.

Economic mechanisms influence how contractual rights are exercised in practice. When financial penalties are rigid or disproportionate, stakeholders may suppress legitimate claims despite legal entitlement. Conversely, flexible and balanced economic arrangements can reinforce the positive effects of legal clarity by reducing fear of adverse financial consequences. Thus, economic flexibility is expected to strengthen the relationship between legal framework strength and EOT claim effectiveness.

H3: EF positively moderates the relationship between LFS and ECE, such that the relationship is stronger under higher levels of economic flexibility.

Figure 1 shows that EOT claim effectiveness is influenced by the strength of the legal framework, perceived psychological safety, and economic flexibility.

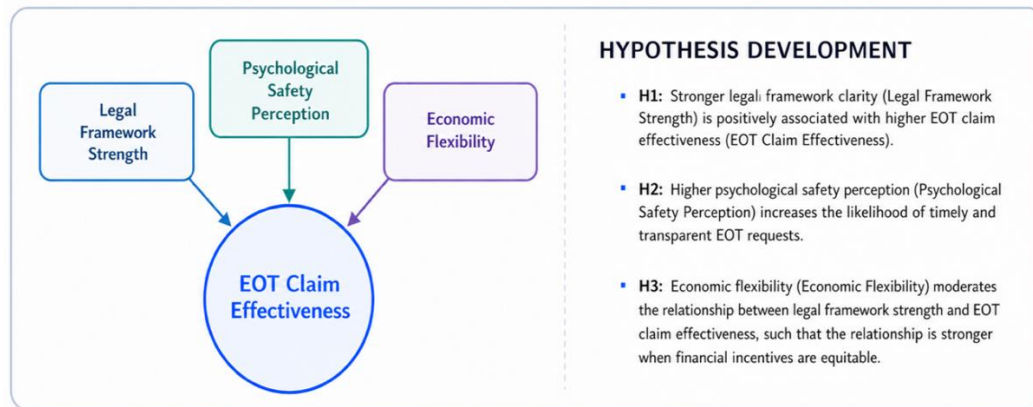


Figure 1. Conceptual framework and hypothesis development

2. Materials and Methods

2.1 Research Design

This study adopted a mixed-methods concurrent triangulation design to examine the legal, economic, and psychological determinants of the effectiveness of EOT claims in construction projects. The mixed-methods approach was selected to address the complexity of EOT governance, in which formal contractual mechanisms interact with behavioural and organisational dynamics that cannot be fully captured by a single method. Quantitative data were used to test hypothesised relationships among key constructs, while qualitative data provided contextual explanations of stakeholder behaviour and organisational practices influencing EOT decisions. The integration of both strands enabled methodological triangulation and enhanced construct validity, consistent with established mixed-methods research guidelines [13], [15]. The study followed four sequential stages: instrument development and pilot testing, quantitative data collection, qualitative interviews, and integrated interpretation of findings. Figure 2 illustrates the overall research process, highlighting the sequential and integrative stages of theory-driven instrument development, mixed-methods data collection, analytical procedures, and triangulated interpretation of findings.

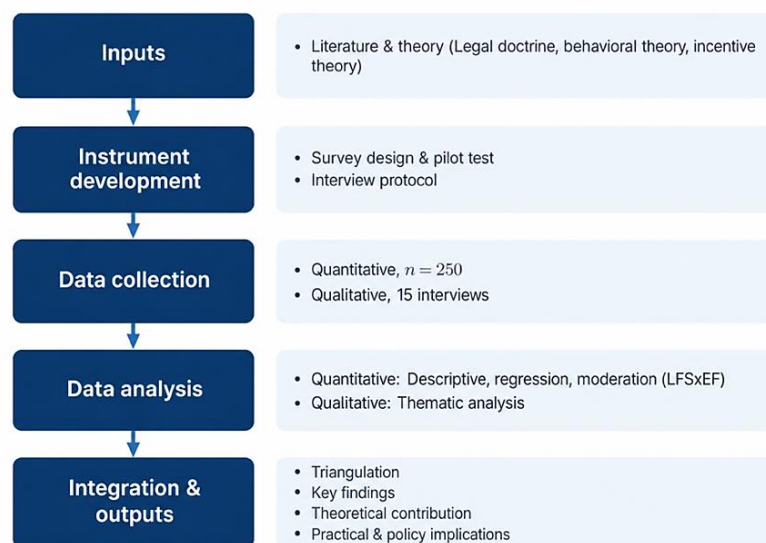


Figure 2. Overview of the research process and methodological integration adopted in this study

2.2 Survey Instrument Development

The survey instrument was developed using a theory-driven and literature-informed approach. Measurement items were adapted from prior studies on construction contract administration, psychological safety, and incentive structures, with modifications to suit the EOT context. Where necessary, new items were formulated to reflect industry-specific practices identified in the literature review. The questionnaire comprised five sections: (i) respondent demographic profile, (ii) LFS, (iii) PSP, (iv) EF, and (v) ECE. All perceptual items were measured using a five-point Likert scale ranging from 1 (“Strongly Disagree”) to 5 (“Strongly Agree”). To establish content validity, the draft instrument was reviewed by three senior academics specialising in construction law and project management and two industry practitioners with extensive experience in contract administration. A pilot study involving 30 construction professionals was subsequently conducted to assess clarity, relevance, and internal consistency. Minor wording adjustments were made based on participant feedback to improve readability and contextual alignment.

