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Assessing Contractor Site Supervision for Construction Delay Mitigation: Delay Factors, Implementation Barriers and Improvement Strategies in Kuala Lumpur, Malaysia

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ABSTRACT

Effective contractor site supervision requires both professional competence and organizational support, yet these dimensions are often examined separately in construction-delay research. This study investigates perceived supervision-related delay factors, barriers to implementing supervisory responsibilities under Pertubuhan Akitek Malaysia (Malaysian Institute of Architects (PAM) Contract 2018, and management improvement priorities in Kuala Lumpur building projects. A quantitative, cross-sectional questionnaire survey yielded 113 contractor-affiliated responses through targeted, non-probability recruitment. Data were analyzed using descriptive statistics and the Relative Importance Index (RII). Inadequate daily monitoring ranked highest among supervisory delay factors (RII = 0.896), followed by poor subcontractor coordination (0.804). Limited decision-making authority (0.867) and insufficient manpower or resources (0.830) were the leading implementation barriers. Digital tools (0.858) and routine monitoring and reporting (0.851) received the highest improvement-strategy rankings. The findings suggest that supervisory development should combine task-specific training with clearer delegation, adequate resources and actionable reporting. The study contributes a management-oriented interpretation linking supervisory responsibilities with organizational implementation conditions. Non-probability recruitment, the predominance of quantity surveyors and reliance on perceptions limit generalizability and prevent causal conclusions.

Keywords: Construction Delays; Contractor Site Supervision; Construction Project Management; Organizational Barriers; Malaysian Institute of Architects

1. INTRODUCTION

Reliable project delivery depends on how organizations translate plans and formal responsibilities into coordinated operational action (Alfarsi & Oo, 2026). In building construction, this challenge is particularly acute on site, where contractors must continuously reconcile shifting work conditions, interdependent subcontractor schedules, and competing resource demands (Halou et al., 2019). Schedule delays therefore raise fundamental management questions concerning organizational capability, information flows, and the allocation of authority for corrective decisions. Sanni-Anibire et al. (2022) identify poor site organization, coordination breakdowns, and inadequate resource planning among the most prominent causes of construction delay.

Their findings position schedule reliability not merely as a technical scheduling issue, but as an organizational challenge with direct consequences for cost control, contractual disputes, and delivery continuity. Yap et al. (2021) identify inadequate planning, client-initiated changes, incompetent site management and supervision, subcontractor weaknesses, and contractor financial constraints as leading delay drivers. Crucially, their analysis links these operational failures to five underlying managerial capabilities: competency management, communication and coordination, financial management, risk management, and site management. Improving schedule performance thus requires examining how contractor organization's structure, support, and coordinate frontline operational work.

For senior managers, the central practical problem is determining which supervisory deficiencies require targeted intervention and which organizational arrangements enable site personnel to execute their duties effectively (Haloul et al., 2024). Contractor site supervision provides an ideal lens for examining this problem because it sits directly at the interface between corporate expectations and daily execution. Supervisors interpret technical and contractual requirements, monitor physical progress, coordinate specialist trades, and escalate emerging deviations requiring managerial intervention. Ijaola et al. (2023) demonstrate that site supervisors' task performance significantly shapes overall project outcomes, validating supervision as a core managerial capability. However, individual competence alone does not guarantee effective execution. A supervisor may detect a workflow bottleneck or quality defect early yet lack the delegated authority, support personnel, or reporting channels needed to enforce timely corrective action. Examining site supervision therefore requires evaluating both individual professional capability and the organizational conditions under which supervisory responsibilities are exercised.

Galbraith's (1974) information-processing perspective offers a useful conceptual lens for analysing this relationship. It links task uncertainty to organizational design, framing vertical information systems and lateral coordination mechanisms as essential responses to operational complexity. Applied to construction supervision, this perspective directs attention to whether real-time information about site deviations reaches personnel empowered to coordinate an appropriate response. Routine site monitoring holds limited managerial value if detected problems stall due to ambiguous decision rights or inadequate organizational backing. This study draws on Galbraith's reasoning to interpret supervisory practices and implementation barriers; it does not seek to test a formal information-processing model or establish causal relationships between organizational structures and project completion durations.

