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FACTORS AFFECTING THE PERFORMANCE OF HIGH-RISE BUILDING CONSTRUCTION PROJECTS IN JAKARTA

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Abstract

The construction of high-rise buildings in Jakarta has grown rapidly in recent years as a response to limited land availability and the increasing demand for commercial, residential, and mixed-use spaces in urban business areas. High-rise projects are highly complex, involving intricate structural design, vertical logistics challenges, demanding foundation and seismic requirements, and intensive multidisciplinary coordination. These complexities directly affect project performance, particularly in terms of time accuracy, cost efficiency, work quality, and site safety. This study aims to identify the key factors influencing the performance of high-rise construction projects in Jakarta using the Relative Importance Index (RII) method. The analysis highlights five factors with the most significant impact: construction methods (RII = 0.8236), workforce training and development (RII = 0.7691), material availability (RII = 0.8127), project team communication (RII = 0.8127), and construction supervision (RII = 0.8018). The findings indicate that successful high-rise projects in Jakarta rely on strong synergy between technical aspects, human resource management, and effective supervision systems. Proper construction methods, improved workforce competence, and strong team coordination are key to enhancing productivity, performance, and overall project quality

Keywords: *Construction Project performance, RII, High-Rise Building, Jakarta*

Introducing

The development of high-rise buildings in Jakarta has accelerated significantly in recent years as a response to limited land availability and the growing demand for commercial space, residential units, and mixed-use developments in central business districts. Currently, Jakarta has become one of the cities with the highest number of high-rise buildings in Indonesia, making high-rise construction activities a crucial component of the city's urban development. High-rise building projects are characterized by a high level of complexity, including intricate structural designs, vertical logistics requirements, technical challenges in foundation construction and seismic resistance, as well as intensive coordination among multiple stakeholders. These characteristics make project management more demanding compared to low-rise building projects. This level of complexity directly affects project outcomes, which are typically evaluated based on schedule compliance, cost control, work quality, and occupational safety performance. Recent studies indicate that low productivity and supply chain disruptions are among the primary threats that frequently reduce construction project performance, including high-rise building projects [1].

Recent studies in the Indonesian construction sector have identified several recurring factors that significantly influence project outcomes, including delays or shortages in material supply, inadequate planning and scheduling, equipment-related issues, as well as challenges in communication and coordination among project teams. These findings suggest the need for further investigation, particularly focusing on high-rise building projects in major metropolitan areas such as Jakarta, in order to identify the most influential factors within this specific regional context (Wijayanto & Amin, 2023).

On the other hand, advancements in technology and the adoption of innovative methods, such as digitalization in construction processes and the implementation of Building Information Modeling (BIM), are considered capable of

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enhancing work efficiency, improving collaboration quality, and optimizing cost management in high-rise building projects. However, the implementation of these technologies in Indonesia continues to face challenges, including practical constraints and workforce readiness issues. Therefore, their actual impact on project performance requires further empirical investigation [2].

The national construction industry context is also highly relevant, as the construction sector continues to play a significant role in the economy and is undergoing ongoing policy reforms and changes in project management practices that directly influence on-site operations. Therefore, a more comprehensive understanding of the factors affecting the performance of high-rise building projects in Jakarta is essential, both for advancing project management theory and for providing practical recommendations to project owners, contractors, and regulatory authorities.

Research Methodology

The research employed an explanatory research design. Explanatory research is a type of study that aims to examine and clarify causal relationships among the variables under investigation, as well as to test the proposed hypotheses [[2]. In this study, a survey-based approach was employed through the distribution of structured questionnaires. For data analysis, the Analytic Hierarchy Process (AHP) was applied with the assistance of Microsoft Excel. The population of this study consisted of construction professionals with experience in high-rise building projects in Jakarta, namely:

1. Project Manager (PM)
2. Site Engineer / Civil dan MEP Engineer
3. Quantity Surveyor (QS)
4. Quality Control (QC)
5. K3 Officer / Safety Officer
6. Supervisor

Based on a conservative estimation of the number of high-rise projects, the calculation was conducted using the following estimation approach:

1. The number of large construction companies in DKI Jakarta is approximately 774 companies (based on data from BPS/Department of Public Works).
2. Each large company employs approximately 5-10 core personnel with experience in high-rise projects (Project Manager, Site Engineer, Quantity Surveyor, Quality Control, Safety Officer, and Supervisor).
3. Therefore, the minimum estimated population is calculated as follows: 774 companies √ó 6 personnel = 4,644 ~ 5,000 individuals.
4. The sample size was determined using the Slovin formula

$$n = \frac{N}{1 + N\,(e)^2} \qquad (1)$$

Where :

n = Sample siz\
N = Population Size
e = Margin of error (error tolerance), set at 10%

