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The Role of the Owner's Supervisory Engineer and Its Impact on Construction Project Execution Time

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دور المهندس المشرف التابع للمالك وتأثيره على مدة تنفيذ المشاريع الإنشائية

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Abstract:
Construction projects often experience delays due to managerial, financial, and coordination challenges among project stakeholders. This study aims to investigate the role of the owner's supervisory engineer and its impact on construction project execution time in Tripoli, Libya. A descriptive–analytical approach was adopted using a structured questionnaire distributed to engineers involved in supervising medium and large construction projects. A total of 90 questionnaires were distributed, of which 83 valid responses were analyzed using SPSS. The results indicate that effective supervision plays a significant role in improving project execution performance. Timely payment of contractors' financial entitlements was identified as the most influential factor with a relative importance of 93.2%, followed by communication and coordination skills (92%) and familiarity with contractual provisions (90.6%). The findings highlight the importance of strengthening the supervisory role to improve project performance and reduce delays in construction projects. The study recommends enhancing supervisory engineers' managerial skills, improving financial procedures, and strengthening project documentation systems.

Keywords: Owner Supervision, Construction Projects, Project Execution Time, Engineering Management, Project Performance.

الملخص:
تعد تأخيرات تنفيذ المشاريع الإنشائية من أبرز التحديات التي تواجه قطاع البناء، حيث تنتج غالباً عن عوامل إدارية ومالية وضعف التنسيق بين أطراف المشروع المختلفة. تهدف هذه الدراسة إلى تحليل دور المهندس المشرف الممثل للمالك وأثره في مدة تنفيذ المشاريع الإنشائية في مدينة طرابلس، ليبيا. اعتمدت الدراسة المنهج الوصفي التحليلي، وتم استخدام استبيان منظم كأداة رئيسية لجمع البيانات من عينة من المهندسين العاملين في الإشراف على المشاريع الإنشائية المتوسطة والكبيرة. تم توزيع (90) استبياناً، واسترجاع (83) استبياناً صالحاً للتحليل الإحصائي باستخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية .(SPSS) أظهرت نتائج الدراسة أن فعالية الممارسات الإشرافية تسهم بشكل ملحوظ في تحسين أداء تنفيذ المشاريع الإنشائية. كما بينت النتائج أن صرف المستحقات المالية للمقاولين في الوقت المناسب يمثل العامل الأكثر تأثيراً في مدة تنفيذ المشروع بنسبة أهمية نسبية بلغت (93.2%)، يليه عامل الاتصال والتنسيق بين أطراف المشروع بنسبة (92%)، ثم إلمام المهندس المشرف بالأحكام التعاقدية والإجراءات الإدارية بنسبة (90.6%). وتشير هذه النتائج إلى أهمية تعزيز كفاءة الإشراف من جانب المالك بما يسهم في تحسين أداء المشاريع والحد من التأخيرات في التنفيذ. وتوصي الدراسة بضرورة تطوير المهارات الإدارية والإشرافية للمهندسين المشرفين، وتحسين الإجراءات المالية، وتعزيز نظم التوثيق وإدارة المعلومات في مواقع المشاريع.

الكلمات المفتاحية: الإشراف من جانب المالك، المشاريع الإنشائية، مدة تنفيذ المشروع، الإدارة الهندسية، أداء المشاريع.

Introduction:

The construction industry plays a significant role in economic development and infrastructure growth [1-3]. Construction projects are typically complex systems involving multiple stakeholders such as owners, contractors, consultants, and suppliers. Due to this complexity, construction projects often face delays and performance challenges [4-8]. Project delays represent one of the most critical problems affecting construction projects worldwide. These delays may result from technical, administrative, financial, or coordination issues among project participants, which often lead to increased project costs and reduced project efficiency [7-9].

Within this context, the owner's supervisory engineer plays a critical role in ensuring effective project execution. The supervisory engineer represents the owner in monitoring project implementation and ensuring compliance with contractual requirements, specifications, and project schedules. Therefore, the effectiveness of the supervisory role can significantly influence project execution performance. This study investigates the role of the owner's supervisory engineer and examines how supervisory practices influence construction project execution time in Tripoli, Libya.

Research Problem:

Construction projects in Libya frequently experience significant delays that lead to increased project costs and reduced economic efficiency. These delays are often associated with multiple stakeholders involved in project implementation, including contractors, project owners, consultants, and supervisory teams. Although previous studies have examined the causes of delays in construction projects, limited attention has been given to the role of the owner's supervisory engineer in influencing project execution time. The supervisory engineer represents the project owner on-site and is responsible for monitoring construction activities, coordinating among project stakeholders, and ensuring compliance with contractual requirements and project specifications.