2.3 Data Collection and Sampling Strategy

The study population comprised construction professionals involved in contract administration, including project managers, contract administrators, legal officers, and senior technical personnel from public- and private-sector organisations in Malaysia. A structured questionnaire was distributed using a stratified purposive sampling approach, with strata defined by organisational role (client/public agency, consultant, contractor) to ensure representation of diverse contractual perspectives. A total of 300 questionnaires were distributed electronically, of which 250 valid responses were received and retained for analysis, representing an effective response rate of approximately 83%. This sample size exceeds minimum requirements for multiple regression and moderation analysis, providing sufficient statistical power for hypothesis testing. Participation criteria required respondents to have direct experience with EOT-related decision-making or administration. Responses that did not meet these criteria or contained substantial missing data were excluded. Table 1 presents the demographic and professional profile of the respondents, including gender, years of experience, organisational role, and sector.

Table 1. Demographic and professional characteristics of respondents (N = 250)

Variable	Category	<i>n</i>	%
Gender	Male	165	66.0
	Female	85	34.0
Years of Professional Experience	<5 years	32	12.8
	5–10 years	76	30.4
	11–15 years	61	24.4
	>15 years	81	32.4
Organisation Type	Contractor	105	42.0
	Consultant	95	38.0
	Public Agency / Client	50	20.0
Professional Position	Project Manager	67	26.8
	Contract Administrator	58	23.2
	Legal Officer	30	12.0
	Senior Engineer / Technical Personnel	95	38.0

2.4 Qualitative Component

To complement the survey findings, a qualitative component was incorporated to explore behavioural and organisational influences on EOT practices. Fifteen semi-structured interviews were conducted with purposively selected participants, comprising project managers, legal officers, and senior contractors. Participant selection was guided by experience level and involvement in EOT-related processes to ensure information-rich cases. Interviews focused on perceptions of legal clarity, organisational culture, communication barriers, financial risk exposure, and decision-making behaviour related to EOT claims. Data collection continued until thematic saturation was achieved, where no substantively new insights emerged. Interview data were analysed using thematic analysis following Braun and Clarke’s six-phase framework. Coding was conducted iteratively, combining deductive codes derived from the conceptual framework with inductive codes emerging from the data. To enhance credibility and dependability, coding consistency was reviewed through peer discussion among the research team, and illustrative quotations were used to support key themes.

2.5 Data Analysis Procedures

Quantitative data were analysed using SPSS version 26. Analysis proceeded in four stages. First, descriptive statistics were used to summarise respondent characteristics and EOT-related practices. Second, Pearson correlation analysis examined bivariate relationships among constructs. Third, multiple regression analysis tested the direct associations hypothesised in H1 and H2. Fourth, moderation analysis was conducted to test H3 by introducing an interaction term between Legal Framework Strength and Economic Flexibility. All predictor variables were mean-centred prior to interaction term construction to reduce multicollinearity. Statistical significance was evaluated at $p < 0.05$. Reliability

was assessed using Cronbach's alpha and composite reliability, while convergent validity was examined through Average Variance Extracted (AVE). Given the self-reported nature of the data, common method bias was assessed using Harman's single-factor test. The results indicated that no single factor accounted for the majority of variance, suggesting that common method bias was unlikely to threaten the validity of the findings. Qualitative findings were integrated with quantitative results during interpretation to explain observed statistical relationships and provide deeper insight into behavioural mechanisms.

2.6 Ethical Considerations

Participation in the study was voluntary, and respondents were informed of the study's purpose and assured of anonymity and confidentiality. No personally identifiable information was collected. Ethical approval was not required as the study did not involve sensitive personal data or vulnerable populations.

3. Results and Analysis

A total of 250 valid responses were analysed. The respondents comprised construction professionals directly involved in contract administration and project management functions. The sample included representatives from public agencies, consulting firms, and contracting organisations, ensuring balanced coverage of key stakeholder groups in EOT administration. Most respondents possessed more than five years of industry experience, indicating adequate familiarity with contractual procedures and EOT-related decision-making. Table 2 summarises the demographic and professional characteristics of the respondents.