A critical gap in the literature concerns how these organizational dynamics operate within a defined contractual framework. Reviewing 70 delay studies across 33 developing economies, Selcuk et al. (2024) highlight inconsistent terminology and a widespread neglect of project type, delivery system, and contract form. While existing studies catalogue numerous delay causes, they offer limited insight into how supervisory obligations are operationalized within specific contractual environments. In Malaysia's private building sector, the Pertubuhan Akitek Malaysia (PAM) Contract 2018 establishes formal contractor obligations governing site agents, site staff, workmanship, and progress control (Pertubuhan Akitek Malaysia, 2018). The resulting research problem centers on the perceived gap between these formal contractual expectations and the internal managerial capacity available to implement them on site.

Thus, this study explores contractor site supervision as an organizational management function for decreasing perceived delay risks in Kuala Lumpur building projects. It aims to emphasize supervision-related deficiencies highlighted by practitioners; to evaluate perceived institutional obstacles hindering the execution of supervisory duties under the PAM Contract 2018; and to determine management priorities for enhancing supervisory practices.

Three research questions steer the inquiry: Which supervision shortcomings are viewed as most relevant to construction delays? What institutional impediments hinder the fulfillment of contractual oversight duties? Which management interventions are emphasized for enhancing supervisory effectiveness? These inquiries maintain the empirical limits of the foundational survey while concentrating directly on managerial choices and operational execution. The intended contribution is a management-oriented synthesis linking supervisory tasks, organizational implementation constraints, and improvement priorities. Rather than treating delay factors in isolation, the study translates practitioner assessments into an integrated account of supervisory competence, decision authority, resource support, and information systems.

These insights can guide contractor decisions regarding staff development, authority delegation, reporting protocols, and digital monitoring adoption, while clearly distinguishing recommended interventions from proven performance gains. Bounded by a cross-sectional survey of professionals within Grade 7 (G7) contractor organizations in Kuala Lumpur, the study offers contextual evidence for managerial decision-making rather than causal estimates of delay reduction or generalizations across all Malaysian contractors.

2. LITERATURE REVIEW

2.1 Construction Delays as an Organizational Management Problem

Construction-delay research establishes a broad range of financial, operational and administrative influences on project schedules. Sanni-Anibire et al. (2022) identified 36 recurring causes, with contractor financial difficulties, approval delays, material delivery, site organization and resource planning featuring prominently. These findings place supervision within a wider management system: supervisory personnel encounter problems whose resolution may depend on procurement, financing or decisions outside their immediate control. Consequently, attributing delays exclusively to individual supervisors would overlook the organizational dependencies surrounding their work.

Yap et al. (2021) identified five underlying managerial capabilities associated with delay factors, including competency management, communication and coordination, financial management, risk management and site management. Their findings support examining how organizational arrangements enable construction activities, rather than treating delay causes as unrelated deficiencies. Nevertheless, factor rankings and statistical groupings do not establish the sequence through which particular supervisory practices affect completion dates.

The contextual limits of delay classifications also require consideration. Selcuk et al. (2024) found inconsistent definitions and frequent neglect of contractual and project characteristics across developing-country studies. Therefore, the present review treats construction delays as the empirical problem motivating investigation, while distinguishing perceptions of contributing factors from observed schedule outcomes. This distinction supports a bounded examination of supervisory management within Kuala Lumpur contractor organizations.

2.2 Supervisory Competence and The Execution of Responsibilities

Supervisory competence concerns the capacity to translate work requirements into appropriate site actions. It encompasses the interpretation of technical information, coordination of people, assessment of work progress and identification of problems requiring intervention. Ijaola et al. (2023) developed indicators for evaluating site supervisors' task performance, demonstrating the importance of examining supervisory work through identifiable performance dimensions. This approach offers a more precise basis for assessment than assuming that appointment to a supervisory position establishes competence.

Manoharan et al. (2024) extend the competency perspective through a Sri Lankan training-based study involving 64 construction supervisors. Their assessment covered 64 competency elements across 12 units and produced structured descriptions for evaluating supervisory capabilities. The study supports linking professional development to specific work requirements, including technical comprehension, documentation and workforce-related practices. However, its contextual and methodological boundaries mean that its competency standards cannot automatically be transferred to Malaysian contractors or interpreted as evidence of reduced project delays.

Taken together, these studies distinguish individual capability from the organizational opportunity to exercise it. Training can strengthen knowledge and judgement, but a capable supervisor may still face inadequate staffing, unresolved information requests or restricted decision authority. For the present study, competence is therefore considered alongside implementation conditions. Recommendations for professional development should address identified task weaknesses and should not substitute for examining whether organizational arrangements allow supervisors to act on their assessments.