However, weaknesses in supervisory practices, delayed decision-making, and insufficient coordination may contribute to project schedule overruns. Therefore, there is a need to examine the role of the owner's supervisory engineer and evaluate its impact on construction project execution time. Accordingly, this study aims to investigate the influence of the owner's supervisory engineer on construction project execution time in Tripoli, Libya.

Research Objectives:

This study aims to achieve the following objectives:

1. To evaluate the current role of the owner's supervisory engineer in supervising construction projects.
2. To identify the key supervisory factors that influence construction project execution time.
3. To examine the relationship between supervisory practices and project schedule performance.
4. To identify potential weaknesses in supervisory practices that may contribute to delays in construction projects.
5. To provide practical recommendations for improving the effectiveness of supervisory performance in construction projects.

Literature Review:

Several studies have examined supervision and project management practices in construction projects and their impact on project performance. For example, in [10], the authors used a questionnaire survey of Chinese construction supervising engineers to examine how project success is evaluated and the extent to which the performance of key project stakeholders is associated with project success. The findings revealed that engineers considered stakeholder relationships, or guanxi, to be the most important criterion of project success, in addition to the traditional golden triangle criteria. The results also indicated that the performance of key stakeholders was positively correlated, that project owners had the most influential role in determining project success, and that the performance of project management organizations, as the central point of project responsibility, showed significant correlations with project success criteria.

In [11], the study investigated the relationships among the safety leadership of project owners, contractors, and subcontractors, with the aim of identifying the leadership dimensions that significantly influence construction safety performance. A hypothetical mechanism linking owner safety leadership, contractor safety leadership, and subcontractor safety leadership was developed and empirically validated. The findings demonstrated significant interrelationships among the safety leadership practices of the three principal stakeholders, with project safety culture serving as an important mediating factor. Furthermore, among the various leadership dimensions of owners and contractors, safety influence and role modeling were found to exert the broadest impact on both project safety culture and the safety leadership of other stakeholders. Based on these results, the study recommended that owners and contractors strengthen project managers' charisma and their capacity to influence safety-related values, while encouraging them to act as role models for others on construction projects.

In [12], the study addressed the importance of factors influencing project success, which is commonly assessed through the triple constraints of time, cost, and quality. Although project performance indicators are critical in evaluating construction outcomes, limited empirical research over the past decade has examined the determinants of performance in high-rise building Engineering, Procurement, and Construction (EPC) projects. Therefore, this paper aimed to analyze and rank the critical EPC activities affecting large-scale residential construction projects in Iran using the TOPSIS method as a multi-attribute group decision-making approach. The results showed that engineering design, project planning, and project control were the most significant contributors to project performance. Moreover, the engineering phase was identified as playing the most pivotal role in overall project success, followed by the construction phase. In contrast, procurement was perceived by participants as less influential than both engineering and construction in determining project performance.

Research Gap:

Despite the extensive literature on construction project management and supervision, most previous studies have focused on general project supervision or the role of supervisory consultants. However, limited empirical research has specifically examined the role of the owner's supervisory engineer and its quantitative impact on construction project execution time.

Furthermore, very few studies have investigated this issue within the context of the Libyan construction sector, where administrative procedures, coordination mechanisms, and financial processes may differ from those in other regions. Therefore, this study aims to address this research gap by examining the influence of the owner's supervisory engineer on construction project execution time in Tripoli, Libya

Contribution of the Study:

Unlike many previous studies that focused on general project supervision or the role of supervisory consultants, the present study specifically examines the role of the owner's supervisory engineer and quantitatively evaluates its direct impact on construction project execution time.

The study contributes to the existing literature by integrating both administrative and technical dimensions of supervision, including delegated authority, contractual and administrative knowledge, communication and coordination skills, financial payment efficiency, and documentation practices. In addition, it provides empirical insights that may assist project owners and supervisory bodies in improving supervisory performance and reducing delays in construction projects**.**

Conceptual Framework:

The present study proposes a conceptual framework to explain the relationship between the owner's supervisory role and construction project execution time.

The owner's supervisory role is represented by several dimensions:

- Delegated authority and decision-making ability.
- Contractual and administrative knowledge.
- Communication and coordination skills.
- Financial payment efficiency.
- Documentation and reporting practices.

These variables are expected to influence the effectiveness of project execution and ultimately affect project schedule performance.

Theoretical Framework:

This section presents the conceptual basis for examining how the project owner's role, exercised through the Owner's Supervisory Engineer (OSE), influences construction project duration.