Table 2. Summarises the demographic and professional characteristics of the respondents

Professional characteristics	Percentage (%)
Contractors	42
Consultants	38
Public-sector project administrators	20

3.1 Descriptive Statistics

Overall, respondents reported relatively high perceptions of legal framework strength, suggesting general awareness of contractual provisions governing EOT claims. Perceptions of psychological safety exhibited moderate mean values, indicating variability in organisational and contractual cultures across projects. Economic flexibility recorded moderate scores, reflecting mixed perceptions regarding financial rigidity and incentive structures. EOT claim effectiveness showed moderate-to-high mean values, suggesting that while EOT mechanisms exist, their practical effectiveness varies across contexts. Approximately 65% of respondents reported submitting at least one EOT request within the previous 12 months. The most frequent causes of delay were shown in Figure 3. These findings align with established risk categories in construction-delay literature [16], confirming the continuing prevalence of physical and administrative disruptions. The dominance of unforeseen site conditions (42%) and supply-chain disruptions (30%) is consistent with Malaysian studies such as Sambasivan and Soon [3] and Jusoh and Sarman [19], reinforcing those physical disruptions remain structural rather than managerial problems.

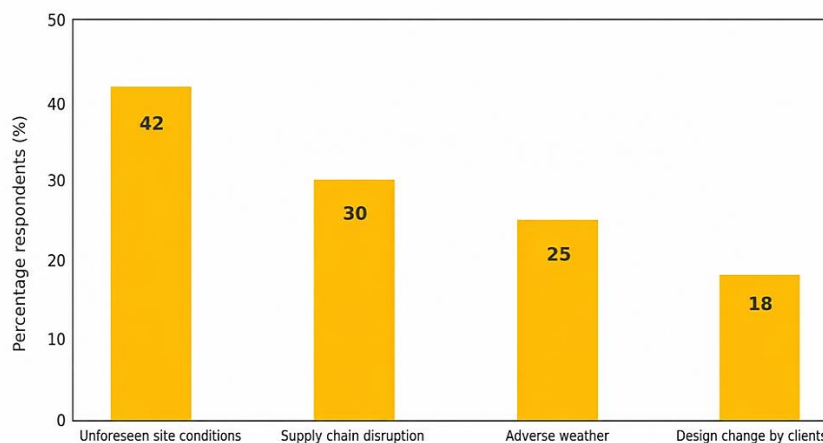


Figure 3. Frequency and drivers of EOT requests

The qualitative insights reveal profound psychological barriers that deter stakeholders from initiating time extension requests. The average comfort level in requesting extensions was moderate at 3.2 on a 5-point Likert scale. A recurring theme was the anxiety and fear of stigmatisation. Many participants expressed concerns about being perceived as incompetent. The anxiety expressed by stakeholders particularly the observation of lower comfort levels among female professionals (average score of 2.8 versus a male average of 3.6) correlates with broader discussions on gender dynamics in leadership and negotiation roles. The role of organisational culture in shaping the negotiation of time extensions is also

critical. Supportive environments promoting open dialogues were linked to higher rates of successful request approvals, highlighting the need for systems that foster environments conducive to vulnerability and transparency in negotiations. The social psychology of negotiation suggests that stakeholders may prioritise preserving their reputation over transparent communication, thereby complicating contract administration. Figure 4 shows the Psychological and Cultural Factors Affecting EOT Requests.