(0.10)

Thus,

$$n = \frac{5000}{1 + 5000\,(0.1)^2} = \frac{5000}{1 + 50} = 98{,}039 \sim 100 \qquad (2)$$

Therefore, the minimum sample size required for this study was 100 respondents. This study examines the factors influencing the performance of high-rise building construction projects in Jakarta. The assessment was conducted using a Likert scale, which is a measurement instrument commonly employed in quantitative research to evaluate attitudes, perceptions, or the degree of influence of specific variables. The Likert scale used in this study is defined as follows:

1. Score 5 = “Very Influential”
2. Score 4 = “Influential”
3. Score 3 = “Moderately Influential”
4. Score 2 = “Less Influential”
5. Score 1 = “Not Influential”

The data analysis method employed in this study consists of data quality testing based on two fundamental concepts: validity and reliability. The quality of the data obtained from the research questionnaire was evaluated through validity and reliability tests. These tests were conducted to assess the accuracy and consistency of the data collected through the questionnaire instrument.

1. Validity Test

Validity test is conducted to determine the degree of accuracy between the actual conditions of the observed object and the data collected by the researcher, in order to assess the validity of each measurement item (Sugiyono, 2016). The decision criteria for the validity test are as follows:

- If the calculated correlation coefficient (r_calculated) > r_table, the item is considered valid.
- If r_calculated < r_table, the item is considered invalid.

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2. Reability Test

The reliability test measures the degree of consistency or stability of a research instrument (questionnaire). A questionnaire is considered reliable if it produces consistent results when administered repeatedly over time under similar conditions. The decision criteria for reliability testing, according to V. Wiratna Sujarweni (2016), are as follows:

- If the Cronbach's Alpha value > 0.60, the instrument is considered reliable or consistent.
- If the Cronbach's Alpha value < 0.60, the instrument is considered unreliable or inconsistent.

3. Relative Importance Index (RII)

Relative Importance Index (RII) method is used to determine the most influential factors by ranking them based on the weights assigned by respondents after completing the questionnaire. The RII analysis was performed using Microsoft Excel. The formula for determining the ranking using the RII method is presented in the following equation:

$$RII = \frac{\sum W}{A \times N} \quad (3)$$

Where :

RII = Relative Importance Index
W = Weight assigned to each factor by respondents
A = Highest weight (in this study, 5 based on the Likert scale)
N = Total number of responden

The RII values can also be categorized into levels of importance, as presented in Table 1 below.

Table 1. Range of RII Values and Corrosponding Levels of Importance

Range of RII	Levels of Importance
0,8 ≤ RII ≤ 1	*High (H)*
0,6 ≤ RII ≤ 0,8	*High-Medium (H-M)*
0,4 ≤ RII ≤ 0,6	*Medium (M)*
0,2 ≤ RII ≤ 0,4	*Medium-Low (M-L)*
0 ≤ RII ≤ 0,2	*Low (L)*

Data Analysis

The variables used in this study are as follows :

Table 2. Variables Used in This Study

NUMBER	VARIABLE		DESCRIPTION	SOUCE
COST				
1	X1	Increase in Material Prices	Fluctuations in material prices due to inflation and supply chain disruptions may increase overall project costs.	(Reddy Anireddy, 2024)
2	X2	Inaccurate Quantity Estimation	Inaccurate estimation of material quantities can lead to cost overruns.	(Paydar et al., 2023)
3	X3	Site Overhead Costs	High site overhead costs may contribute to an increase in total project expenditure.	(Madihah & Amin, 2023)
4	X4	Design Changes	Design changes during project implementation can result in additional costs.	(Husin & Danumurti, 2023)
5	X5	Payment Delays	Payment delays to contractors may disrupt workflow continuity and increase project costs.	(Septiaji et al., 2025a)
6	X6	Limited Working Area	Limited working space can reduce operational efficiency and consequently increase costs.	(Madihah & Amin, 2023)