Project Success and the Owner's Role: Project success is commonly evaluated through the triple constraint of time, cost, and quality, often extended to include stakeholder satisfaction [9]. In construction projects, the owner plays an active governance role; decisions related to authority, approvals, and coordination directly shape execution outcomes, particularly in complex, multi-stakeholder environments [8].

Owner's Supervisory Engineer (OSE): Operational control is exercised through the OSE, who ensures alignment between site activities and contractual requirements, drawings, specifications, schedule, and approved budget [1,9]. The effectiveness of this role depends on two core conditions: clearly delegated authority and timely decision-making, which together reduce workflow interruptions and coordination delays. Contract and administrative competence further strengthen compliance, limits disputes, and improves control over variations and claims.

Coordination, Communication, and Financial Continuity: Given the interdependent nature of construction tasks, the OSE facilitates performance through structured communication mechanisms (e.g., site meetings, reporting systems, and formal RFIs) that support stakeholder alignment [3]. In

parallel, payment efficiency sustains work continuity by enabling timely procurement and stable labor productivity, thereby supporting schedule reliability [5].

Documentation and Control of Variations: Effective documentation provides traceability for approvals, instructions, measurements, and claims [1]. By maintaining accurate project records, the OSE enhances accountability, expedites change resolution, and mitigates dispute risk-key factors for maintaining schedule control [11].

Conceptual Linkage: Based on the above, the owner's supervisory role is conceptualized through five operational dimensions, delegated authority and decision speed, contract and administrative competence, communication and stakeholder coordination, financial payment efficiency, and documentation and information control, which collectively constitute the study's independent variables and are hypothesized to influence project duration as the dependent variable [1,8].

Research Hypotheses: Based on the conceptual framework and previous studies, the following hypotheses are proposed to examine the relationship between the owner's supervisory role and construction project execution time.

Main Hypothesis: There is a statistically significant relationship between the owner's supervisory role and construction project execution time.

Sub-Hypotheses:

1. Delegated authority and decision-making ability of the supervisory engineer affect construction project execution time.
2. Contractual and administrative knowledge of the supervisory engineer influences project schedule performance.
3. Effective communication and coordination improve construction project execution time.
4. Financial payment efficiency contributes to reducing construction project delays.
5. Documentation and reporting practices improve construction project execution performance.

Methodology:

Research Design and Context:

This study adopts an applied descriptive–analytical research design to examine the role of the owner's supervisory engineer and its influence on construction project execution time. The descriptive approach is used to describe current supervisory practices within construction projects, while the analytical approach is employed to analyze the relationship between supervisory performance and project schedule outcomes. The study was conducted within the context of construction projects located in Tripoli, Libya, where construction activities often involve complex administrative procedures, multiple stakeholders, and coordination challenges.

Population and Sample:

The target population consists of engineers and technical professionals with practical experience in supervising medium- and large-scale public construction projects in Tripoli. A random sampling technique was adopted to obtain diverse professional perspectives.

A total of 90 questionnaires were distributed to engineers working in consulting firms, contracting companies, and public institutions. Out of these, 83 valid responses were received and used for statistical analysis, resulting in a response rate of 92.22%.

Data Collection Instrument:

A structured questionnaire was used as the main instrument for data collection. The questionnaire was developed based on a review of previous studies related to construction management, project supervision, and project performance.

It consisted of 12 items measuring supervisory practices that may influence construction project execution time, in addition to one open-ended question. The questionnaire included three sections: demographic information, supervisory background, and supervisory performance factors.

The instrument's validity was ensured through expert review in construction engineering and project management, and a pilot test was conducted prior to the final distribution.

Measurement Scale and Variables:

The questionnaire items were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The independent variable represents the owner's supervisory role, which includes several dimensions such as delegated authority, contractual knowledge, communication and coordination, financial payment efficiency, and documentation practices. The dependent variable is construction project execution time.

Statistical Analysis:

Data were analyzed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics including frequencies, percentages, means, and standard deviations were used to summarize respondent characteristics and analyze response patterns. The internal consistency reliability of the questionnaire items was assessed using Cronbach's alpha, which yielded $\alpha = 0.858$, indicating high

reliability. For inferential analysis, a one-sample t-test was conducted to determine whether the mean response significantly differs from the neutral midpoint of the Likert scale (μ = 3) at a significance level of 0.05.

Results and Discussion:

The statistical analysis demonstrates a strong consensus among respondents regarding the importance of the owner's supervisory role in achieving effective construction project execution and maintaining adherence to project schedules. The results presented in Table 1 identify several supervisory factors that significantly influence construction project execution time in Tripoli.