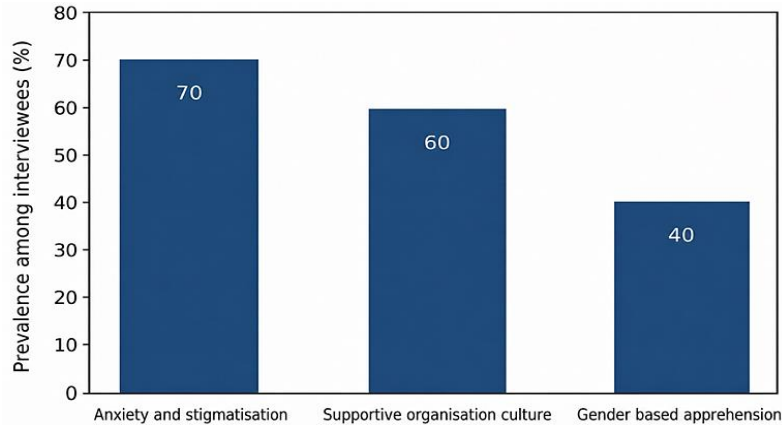


Figure 4. Psychological and cultural factors affecting EOT requests

The research findings on economic impacts revealed that projects requiring time extensions experienced an average 15% increase in project budgets. This observation underscores the need for contractual frameworks to incorporate flexibility without unduly penalising contractors. Furthermore, the observation that financial penalties for delays often discouraged 60% of participants from requesting warranted extensions highlights a systemic issue. This punitive approach may lead to delayed risk reporting, ultimately exacerbating problems. While incentive contracts were noted as motivating (70% of participants who used them), concerns about inadequate performance metrics persisted. Figure 5 shows the Economic Implications of Time Extensions. This validates the literature gap on the empirical efficacy of incentive structures and aligns with discussions on the potential of qualitative methodologies to derive practical insights into how economic structures within a contract affect stakeholder motivation. The internal consistency of the measurement constructs was assessed using Cronbach's alpha and composite reliability. All constructs exceeded the recommended threshold of 0.70, indicating satisfactory reliability. Convergent validity was examined using AVE, with all constructs meeting the minimum acceptable value of 0.50. These results confirm that the measurement items adequately represent their respective latent constructs. To assess potential common method bias, Harman's single-factor test was conducted. The results showed that no single factor accounted for the majority of variance, suggesting that common method bias was unlikely to significantly affect the findings. Table 3 shows the construct reliability and validity summary. All alpha values exceed the recommended 0.70 threshold [17], confirming reliability. AVE values above 0.50 indicate convergent validity.

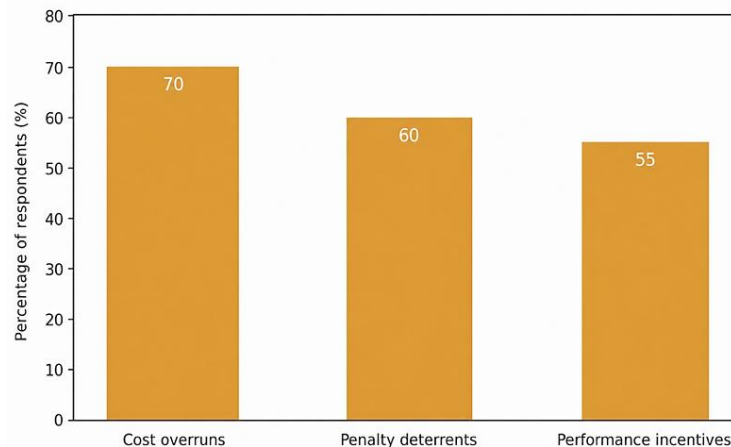


Figure 5. Economic implications of time extensions

Table 3. Construct reliability and validity summary

Construct	Cronbach's α	CR	AVE
Legal framework strength	0.88	0.91	0.67
Psychological safety perception	0.86	0.89	0.63
Economic flexibility	0.82	0.86	0.61
EOT claim effectiveness	0.89	0.92	0.69

3.2 Correlation Analysis

Pearson correlation analysis was conducted to examine the bivariate relationships among the study variables. As shown in Table 4, all independent variables were positively correlated with EOT claim effectiveness. Legal framework strength exhibited the strongest correlation with EOT claim effectiveness, followed by psychological safety perception. Economic flexibility was also positively correlated with both legal framework strength and EOT claim effectiveness. No correlation coefficients exceeded the threshold indicative of multicollinearity concerns.

Table 4. Pearson correlation matrix of study variables

Variables	1	2	3	4
1. Legal framework strength	1.000			
2. Psychological safety perception	-	1.000		
3. Economic flexibility	-	-	1.000	
4. EOT claim effectiveness	0.68**	0.55**	-	1.000

Note:

r = Pearson correlation coefficient.

** Correlation is significant at $p < 0.01$.

“—” indicates values not reported or not emphasised in the original analysis.

Multiple regression analysis was conducted to examine the direct relationships between the independent variables and EOT Claim Effectiveness, as hypothesised in H1 and H2. LFS and PSP were entered simultaneously into the regression model to assess their individual contributions while controlling for the effects of other predictors. The results indicate that Legal Framework Strength has a strong, statistically significant positive association with EOT Claim Effectiveness ($\beta = 0.47$, $t = 6.84$, $p < 0.001$), supporting H1. This finding suggests that clearer contractual provisions, transparent administrative procedures, and consistent emphasis on procedural fairness significantly enhance the effectiveness of EOT claim submission and evaluation. Psychological Safety Perception also demonstrates a statistically significant positive relationship with EOT Claim Effectiveness ($\beta = 0.31$, $t = 5.72$, $p = 0.002$), supporting H2. This result indicates that stakeholders who perceive greater freedom to communicate delays without fear of blame or reputational damage are more likely to initiate timely and transparent EOT claims. Collectively, the regression model exhibits satisfactory explanatory power, confirming that both formal legal clarity and behavioural conditions play meaningful roles in shaping the effectiveness of EOT claims [18]. The standardised regression coefficients further indicate that while Legal Framework Strength emerges as the dominant predictor, Psychological Safety Perception provides an important complementary influence by enabling the practical exercise of contractual entitlements. The regression coefficients for the predictors of EOT Claim Effectiveness are illustrated in Figure 6, while the full regression results are summarised in Table 4.

