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Analysis of Delay Factors in the Capital Expenditure Package and Public Facilities Project of Turyapada Tower Technology Park KBS 6.0 Kerthi Bali

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Abstract: Delays in construction projects often impact cost, time, and quality. This study was conducted on the Turyapada Tower Technology Park KBS 6.0 Kerthi Bali project, which experienced delays from its initial schedule. The aim of the research is to identify and analyze the dominant factors contributing to project delays. Using a quantitative method through questionnaires distributed to 50 respondents and data analysis with validity tests, reliability tests, and Pearson correlation in SPSS, the results indicate that environmental and equipment factors are the primary causes of delays, followed by labor, management, execution methods, and materials. The dominant factors show a very strong correlation with project schedule delays. These findings are expected to serve as an evaluation and input to improve timeliness and efficiency in similar projects in the future.

Keywords: Project delay, causative factors, Turyapada Tower Technology Park, construction management, quantitative analysis

INTRODUCTION

Construction projects play a crucial role in infrastructure development and in improving the quality of life for communities. One of the strategic projects is the Turyapada Tower Technology Park KBS 6.0 Kerthi Bali, a 115-meter multifunctional tower located in Pegayaman Village, Buleleng Regency, Bali. With a budget allocation of IDR 334.27 billion, the project aims to expand television broadcast coverage, support digital transformation, and serve as a new tourism landmark in North Bali. In addition to enhancing access to information, the project is expected to generate significant economic and social benefits for the local community.

RESEARCH METHOD

This research employs a quantitative method based on numerical data analyzed using statistical formulas. The analysis process includes validity and reliability testing, followed by descriptive statistics (mean, median, mode, and level of agreement) and ranking of variables according to the highest level of agreement. Factor analysis is then applied to identify the dominant variables contributing to project delays.

Validity and Reliability

To ensure data validity and reliability, triangulation of sources and member checking were conducted, confirming that the researcher's interpretation aligned with the informants' perspectives

Pearson Correlation

The Pearson correlation test was applied to determine the strength and direction of the relationship between delay-causing factors (equipment, materials, labor, management, implementation methods, and environment) and project delays. The correlation coefficient ranges from -1 to +1, where positive values indicate a direct relationship and negative values indicate an inverse relationship. A significance level of less than 0.05 indicates a statistically significant correlation. The analysis was performed using SPSS, and the results provide supporting evidence for the discussion.

RESULT AND DISCUSSION

Validity Test

Validity refers to the extent to which an instrument measures what it is intended to measure. In this study, the validity test was applied to questionnaire items representing factors causing project delays. The test was conducted by comparing the calculated correlation coefficient (*r-count*) with the critical value (*r-table* = 0.284, n = 50). If *r-count* > *r-table*, the item is considered valid.

The results confirm that all items across six factors are valid, with *r-count* values exceeding the threshold. This indicates that each statement reliably reflects the intended variable, meaning the questionnaire successfully measures the factors contributing to construction delays.

Tabel 1. Summary of Validity Test Result

Factor	r-count Range	r-table	Validity Result	Main Indicators
Material	0.522 – 0.621	0.284	Valid	Delivery delays, poor material quality, market availability

Factor	r-count Range	r-table	Validity Result	Main Indicators
Equipment	0.393 – 0.621	0.284	Valid	Equipment damage, insufficient quantity, readiness of tools
Labor	0.625 – 0.688	0.284	Valid	Attendance, skills, labor availability
Management	0.463 – 0.680	0.284	Valid	Poor planning, weak communication, lack of project control
Execution Method	0.492 – 0.549	0.284	Valid	Work method suitability, design changes, team coordination
Environment	0.462 – 0.697	0.284	Valid	Weather, geographical conditions, community disturbances

Source: Author's Analysis (2025)

Reliability Test

Reliability is used to measure the internal consistency of the research instrument. An instrument is considered reliable if its Cronbach's Alpha value is greater than the minimum threshold of 0.60. Based on the test results, all factors obtained Cronbach's Alpha values above 0.60, indicating that the questionnaire items are consistent and reliable for further analysis. The highest reliability was found in the management factor (0.739), while the lowest was in the environmental factor (0.620).

Tabel 2. Reliability Test Results

Factor	Cronbach's Alpha	Threshold	Decision
Material	0.683	0.60	Reliable
Equipment	0.724	0.60	Reliable
Labor	0.696	0.60	Reliable
Management	0.739	0.60	Reliable
Execution Method	0.725	0.60	Reliable
Environment	0.620	0.60	Reliable

Source: Author's Analysis (2025)

Descriptive Statistics

Descriptive statistics were conducted to summarize the distribution of responses for each factor influencing project delays. The statistical measures include the minimum, maximum, mean, and standard deviation values.