2.3 Information Processing and Coordination in Supervisory Work

Information-processing theory explains why organizational arrangements must respond to uncertainty in task execution. Galbraith (1974) connects task uncertainty with organizational design and identifies information systems and collaborative problem-solving as responses to coordination requirements. This perspective is relevant to construction supervision because planned activities must be adjusted as work conditions, resource availability and technical requirements change. Its application here directs attention to the movement of information between site personnel and those responsible for decisions.

Tushman and Nadler (1978) similarly use uncertainty and information processing to explain the fit between organizational requirements and structural arrangements. Applied to supervisory management, their reasoning suggests that reporting arrangements should reflect the complexity and interdependence of the work. Increasing the volume of reports is insufficient if information reaches the wrong decision-maker, arrives after the relevant work window or lacks the detail required for action. These are theoretical implications for interpreting supervisory practices, rather than relationships already demonstrated by the present survey.

Coordination theory provides a complementary explanation of how information becomes collective action. Okhuysen and Bechky (2009) identify accountability, predictability and common understanding as conditions generated through mechanisms such as plans, routines and meetings. In construction, these conditions can be used to examine whether subcontractors understand responsibility for interface tasks, anticipate preceding work and share an interpretation of current constraints. Supervisory coordination therefore involves maintaining workable relationships among activities, beyond transmitting instructions. These perspectives jointly support examining monitoring, communication and corrective decisions as connected management functions.

2.4 Contractual Responsibilities and Organizational Implementation

PAM Contract 2018 supplies a defined contractual setting for examining supervision. An important distinction concerns the personnel represented by different provisions. Clause 8.1 addresses the contractor's appointment of a competent site agent, supported by necessary assistants and supervisory personnel. Clause 10.1 concerns site staff appointed by the employer to undertake inspection under the architect's direction (Pertubuhan Akitek Malaysia, 2018).

Contractor supervision and employer-side inspection therefore represent different responsibilities and should not be combined into one category of contractor staffing. This distinction matters analytically because inspection, contractual representation and operational management are not interchangeable. The existence of an inspection arrangement does not describe how a contractor distributes internal workloads, coordinates subcontractors or authorizes corrective decisions. The present study consequently uses the contract to establish the responsibilities and interfaces relevant to supervision, while examining implementation through practitioner assessments. Contractual expectations provide a reference point; they do not independently demonstrate compliance or managerial effectiveness.

Too and Weaver (2014) distinguish governance from management and emphasize that management decisions operate within a governance framework. Their conceptual framework concerns organizational project governance rather than Malaysian site supervision, but it offers a useful distinction between setting responsibilities and supporting their execution. Applied cautiously, this distinction helps frame the implementation problem: formal obligations require organizational arrangements through which information, resources and decisions reach the personnel performing the work.

2.5 Decision Authority, Resources and Integrated Performance Management

Supervisory responsibility creates a practical need for access to decisions and resources. For example, identifying a sequencing conflict may require a supervisor to coordinate subcontractors, obtain clarification and request additional labour. Each action can involve different organizational approval routes. The management issue is therefore whether responsibility for detecting problems is matched by a workable route for resolving them. This is an interpretive implication of governance and coordination theory, rather than an assumption that unrestricted delegation is always appropriate (Too & Weaver, 2014; Okhuysen & Bechky, 2009).

The integration of supervisory functions also matters because schedule, quality and safety decisions can interact. In Malaysia, Yap et al. (2022) examined managerial measures for reducing rework and improving construction safety. Their analysis identified project management best practices and proactive competency management as two underlying groups of measures. This evidence supports considering people and work processes together, although it does not establish that every recommended measure produces equivalent schedule benefits.

For contractor organizations, the implication is that monitoring frequency, workforce development and resource provision should be assessed in relation to operational needs. Additional reporting can consume supervisory time, while pressure to accelerate work can compete with inspection and coordination duties. An integrated management perspective therefore examines how organizational priorities support the execution of responsibilities across performance areas, without assuming that improvements in one area automatically demonstrate improvements in another.