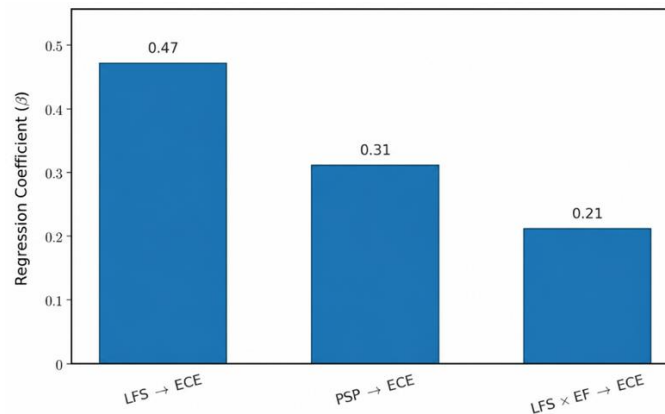


Figure 6. Regression coefficients for predictors of EOT claim effectiveness

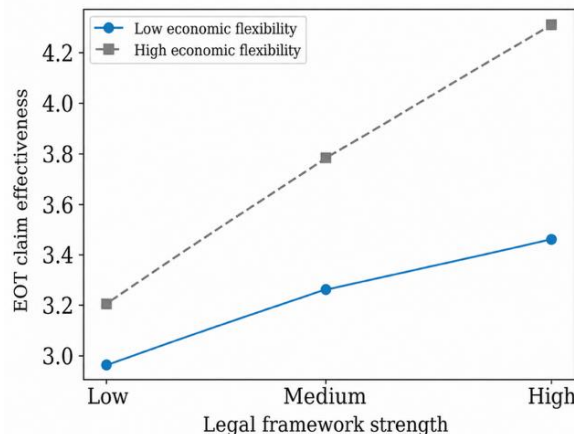


Figure 7. The positive association between legal framework strength and EOT claim effectiveness

3.3 Moderation Analysis

Following the examination of direct effects, moderation analysis was conducted to test whether EF conditions the relationship between Legal Framework Strength and EOT Claim Effectiveness, as proposed in H3. An interaction term (LFS $\times$ EF) was introduced into the regression model after mean-centring all predictor variables to reduce potential multicollinearity. The results reveal that the interaction between Legal Framework Strength and Economic Flexibility is statistically significant ($\beta = 0.21$, $p = 0.011$), providing empirical support for H3. This finding indicates that the effectiveness of legal framework clarity in improving EOT claim outcomes is not uniform across contexts but depends on the degree of flexibility embedded within contractual financial arrangements. To aid interpretation of the interaction effect, the relationship between Legal Framework Strength and EOT Claim Effectiveness was plotted at low and high levels of Economic Flexibility (-1 SD and $+1$ SD, respectively). As illustrated in Figure 7, the positive association between Legal Framework Strength and EOT Claim Effectiveness becomes more pronounced under conditions of higher Economic Flexibility. Conversely, when Economic Flexibility is low, the relationship remains positive but comparatively weaker, suggesting that rigid financial mechanisms may dampen the practical impact of otherwise clear legal provisions. These results suggest that while legal clarity provides the formal foundation for effective EOT administration, its influence is amplified when financial penalties and incentives are perceived as balanced and responsive to uncontrollable delay events. In economically rigid environments, stakeholders may remain reluctant to pursue legitimate EOT claims despite clear contractual entitlement, thereby constraining the effectiveness of legal governance mechanisms. Overall, the moderation analysis confirms that Economic Flexibility serves as a contextual mechanism shaping how Legal Framework Strength translates into effective EOT claim outcomes, reinforcing the integrated legal–economic–behavioural perspective adopted in this study.

Table 5. Regression output

Predictor	β	t-value	p-value	Results
LFS $\rightarrow$ ECE	0.47	6.84	0.000	H1 Supported
PSP $\rightarrow$ ECE	0.31	5.72	0.002	H2 Supported
LFS $\times$ EF $\rightarrow$ ECE	0.21	3.15	0.011	H3 Supported

Table 5 summarises the hypothesis testing results. All three hypotheses were supported by the quantitative analysis. The quantitative findings demonstrate that legal clarity, psychological safety, and economic conditions jointly shape EOT claim effectiveness, with legal framework strength emerging as the most influential predictor. The empirical findings demonstrate that LFS is the most influential determinant of EOT Claim Effectiveness. This is evidenced by its strong correlation with EOT claim effectiveness ($r = 0.68$, $p < 0.01$) and its substantial standardised regression coefficient ($\beta = 0.47$). These results confirm that contractual clarity, procedural certainty, and consistency in administrative interpretation remain central to effective EOT governance in construction projects. Within the Malaysian construction context, EOT administration is predominantly contract-driven, with formal provisions governing entitlement, notice requirements, and approval procedures. Clear legal frameworks reduce interpretive ambiguity and discretionary inconsistency, thereby enhancing stakeholders' confidence in pursuing legitimate time extensions. The findings align with established construction law literature, which emphasises that time-related claims are fundamentally rooted in contractual governance rather than managerial discretion. However, the results also suggest that legal clarity functions as a necessary but not sufficient condition. While strong legal frameworks provide the structural foundation for EOT administration, their effectiveness depends on complementary organisational and economic conditions that enable the exercise of contractual rights in practice.