Table (1): Relative Importance Ranking of Supervisory Factors Affecting Construction Project Execution Tim

Supervisory Factor	Mean Score	Relative Importance (%)	Rank
Timely payment of contractors' financial entitlements	4.66	93.2	1
Communication and coordination skills	4.60	92.0	2
Familiarity with contractual provisions	4.53	90.6	3
Delegated authority and decision-making ability	4.49	89.8	4
Documentation and reporting practices	4.42	88.4	5

The findings indicate that timely payment of contractors' financial entitlements is the most influential factor affecting project execution time, with a relative importance of 93.2%. This result highlights the critical role of financial continuity in construction projects. In the Libyan construction environment, delays in administrative or financial procedures can disrupt project activities, reduce labor productivity, and ultimately lead to schedule overruns.

The second most influential factor is effective communication and coordination among project stakeholders, which achieved a relative importance of 92.0%. Efficient communication between contractors, consultants, and the owner's supervisory team helps minimize misunderstandings, accelerate information exchange, and resolve conflicts at an early stage. Furthermore, effective communication mechanisms reduce response time for technical clarifications and Requests for Information (RFIs), thereby supporting smooth project execution.

Additionally, the results highlight the importance of the supervisory engineer's familiarity with contractual provisions and administrative procedures, which recorded a relative importance of 90.6%. Adequate contractual knowledge enables supervisory engineers to interpret contractual obligations accurately, manage variation orders effectively, and ensure compliance with project specifications and regulatory requirements. This competence contributes to maintaining project scope stability and preventing unnecessary schedule extensions.

Similarly, delegated authority and decision-making ability for the supervisory engineer were identified as important factors influencing project performance, with a relative importance of 89.8%. Providing sufficient authority enables supervisory engineers to respond quickly to on-site issues, accelerate approval processes, and reduce delays associated with lengthy administrative procedures.

Finally, documentation and reporting practices also play an important role in project execution performance, with a relative importance of 88.4%. Maintaining comprehensive project documentation, including contracts, drawings, correspondence, and progress reports, enhances transparency, supports effective monitoring of project activities, and facilitates the resolution of disputes or technical issues during project implementation.

Overall, these findings confirm that effective owner-side supervision plays a crucial role in improving construction project execution performance. By ensuring financial continuity, strengthening communication and coordination, enhancing contractual control, and improving decision-making efficiency, supervisory practices contribute significantly to maintaining project schedules and minimizing potential delays.

Study Limitations:

This study has several limitations. First, the research was conducted in Tripoli, Libya, which may limit the generalizability of the findings to other regions. Second, the study relied mainly on questionnaire responses reflecting participants' perceptions rather than direct project performance data. Future studies may expand the sample size and include additional project stakeholders such as contractors and consultants.

Conclusion:

This study examined the role of the owner's supervisory engineer and its impact on construction project execution time within the context of construction projects in Tripoli, Libya. The findings demonstrate that effective supervisory practices play a critical role in improving project performance

and minimizing schedule delays, which is consistent with previous studies highlighting the importance of governance and supervisory mechanisms in enhancing construction project performance.

The results highlight that several supervisory factors significantly influence project execution, particularly the timely payment of contractors' financial entitlements, effective communication and coordination among project stakeholders, and the supervisory engineer's familiarity with contractual and administrative procedures. These factors contribute to smoother project implementation, faster decision-making, and reduced administrative disruptions during construction activities.

Overall, the study emphasizes the importance of strengthening the owner's supervisory role as a key managerial function in construction project management. Enhancing supervisory efficiency can significantly improve project schedule performance, strengthen coordination among stakeholders, and support the successful achievement of construction project objectives in terms of time, cost, and quality**.**

Recommendations:

Based on the study findings, the following recommendations are proposed:

1. Project owners and supervisory bodies should establish clear and efficient mechanisms for the timely payment of contractors, ensuring stable cash flow and preventing work disruptions.
2. Owner's supervisory engineers should be encouraged to enhance their communication and leadership skills through targeted training programs in project management and stakeholder coordination.
3. Construction organizations should adopt well-defined organizational structures that clearly allocate responsibilities and decision-making authority across engineering and administrative functions.
4. Supervisory teams should maintain comprehensive documentation systems at the project site, including contracts, drawings, correspondence, and progress reports, to support effective control and dispute avoidance.
5. Further research is recommended to extend the analysis of owner-side supervision, particularly in different project types and regional contexts, to strengthen evidence-based improvements in construction project management.

Future Research:

Future studies may investigate the role of owner-side supervision in different types of construction projects and organizational contexts. Comparative studies between public and private sector projects may also provide further insights into improving construction project performance. In addition, future research may apply advanced statistical techniques and larger sample sizes to further validate the findings of this study.

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