2.6 Digital Technologies and AI as Organizational Support for Supervision

Digital technologies can strengthen contractor supervision by improving access to records, communication and visibility of site conditions. Their managerial value depends on their integration into organizational routines. Alaloul et al. (2020) identify social and technical considerations as important influences on construction-industry technology adoption, indicating that technological investment requires complementary organizational capabilities.Artificial intelligence extends this discussion from information capture towards automated analysis and decision support. Abioye et al. (2021) review construction applications involving activity monitoring, risk management and resource optimisation. These applications suggest opportunities for supporting supervisors in identifying emerging problems and directing attention towards activities requiring intervention.

However, the review also identifies adoption challenges, including costs, skills shortages, trust, security and connectivity. AI-supported supervision therefore requires organizational preparation alongside technical capability. The distinction between collecting information and using it effectively remains central. Wang et al. (2025), reviewing sensor-adoption research published between 2004 and 2024, identify barriers involving skills, user-centred design, standardisation and data management. Although their findings concern sensors specifically, they highlight implementation conditions relevant to the information infrastructure on which AI-supported monitoring may depend. More extensive data capture does not itself ensure accurate interpretation or timely managerial action.

Galbraith's (1974) information-processing perspective provides a theoretical basis for interpreting these organizational requirements. Applied to contemporary supervision, digital and AI tools can be understood as potential means of supporting information processing; responsibility for evaluating outputs and authorising responses remains a management consideration. The resulting implication is that technological support should be assessed alongside supervisory competence, decision authority and resource availability. In the present study, these developments inform the interpretation of digital-tool improvement priorities. Respondents' endorsement of digital technologies is not treated as evidence of AI readiness, predictive accuracy or demonstrated reductions in construction delays.

2.7 Research Gap and Analytical Framework

The reviewed literature contributes complementary explanations of supervisory management. Delay studies identify recurring problems and contextual variation; competency studies examine capabilities required for supervisory tasks; organizational theories explain information processing, coordination and responsibility; and technology research identifies conditions affecting implementation. These contributions support an integrated interpretation, but their different units of analysis and evidence base limit direct comparison. An international ranking, an organizational theory and a training-based assessment do not provide equivalent evidence of site-level performance.

The research gap addressed the need to examine practitioner-assessed supervisory weaknesses, barriers to implementing responsibilities and improvement priorities together within a defined contractor and contractual setting. This focus extends beyond identifying supervision as one item in a general delay list. It asks how reported deficiencies can be interpreted in relation to the organizational support available for carrying out supervisory work. It does not imply that previous research has ignored supervision or already established the causal importance of each proposed dimension.

The study adopts an analytical framework linking supervisory tasks with implementation conditions and management priorities. Monitoring and coordination represent the tasks under examination; competence, decision authority, resource support and information use organize the interpretation of implementation conditions. Training, reporting improvements, clearer decision arrangements and digital support are considered possible responses, subject to the survey evidence. These categories guide synthesis rather than constitute newly validated measurement scales. Consistent with the introduction, the framework supports descriptive prioritization and contextual management recommendations, while leaving causal testing and evaluation of actual schedule improvements to subsequent research.

3. METHODOLOGY

3.1 Research Design

The study used a quantitative, cross-sectional questionnaire survey of construction professionals to identify perceived supervision-related delay factors, barriers to implementing supervisory responsibilities, and improvement priorities in Kuala Lumpur building projects.

Descriptive analysis examined respondents' assessments of supervisory competence, coordination, decision authority, resources and information use. The findings reflect practitioner perceptions rather than measured effects on project completion times.

3.2 Sample Size and Data Collection

The study targeted professionals associated with CIDB Grade 7 contractor organizations in Kuala Lumpur, using a directory of 1,848 firms as the recruitment context. Eligible participants included site supervisors, engineers, project managers, quantity surveyors and other contractor representatives with relevant project experience. Targeted, non-probability sampling was used, and participation was voluntary. The structured questionnaire was administered through Google Forms and circulated through email.

3.3 Instrument Design

The questionnaire was developed from the literature and study objectives, with PAM Contract 2018 providing the contractual context (Sanni-Anibire et al., 2022; Yap et al., 2021; Pertubuhan Akitek Malaysia, 2018). It comprised four sections: A, organizational affiliation and professional role; B, 15 five-point items covering delay factors, supervisory responsibilities and improvement practices; C, comparative assessments of causes, challenges, priorities and consequences; and D, optional comments. Items measured perceived agreement or importance. Implementation and implementation-gap statements were analysed separately. One item incorrectly grouped Clause 10, concerning employer-appointed inspectors, with contractor supervision; it was therefore interpreted as perceived role clarity, with this wording acknowledged as an instrument limitation.