PSP exhibits a statistically significant positive association with EOT Claim Effectiveness ($\beta = 0.31$), highlighting the importance of behavioural and cultural factors in contract administration. This finding indicates that stakeholders are more likely to submit timely and transparent EOT claims when they perceive a supportive environment that minimises fear of blame, stigma, or reputational damage. The result reinforces organisational behaviour theories suggesting that formal contractual entitlements may remain underutilised in environments characterised by hierarchical authority structures and punitive contract cultures. In such settings, individuals may prioritise preserving their reputation over transparent disclosure, even when a contractual entitlement exists. Psychological safety therefore operates as an enabling condition that allows legal mechanisms to function as intended. Importantly, the relative strength of LFS compared to PSP suggests that behavioural conditions complement rather than replace formal legal structures. Psychological safety does not independently drive EOT effectiveness but facilitates the practical activation of legally grounded entitlements within day-to-day project administration.

The moderation analysis provides further insight into how contractual governance operates in practice. The significant interaction between Legal Framework Strength and Economic Flexibility ($\beta = 0.21$, $p = 0.011$) indicates that financial arrangements condition the extent to which legal clarity translates into effective EOT claim outcomes. As illustrated in Figure 7, the positive relationship between Legal Framework Strength and EOT Claim Effectiveness is markedly stronger under conditions of higher Economic Flexibility. When financial penalties, incentive mechanisms, and compensation provisions are perceived as balanced and proportionate, stakeholders are more willing to invoke contractual rights without fear of disproportionate financial consequences. Conversely, in economically rigid environments, the benefits of legal clarity are partially constrained, as stakeholders may suppress legitimate claims to avoid adverse financial exposure. This finding supports governance and behavioural economics perspectives, which argue that rigid penalty regimes may discourage early disclosure of delays and inadvertently exacerbate downstream disputes. Economic Flexibility therefore

functions as a contextual amplifier that strengthens the practical impact of legal frameworks rather than acting as a direct driver of EOT effectiveness.

3.4 Integration of Legal, Psychological, and Economic Dimensions

Taken together, the findings demonstrate that EOT claim effectiveness emerges from the interaction of formal legal structures and informal organisational conditions, rather than from any single factor in isolation. Legal frameworks establish entitlement, psychological safety enables claim initiation, and economic flexibility conditions the willingness to pursue claims without fear of disproportionate financial repercussions. The qualitative findings further reinforce this interpretation by revealing that fear of stigmatisation and punitive contract cultures suppress legitimate claims, particularly among certain stakeholder groups. These behavioural barriers explain why legally sound EOT entitlements may remain underutilised in practice. Rather than proposing a new theoretical model, this study provides context-specific empirical validation of established legal and behavioural theories within Malaysian construction practice. It demonstrates that EOT governance is best understood as a socio-legal and economic process, where contractual effectiveness depends on alignment between formal rules and the organisational environments in which they are applied.

3.5 Theoretical Implications

This study contributes by confirming and contextualising existing construction governance theories. It empirically demonstrates that legal determinism alone is insufficient to explain EOT outcomes and that behavioural and economic conditions play critical supporting roles. By empirically testing moderation effects within an EOT governance context, the study extends prior legal-centric research and responds to calls for more behaviourally informed studies of construction contracts. However, the contribution remains incremental rather than theory-building, refining existing perspectives rather than replacing them. From a practical standpoint, the findings suggest that improving EOT effectiveness requires more than refining contract clauses. Project owners and administrators should also foster psychologically safe communication environments and consider economic mechanisms that reduce fear-driven claim suppression. At the policy level, public-sector standard forms and administrative guidelines may benefit from clearer EOT procedures combined with governance practices that encourage early disclosure and fair assessment of delays. Such measures may reduce downstream disputes and adversarial escalation. Prior studies such as Kanchanarak [20] and Wang et al. [21] examined administrative rigidity in EOT claims but did not integrate behavioural data. The current results advance that work by illustrating how behavioural resistance quantitatively interacts with contract variables. Additionally, the findings align with Massad [22], who identified time-cost correlation but did not explore the psychosocial causes underlying delayed communication. This research thereby bridges quantitative and qualitative traditions, offering a more holistic view of construction project management. Several limitations should be acknowledged. First, the study adopts a cross-sectional design, limiting causal inference. Second, the reliance on self-reported data introduces the potential for perceptual bias. Third, the findings are context-specific to Malaysia and may not be directly generalizable to other jurisdictions with different legal and contractual regimes. Future research could explore longitudinal designs, comparative cross-country studies, or qualitative investigations focusing on specific stakeholder groups to further unpack behavioural dynamics in EOT governance.