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7	X7	Material Procurement Delays	Delays in material procurement may cause work stoppages and lead to cost escalation.	(Reddy Anireddy, 2024)
8	X8	Cost Estimation Errors	Errors in cost estimation may result in budget overruns.	(Paydar et al., 2023)
9	X9	Currency Exchange Rate Fluctuations	Fluctuations in currency exchange rates may affect the cost of imported materials.	(Reddy Anireddy, 2024)
10	X10	Resource Constraints	Shortages of skilled labor and equipment may contribute to increased project costs.	(Paydar et al., 2023)
TIME				
11	X11	Drawing Revisions	Design revisions during project implementation may cause schedule delays.	(Nurlia et al., 2023a)
12	X12	Limited Working Area	Limited workspace may hinder mobility and reduce work efficiency.	(Septiaji et al., 2025)
13	X13	Inspection Delays	Delayed inspection processes may postpone subsequent project activities.	(Madihah & Amin, 2023)
14	X14	Weather Changes	Extreme weather conditions may disrupt the project schedule.	(Husin & Danumurti, 2023)
15	X15	Worker Productivity	Low productivity may extend the overall project duration.	(Hernandi & Tamtana, 2020)
16	X16	Payment Delays	Payment delays to contractors may disrupt workflow continuity.	(Reddy Anireddy, 2024)
17	X17	Work Plan Changes	Changes in the work plan during project implementation may result in delays.	(Paydar et al., 2023)
18	X18	Workforce Availability	Shortages of skilled labor may slow project progress.	(Madihah & Amin, 2023)
19	X19	Inter-Team Coordination	Lack of coordination among project teams may lead to miscommunication and dela	(Paydar et al., 2023)
20	X20	Regulatory Uncertainty	Unexpected regulatory changes may hinder project execution..	(Reddy Anireddy, 2024)
QUALITY				
21	X21	Material Availability	Material shortages may disrupt construction activities and reduce the	(Hernandi & Tamtana, 2020)

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				quality of the final output.	
In this study,	22	X22	Construction Implementation Methods	The selection of appropriate construction methods significantly influences work quality.	(Reddy Anireddy, 2024)
	23	X23	Human Resource Quality	Skilled and experienced workers enhance the quality of construction outcomes.	Madihah, J. (2023).
	24	X24	Equipment and Technology	The use of appropriate equipment and advanced technology can improve construction quality.	(Madihah & Amin, 2023)
	25	X25	Quality Standards	The implementation of strict quality standards ensures that construction results comply with established specifications.	(Husin & Danumurti, 2023)
	26	X26	Quality Control	An effective quality control system prevents defects in construction outputs.	(Septiaji et al., 2025)
	27	X27	Project Team Communication	Effective communication among project team members improves coordination and work quality.	(Nurlia et al., 2023b)
	28	X28	Construction Supervision	Intensive supervision ensures that work is carried out in accordance with plans and technical specifications.	(Reddy Anireddy, 2024)
	29	X29	Availability of Skilled Experts	The availability of specialized experts enhances the technical quality of the work.	(Madihah & Amin, 2023)
	30	X30	Training and Development	Continuous training programs improve workforce skills and knowledge, thereby contributing to construction quality.	(Paydar et al., 2023)

In this study, questionnaires were distributed to 110 respondents, resulting in a degree of freedom (df) calculated as (N − 2), namely 110 − 2 = 108. A two-tailed significance level of 0.10 was applied. The 0.10 level was selected because the researcher established a 90% confidence level for the validity testing, allowing a 10% margin of error in decision-making.

Based on the validity test results, all variables demonstrated r_calculated > r_table, indicating that all measurement items were valid. Furthermore, the reliability test results showed that all variables had Cronbach's Alpha values greater than 0.60, confirming that the data were reliable and internally consistent.

The Relative Importance Index (RII) illustrates the influence of each factor on high-rise building project performance based on respondents' perceived level of importance. A higher RII value indicates that the factor is considered more important by respondents and has a greater impact on the performance of high-rise construction projects in Jakarta. The RII results are presented in Table 3 below.