3.4 Data Collection and Respondent Screening

Out of 180 disseminated Google Forms questionnaires, 118 were completed and returned, representing a response rate of 65.6%. Five consultancy replies were omitted, resulting in 113 contractor-associated participants for evaluation. One participant with dual affiliations as a contractor and an academic was retained due to their contractor association. The data were encoded and examined utilising Microsoft Excel and IBM SPSS. The sample consisted of individual practitioners, rather than separate companies. The prevalence of quantity surveyors constrains the interpretation of the results as direct testimonies from on-site supervisors.

3.5 Data Analysis

Data were analysed using frequencies, percentages, means, standard deviations and the Relative Importance Index (RII). Higher RII values indicated stronger agreement or perceived importance within comparable item groups. Implementation and implementation-gap statements were interpreted separately. Rankings represented respondent perceptions and did not establish causal effects or statistically significant differences.

3.6 Ethical Considerations and Study Limitations

Participants received information about the study's purpose, voluntary participation, consent and confidential use of responses for academic research. Self-reporting, non-probability recruitment, geographical scope and the predominance of quantity surveyors limit generalisability. Without linked project records, the findings indicate perceived priorities rather than verified effects on project delays.

4. RESULTS AND DISCUSSION

4.1 Perceived Supervision Related Delay Factors

Table 1 presents respondents' assessments of five supervision-related delay factors. In Section B, inadequate daily monitoring received the highest mean score (4.43), with 86.7% selecting scores 4 or 5. The corresponding proportions were 84.1% for poor subcontractor coordination, 77.9% for under qualified or inexperienced supervisors, 71.7% for delayed error detection, and 69.9% for weak safety and quality enforcement. In Section C, inadequate daily monitoring ranked first (RII = 0.896), with 78 respondents (69.0%) selecting score 5. Subcontractor coordination ranked second (0.804), followed by supervisory qualifications and experience (0.798), safety and quality enforcement (0.763), and early error detection (0.706). The assessments produced different orderings: early error detection recorded the second-highest Section B mean (4.20) but the lowest Section C RII. The two sets of results are therefore interpreted separately.

Table 1. Assessments of Supervision Related Delay Factors (N=113)

Factor	Section B scores 4–5 (%)	Section B mean	Section C total	Section C RII	Rank
Inadequate daily monitoring	86.7	4.43	506	0.896	1
Poor subcontractor coordination	84.1	4.01	454	0.804	2
Under qualified or inexperienced supervisors	77.9	4.12	451	0.798	3
Weak safety and quality enforcement	69.9	4.02	431	0.763	4
Failure to detect errors early	71.7	4.20	399	0.706	5

4.2 Supervisory Responsibilities and Implementation Barriers

Table 2 presents respondents' perceptions of supervisory responsibilities under PAM Contract 2018. Scores of 4–5 were selected by 74.3% for clearly defined responsibilities and 80.5% for effective implementation, with means of 4.08 and 4.20, respectively. However, 77.0% also selected scores 4–5 for gaps between stated duties and site practice (Mean = 4.12).

Table 2. Perceptions of Supervisory Responsibilities and Implementation

Section B item	Scores 1–2 (%)	Score 3 (%)	Scores 4–5 (%)	Mean
Responsibilities are clearly defined and understood	0.9	24.8	74.3	4.08
Responsibilities are effectively implemented	0.9	18.6	80.5	4.20
Gaps exist between duties and site practice	0.0	23.0	77.0	4.12
Compliance helps reduce project delays	2.7	26.5	70.8	4.04
Delegation, authority or resource barriers hinder implementation	1.8	25.7	72.6	4.14

For the perceived contribution of compliance to delay reduction, 70.8% selected scores 4–5 (mean = 4.04). For barriers involving delegation, authority or resources, the corresponding proportion was 72.6% (Mean = 4.14). Positive implementation assessments and reports of implementation gaps coexisted at the sample level. These aggregate results do not explain the reasons for that pattern.