4. Conclusions

This study examined the effectiveness of EOT claims in construction projects through an empirical investigation of legal, psychological, and economic factors within the Malaysian construction context. Using a mixed-methods approach, the study assessed how Legal Framework Strength, Psychological Safety Perception, and Economic Flexibility are associated with EOT claim effectiveness. The findings confirm that legal framework strength is the most influential determinant of EOT claim effectiveness, underscoring the central role of contractual clarity, procedural certainty, and enforceability in time-related contract administration. However, the results also demonstrate that legal mechanisms do not operate in isolation. Psychological safety facilitates the practical exercise of contractual entitlements, while economic flexibility conditions the extent to which legal clarity translates into effective EOT outcomes. Rather than proposing a new theoretical model, this study provides context-specific empirical validation of established legal and behavioural theories in construction contract governance. It highlights that the effectiveness of EOT mechanisms depends not only on formal contractual provisions but also on the organisational and economic environments in which these provisions are applied. From a practical perspective, the findings suggest that efforts to improve EOT administration should move beyond contractual refinement alone. Enhancing communication climates, reducing fear-driven claim suppression, and incorporating flexible economic arrangements may contribute to more transparent and effective management of time-related claims. Overall, this study contributes to the construction management literature by offering a nuanced understanding of EOT governance in a developing construction market. While the findings are context-bound and confirmatory, they provide a foundation for future research exploring behavioural and institutional dynamics in construction contract administration across jurisdictions.

Acknowledgements

The authors would like to thank the Faculty of Engineering, Universiti Malaysia Sabah for providing the facilities for the research. This study was not supported by any grants from funding bodies in the public, private, or not-for-profit sectors.

Funding

This study was not supported by any grants from funding bodies in the public, private, or not-for-profit sectors.

Declaration of Competing Interests

The authors declare no conflicts of interest.

Credit Authorship Contribution Statement

E. M. Mazlan (Conceptualisation; Formal analysis; Writing - review & editing)
 A. Mohd Sarman (Conceptualisation; Visualisation; Supervision; Writing - review & editing)
 A. S. Ramzi (Investigation; Writing - review & editing)
 N. Abdullah (Investigation; Writing - review & editing)
 S. S. Kamarudin (Data collection; Analysis; Validation; Writing - original draft; Resources)
 Wei G (Methodology; Data curation; Writing - review & editing)

Availability of Data and Materials

The data supporting this study's findings are available on request from the corresponding author.

Ethics Declarations

This study did not involve human participants or animals. Ethical approval was therefore not required.

Generative Artificial Intelligence Declarations

The authors claim that artificially intelligent-assisted technologies, such as generative AI, were not used to generate content, ideas, or theories. We have just utilised AI to enhance readability and refine the language. This was used with extreme human control and oversight. The authors take full responsibility for reviewing and approving the content.