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Table 3. RII Results

VARIABLE		RESULT		LEVEL OF IMPORTANCE
		RII	RANK	
X1	Increase in Material Prices	0,7509	24	*High-Medium (H-M)*
X2	Inaccurate Quantity Estimation	0,7436	28	*High-Medium (H-M)*
X3	Site Overhead Costs	0,7691	12	*High-Medium (H-M)*
X4	Design Changes	0,7491	26	*High-Medium (H-M)*
X5	Payment Delays	0,7582	18	*High-Medium (H-M)*
X6	Limited Working Area	0,7727	11	*High-Medium (H-M)*
X7	Material Procurement Delays	0,7636	15	*High-Medium (H-M)*
X8	Cost Estimation Errors	0,7655	14	*High-Medium (H-M)*
X9	Currency Exchange Rate Fluctuations	0,7545	20	*High-Medium (H-M)*
X10	Resource Constraints	0,7509	25	*High-Medium (H-M)*
X11	Drawing Revisions	0,7636	16	*High-Medium (H-M)*
X12	Limited Working Area	0,7527	21	*High-Medium (H-M)*
X13	Inspection Delays	0,7673	13	*High-Medium (H-M)*
X14	Weather Changes	0,7364	29	*High-Medium (H-M)*
X15	Worker Productivity	0,7527	22	*High-Medium (H-M)*
X16	Payment Delays	0,7364	30	*High-Medium (H-M)*
X17	Work Plan Changes	0,7455	27	*High-Medium (H-M)*
X18	Workforce Availability	0,7527	23	*High-Medium (H-M)*
X19	Inter-Team Coordination	0,7582	19	*High-Medium (H-M)*
X20	Regulatory Uncertainty	0,7600	17	*High-Medium (H-M)*
X21	Material Availability	0,8127	3	*High (H)*
X22	Construction Implementation Methods	0,8236	1	*High (H)*
X23	Human Resource Quality	0,7982	8	*High-Medium (H-M)*
X24	Equipment and Technology	0,8000	7	*High-Medium (H-M)*
X25	Quality Standards	0,7964	9	*High-Medium (H-M)*
X26	Quality Control	0,7909	10	*High-Medium (H-M)*
X27	Project Team Communication	0,8127	4	*High (H)*
X28	Construction Supervision	0,8018	5	*High (H)*
X29	Availability of Skilled Experts	0,8018	6	*High (H)*
X30	Training and Development	0,7691	2	*High-Medium (H-M)*

Based on the table above, overall, all factors fall within an RII range of 0.7364 to 0.8236. The top five ranked factors overall are construction implementation method (X22, RII = 0.8236), training and development (X30, RII = 0.7691), material availability (X21, RII = 0.8127), project team communication (X27, RII = 0.8127), and construction supervision (X28, RII = 0.8018).

The analysis results indicate that the factor "Construction Implementation Method" achieved a Relative Importance Index (RII) value of 0.8236, ranking it as the

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most influential factor affecting construction project performance. This finding emphasizes that the application of effective and efficient construction methods not only improves work quality but also supports better time and cost control, thereby directly contributing to overall project success amid material price fluctuations and dynamic construction market conditions.

Furthermore, based on the RII analysis, the factor "Training and Development" ranks as the second most influential factor with an RII value of 0.7691. This result highlights that enhancing human resource competence is one of the key determinants in achieving work efficiency, reducing technical errors in the field, and maintaining consistent quality standards in high-rise building projects, particularly given their inherent complexity.

The factor of Material Availability is identified as one of the critical aspects influencing the performance of high-rise building construction projects in Jakarta. The analysis indicates that this factor achieved a Relative Importance Index (RII) value of 0.8127, ranking third among all evaluated variables. Ensuring consistent material availability is essential, as shortages or delays in material supply can disrupt construction activities, lead to schedule delays, and negatively affect the quality of the final output. Therefore, effective procurement management and well-planned material logistics are fundamental to maintaining project continuity and ensuring that construction quality complies with established standards.

The factor of Project Team Communication also demonstrates a significant influence on the performance of high-rise building construction projects in Jakarta. With an RII value of 0.8127, this factor ranks fourth in overall importance. Effective communication among project team members plays a crucial role in enhancing coordination, accelerating decision-making processes, and minimizing errors and conflicts during project execution. When information is conveyed clearly and in a timely manner, all project components can operate more synchronously and efficiently, ultimately contributing positively to construction quality and overall project performance.

Conclusion

Based on the results of the Relative Importance Index (RII) analysis of factors influencing the performance of high-rise building construction projects in Jakarta, five key factors were identified as having the most significant impact on project success. The objective of this study was to identify and understand the primary factors affecting construction project performance. The findings indicate that:

1. Construction Implementation Method ranks first with an RII value of 0.8236, indicating that the selection of appropriate construction methods plays a decisive role in ensuring project efficiency, quality, and timely completion.
2. Training and Development ranks second with an RII value of 0.7691, highlighting the importance of enhancing workforce competency through continuous training programs to maintain construction quality standards.
3. Material Availability ranks third with an RII value of 0.8127, demonstrating that a stable and reliable material supply is a critical factor in preventing delays and maintaining the quality of work.
4. Project Team Communication ranks fourth with an RII value of 0.8127, emphasizing that effective coordination and communication among project team members are essential to maintaining synergy and ensuring smooth project execution.
5. Construction Supervision ranks fifth with an RII value of 0.8018, underscoring the importance of intensive supervision to ensure that on-site activities comply with project plans, technical specifications, and quality standards.

Overall, the results of this study demonstrate that the success of high-rise building projects in Jakarta is strongly influenced by the synergy between technical aspects, material management, and human resource capacity. The proper application of construction methods, continuous workforce development, adequate material availability, effective communication, and rigorous supervision constitute the primary determinants of improved performance and quality in high-rise construction projects.

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