Table 3. Ranked Barriers to Implementing Supervisory Responsibilities

Barrier	Total score	RII	Rank
Limited decision-making authority	490	0.867	1
Insufficient manpower or resources	469	0.830	2
Ambiguity in contract clauses	453	0.802	3
Inconsistent consultant instructions	442	0.782	4
Lack of technical competence	430	0.761	5

Table 3 shows that limited decision-making authority ranked highest (RII = 0.867), followed by insufficient manpower or resources (0.830). Contract-clause ambiguity ranked third (0.802), inconsistent consultant instructions fourth (0.782), and lack of technical competence fifth (0.761). Limited authority received the maximum score from 65 respondents (57.5%). These rankings reflect perceived barriers rather than measured effects on project performance.

4.3 Improvement Strategies and Priorities

The third research objective concerned proposed improvements to supervisory practice. In Section B, routine monitoring and reporting received the highest mean (4.35), with 84.1% selecting scores 4–5. Training received 78.8%, digital tools and contractual enforcement each received 75.2%, and stakeholder communication received 72.6%. Their respective means were 4.19, 4.19, 4.18 and 4.00.

Table 4. Assessments of Improvement Strategies and Priority Areas

Strategy or priority	Section B scores 4–5 (%)	Section B mean	Section C total	Section C RII	Rank
Panel A Strategies					
Digital or technological tools	75.2	4.19	485	0.858	1
Routine monitoring and reporting	84.1	4.35	481	0.851	2
Stakeholder communication	72.6	4.00	451	0.798	3
Supervisor training and upskilling	78.8	4.19	441	0.781	4
Stronger contractual enforcement	75.2	4.18	439	0.777	5
Panel B Priority areas					
Real-time monitoring systems	—	—	496	0.878	1
Continuous professional training	—	—	468	0.828	2
Subcontractor management	—	—	465	0.823	3
Clearer delegation and accountability	—	—	434	0.768	4
Safety and quality enforcement	—	—	410	0.726	5

In Section C, digital tools ranked first among improvement strategies (RII = 0.858), followed by routine monitoring and reporting (0.851). The difference was 0.007 and is interpreted descriptively. Communication ranked third (0.798), training fourth (0.781) and contractual enforcement fifth (0.777). For improvement priorities, real-time monitoring systems ranked first (RII = 0.878), followed by continuous training (0.828) and subcontractor management (0.823). Clearer delegation and accountability ranked fourth (0.768), ahead of safety and quality enforcement (0.726). These results indicate perceived priorities for improvement; they do not establish implementation readiness or verified benefits from adopting the proposed practices.

4.4 Perceived Consequences of Ineffective Supervision

Table 5 summarizes Section C assessments of five potential consequences of ineffective supervision. Time overruns received the highest rating (RII = 0.867), followed by cost overruns (0.816) and disputes or claims (0.791). Safety incidents (0.773) and quality defects (0.740) ranked fourth and fifth. These

are practitioner assessments of possible consequences, rather than measured frequencies or independently verified project outcomes.

Table 5. Ranked Perceived Consequences of Ineffective Supervision

Consequence	Total Score	RII	Rank
Time overruns	490	0.867	1
Cost overruns	461	0.816	2
Disputes and claims	447	0.791	3
Safety incidents	437	0.773	4
Quality defects	418	0.740	5

5. DISCUSSION

5.1 Monitoring and Coordination as Management Priorities

The findings position contractor site supervision as an organizational management concern involving monitoring, coordination and the capacity to respond to site problems. Inadequate daily monitoring ranked first among the assessed delay factors (RII = 0.896), followed by subcontractor coordination (0.804). This pattern is consistent with Sanni-Anibire et al. (2022), whose international synthesis identified site organization, coordination and resource planning among prominent delay causes. It also aligns with Yap et al. (2021), who identified site-management competence and communication and coordination as important managerial dimensions in Malaysian construction. The comparison indicates convergence in the issues identified, rather than equivalent effect sizes across different samples and instruments.

The present study provides a more focused assessment of selected supervisory tasks within this broader literature. Okhuysen and Bechky (2009) explain that coordination mechanisms support accountability, predictability and common understanding. Applied here, this perspective suggests that site monitoring becomes useful when observations inform shared work priorities and clearly assigned responses. A practical implication is to connect progress reports with identified constraints, responsible personnel and follow-up decisions. This is a management recommendation arising from the synthesis, rather than an intervention evaluated by the survey.