References

- [1] S. Singh, C. Thakre, and A. Kumar, "Guidance on extension of time in construction contracts," *International Journal of Scientific Research in Engineering and Management*, vol. 7, no. 4, pp. 10–18, 2023, <https://doi.org/10.55041/IJSREM19431>.
- [2] T. Endicott, "Contracts in Administrative Law," in *Administrative Law*, pp. 599–644, 2021.
- [3] M. Sambasivan and Y. W. Soon, "Causes and effects of delays in Malaysian construction industry," *International Journal of Project Management*, vol. 25, no. 5, pp. 517–526, 2007, <https://doi.org/10.1016/j.ijproman.2006.11.007>.
- [4] A. V. Whillans, J. Yoon, A. Turek, and G. E. Donnelly, "Extension request avoidance predicts greater time stress among women," *Proceedings of the National Academy of Sciences of the United States of America*, vol. 118, no. 45, p. e2105622118, 2021, <https://doi.org/10.1073/pnas.2105622118>.
- [5] B. Mikušová Meričková, M. Majerík, and M. Lendvorský, "The problem of corruption in the contracting out of public services: The case of Slovakia," *Acta Universitatis Bohemiae Meridionalis*, vol. 24, no. 2, pp. 75–90, 2021, <https://doi.org/10.32725/acta.2021.008>.
- [6] C. S. Tang, K. Zhang, and S. X. Zhou, "Incentive contracts for managing a project with uncertain completion time," *Production and Operations Management*, vol. 24, no. 12, pp. 1945–1954, 2015, <https://doi.org/10.1111/poms.12387>.
- [7] K. S. Aboelazm, "The legal framework and policies for sustainable administrative contracts in Egypt: Reality and challenges," *International Journal of Public Law and Policy*, vol. 9, no. 2, pp. 111–129, 2023, <https://doi.org/10.1504/IJPLAP.2023.130011>.
- [8] N. Fauzan, M. S. Misnan, M. Mustapa, N. M. Shukery, and M. Z. Ismail, "Challenges in construction project management: Time extensions and claims implications," *International Journal of Research and Innovation in Social Science*, vol. 9, no. 1, pp. 4027–4044, 2025, <https://doi.org/10.47772/IJRISS.2025.9010312>.
- [9] A. Bandura, *Self-Efficacy: The Exercise of Control*, New York, NY, USA: W. H. Freeman, 1997.
- [10] I. Ajzen, "The theory of planned behavior," *Organizational Behavior and Human Decision Processes*, vol. 50, no. 2, pp. 179–211, 1991, [https://doi.org/10.1016/0749-5978\(91\)90020-T](https://doi.org/10.1016/0749-5978(91)90020-T).
- [11] A. C. Edmondson, "Psychological safety and learning behavior in work teams," *Administrative Science Quarterly*, vol. 44, no. 2, pp. 350–383, 1999, <https://doi.org/10.2307/2666999>.
- [12] G. Hofstede, *Culture's Consequences: Comparing Values, Behaviors, Institutions, and Organizations Across Nations*, 2nd ed. Thousand Oaks, CA, USA: Sage, 2001.
- [13] J. Schoonenboom and R. B. Johnson, "How to construct a mixed methods research design," *Kölner Zeitschrift für Soziologie und Sozialpsychologie*, vol. 69, Suppl. 2, pp. 107–131, 2017, <https://doi.org/10.1007/s11577-017-0454-1>.
- [14] M. S. Sai Vinod, P. Umesh, and N. Sivakumar, "Impact of COVID-19 on corporate social responsibility in India: A mixed methods approach," *International Journal of Organizational Analysis*, vol. 31, no. 1, pp. 168–195, 2023, <https://doi.org/10.1108/IJOA-03-2022-3206>.
- [15] H. E. Levitt et al., "Journal article reporting standards for qualitative primary, qualitative meta-analytic, and mixed methods research in psychology: The APA Publications and Communications Board task force report," *American Psychologist*, vol. 73, no. 1, pp. 26–46, 2018, <https://doi.org/10.1037/amp0000151>.

- [16] K. M. Phillips, A. A. Tichavakunda, and A. R. Sedaghat, "Qualitative research methodology and applications: A primer for the otolaryngologist," *The Laryngoscope*, vol. 134, no. 1, pp. 27–31, 2024, <https://doi.org/10.1002/lary.30817>.
- [17] A. C. Curtis and C. Keeler, "Interpretive methodologies in qualitative nursing research," *American Journal of Nursing*, vol. 122, no. 10, pp. 45–49, 2022, <https://doi.org/10.1097/01.NAJ.0000890224.65902.0a>.
- [18] C. S. F. Fernandes, J. Loureiro, and F. Alves, "Research in environmentally induced human mobility: An analysis of methodological and theoretical dimensions," *International Journal of Climate Change Strategies and Management*, vol. 15, no. 5, pp. 729–744, 2023, <https://doi.org/10.1108/IJCCSM-11-2022-0137>.
- [19] C. A. Jusoh and A. M. Sarman, "Claim loss and expense due to extension of time (EOT)," *Review of International Geographical Education Online*, vol. 11, no. 7, pp. 220–228, 2021.
- [20] M. Kanchanarak, "Problems in the interpretation of administrative contracts: The case of contract for public services and contract for providing public utilities in accordance with the Act on Establishment of Administrative Courts and Administrative Court Procedure B.E. 2542," *Parichart Journal*, vol. 37, no. 3, pp. 566–581, 2024, <https://doi.org/10.55164/pactj.v37i3.269245>.
- [21] Y. Wang, Y. Chen, W. Wang, Y. Chen, and M. Jin, "Revisiting the relationship between contract governance and contractors' opportunistic behavior in construction projects," *IEEE Transactions on Engineering Management*, vol. 69, no. 6, pp. 2517–2529, 2022, <https://doi.org/10.1109/TEM.2019.2945551>.
- [22] R. S. B. Massad, "The evaluation of construction projects time overrun and cost overrun using machine learning method: A case of Jordan," *International Journal of Scientific Development and Research*, vol. 9, no. 8, pp. 166–177, 2024, <https://doi.org/10.5281/zenodo.13237271>.