Tabel 2. Descriptive Statistics Results

Factor	N	Minimum	Maximum	Mean	Std. Deviation
Material	50	7	15	10.32	1.932
Equipment	50	6	15	10.74	1.759

Factor	N	Minimum	Maximum	Mean	Std. Deviation
Labor	50	7	14	10.70	1.810
Management	50	7	14	10.32	1.743
Execution Method	50	6	14	10.32	1.708
Environment	50	6	14	10.32	1.708
Valid N (listwise)	50				

Source: Author's Analysis (2025)

Interpretation:

Material (Mean = 10.32, SD = 1.932)

Respondents tend to agree that material-related issues (e.g., delivery delays, poor quality, scarcity in the market) are significant contributors to project delays.

Equipment (Mean = 10.74, SD = 1.759)

This factor has the highest mean score, indicating that equipment-related issues (e.g., breakdowns, insufficient availability, readiness for use) are perceived as the most dominant causes of delays.

Labor (Mean = 10.70, SD = 1.810)

Workforce availability, skill levels, and discipline significantly affect project progress. Delays in labor can create a chain reaction impacting other activities.

Management (Mean = 10.32, SD = 1.743)

Weak project planning, poor team coordination, and lack of supervision are viewed as key managerial shortcomings that contribute to delays.

Execution Method (Mean = 10.32, SD = 1.708)

Inappropriate construction methods, mid-project design changes, and poor coordination among executors are highlighted as delay factors.

Environment (Mean = 10.32, SD = 1.708)

Extreme weather, geographical challenges, and social disturbances from the local community are acknowledged as external but impactful sources of delay

Pearson Correlation Test

Pearson correlation analysis was conducted to examine the strength and direction of relationships between the delay factors. Correlation values range between -1 and +1, with values closer to ±1 indicating stronger relationships. All correlations were found to be statistically significant at the 0.01 level (2-tailed), confirming interdependence among factors.

Tabel 2. Pearson Correlation Results

Factor	Material	Equipment	Labor	Management	Execution Method	Environment
Material	1	.755	.764	.800	.804	.835
Equipment	.755	1	.805	.818	.789	.777
Labor	.764	.805	1	.798	.730	.851
Management	.800	.818	.798	1	.870	.845
Execution Method	.804	.789	.730	.870	1	.824
Environment	.835	.777	.851	.845	.824	1

Note: Correlation is significant at the 0.01 level (2-tailed)

Interpretation

Material strongly correlates with Environment (0.835) and Execution Method (0.804), indicating that material delays are often influenced by weather conditions and improper execution planning.

Equipment has strong ties with Labor (0.805) and Management (0.818), showing that machinery efficiency depends on operator skills and effective managerial oversight.

Labor shows the highest correlation with Environment (0.851), suggesting that workforce performance is highly sensitive to external conditions such as weather and site challenges.

Management correlates most strongly with Execution Method (0.870), highlighting the critical role of managerial decisions in ensuring proper implementation on-site.

Execution Method is closely tied to Management (0.870) and Environment (0.824), emphasizing that execution strategies must adapt to both managerial control and environmental challenges.

Environment affects nearly all factors, particularly Labor (0.851) and Management (0.845), reaffirming its importance as a dominant external variable impacting project performance.

CONCLUSION

The research results show that the instrument used is reliable, as all factors analyzed (Material, Equipment, Labor, Management, Implementation Method, and Environment) have Cronbach's Alpha values greater than 0.60. This indicates that the questionnaire is consistent in measuring the factors causing project delays.

Based on descriptive statistical analysis, the dominant factors influencing delays are Equipment (Mean = 10.74) and Labor (Mean = 10.70). This finding highlights that the availability, condition, and reliability of equipment, as well as the quality and discipline of the workforce, are crucial issues in the success of construction projects.

Pearson correlation analysis further reveals that all factors have a strong and significant relationship ($p < 0.01$). The strongest correlation is found between Management and Implementation Method ($r = 0.870$), confirming that management quality greatly influences the effectiveness of execution in the field. The Environmental factor also shows a high correlation with Labor ($r = 0.851$), suggesting that external conditions such as weather and social factors strongly affect workforce performance.

Although the Environmental factor has a relatively lower mean value compared to other factors, it demonstrates high correlations with nearly all variables. This indicates that external factors, including weather, geographical conditions, and community dynamics, cannot be ignored, as they can intensify the impact of internal factors such as materials, equipment, labor, management, and implementation methods.

In conclusion, the main causes of delay in the Taman Teknologi Turyapada Tower KBS 6.0 Kerthi Bali project are internal factors, particularly Equipment, Labor, and Management, while external factors such as Environment also play a critical role as they reinforce the influence of internal issues.

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