5.2 Contractual Expectations and Organizational Implementation

Positive assessments of implementation coexisted with perceived implementation gaps: 80.5% selected scores 4–5 for effective implementation, while 77.0% selected these scores for gaps between duties and practice. These findings should not be interpreted as proof that respondents contradicted themselves. General implementation may coexist with weaknesses in particular activities or circumstances, although this explanation cannot be established from aggregate responses alone. Item wording and response tendencies may also influence the pattern. Limited decision-making authority ranked highest among implementation barriers (RII = 0.867), followed by insufficient manpower or resources (0.830). These results draw attention to organizational support for fulfilling responsibilities. Too and Weaver (2014) distinguish governance arrangements from management decisions made within those arrangements.

Their framework helps interpret why defining responsibilities may be insufficient when personnel lack access to decisions or resources. However, the present survey does not demonstrate that authority constraints caused the reported implementation gaps.

Selcuk et al. (2024) highlight the limited attention given to contract and project characteristics in delay research. Examining perceptions within the PAM Contract 2018 context responds to that concern, but the contribution remains bounded: the survey assesses perceived implementation rather than independently verified compliance. The role-clarity item's inclusion of employer-side inspection responsibilities further limits clause-specific conclusions. Managerially, the findings favor reviewing internal delegation, escalation routes and resource provision alongside contractual awareness.

5.3 Competence and the Conditions for Effective Supervision

Under qualified or inexperienced supervisors ranked third among delay factors (RII = 0.798), whereas technical competence ranked fifth among implementation barriers (0.761). These positions concern different questions and do not imply that competence is unimportant. A factor may be considered relevant to delays while receiving a lower relative rating than authority or resource constraints in a separate assessment of implementation.

Manoharan et al. (2024) provide complementary evidence through a structured assessment of supervisory competencies in Sri Lanka. Their work supports task-specific development rather than treating competence as a general attribute established by job title. The present findings add a contractor-side perspective on the organizational conditions surrounding supervisory work. Training should therefore be considered alongside the opportunity to apply acquired skills. For example, clearer responsibilities and access to timely decisions may be necessary for improved technical judgement to translate into action. These implications remain contextual recommendations, with transferability limited by differences in national settings, samples and assessment methods.

5.4 Digital Support and The Role of AI

Digital tools ranked first among improvement strategies (RII = 0.858), closely followed by routine monitoring and reporting (0.851). Routine monitoring nevertheless received the highest Section B mean. These separate assessments suggest that technological support and established monitoring practices both warrant managerial attention; the small RII difference does not establish a statistically significant preference for technology.

Alaloul et al. (2020) identify social and technical considerations affecting construction-industry digital adoption. Wang et al. (2025) similarly identify skills, standardization and data-management barriers in sensor adoption. These studies qualify the interpretation of the present rankings: interest in digital tools does not demonstrate readiness to implement them. Contractors should assess whether tools fit existing workflows, whether personnel can interpret their outputs and whether information reaches someone authorized to respond.

Galbraith's (1974) information-processing perspective provides the organizational explanation for connecting information availability with coordinated decisions. Contemporary AI applications, including activity monitoring, risk management and resource optimization, are discussed by Abioye et al. (2021). Such applications offer a future direction for supervisory support, but the survey's general digital-tool questions do not measure AI adoption or effectiveness. Any AI-supported extension would require separate assessment of data quality, usability and performance in actual site conditions.

6. CONCLUSION AND RECOMMENDATIONS

This study examined contractor-affiliated professionals' perceptions of site supervision, implementation barriers and improvement priorities in Kuala Lumpur building projects.

Inadequate daily monitoring and poor subcontractor coordination were the highest-ranked supervisory delay factors, while limited decision-making authority and insufficient resources led the implementation barriers. Digital tools and routine monitoring received the highest improvement-strategy rankings. Together, these findings suggest that supervisory improvement requires attention to both individual capability and organizational support. Contractors should connect daily progress reports with assigned responsibilities, decision deadlines and follow-up actions. Clearer delegation and escalation procedures, adequate supervisory resources and task-specific training should accompany digital monitoring initiatives. Technology adoption should address workflow suitability, staff capabilities and data quality, with subsequent evaluation of delivery outcomes. The findings are limited by voluntary, non-probability recruitment, a single geographical setting and the predominance of quantity surveyors. Self-reported perceptions and the absence of linked project records prevent causal conclusions or verification of delay reductions. Future research should combine broader professional representation with project records and longitudinal evaluation to test whether the recommended practices improve schedule performance.

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