Jurnal Komposit: Jurnal Ilmu-ilmu Teknik Sipil
Vol. 10 No. 2 (2026) pp. 401 - 410
DOI: http://dx.doi.org/10.32832/komposit.v10i2.23153

ISSN: 2615-3513
e-ISSN: 2655-934X

Performance Analysis of Construction Management at Haluoleo Airport Passenger Terminal Building Arrangement Project

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ABSTRACT

Construction management plays a critical role in ensuring that projects are completed on schedule, within budget, and in accordance with established quality standards. This study aims to identify and analyse the factors affecting construction management performance in the Passenger Terminal Building Arrangement Project at Haluoleo Airport, Kendari, as well as to evaluate the outcomes of construction work conducted under the applied construction management system. This research employed a quantitative approach using structured questionnaires distributed to 30 respondents consisting of project stakeholders including the owner, project manager, consultants, contractors, and workers. Data were analysed using validity tests, Pearson product-moment correlation analysis, and reliability testing with Cronbach's alpha through the SPSS program. The reliability test yielded a Cronbach's alpha value of 0.911 across 44 variables, indicating a very high level of reliability. The results revealed that among six construction management aspects, the Planning Aspect (A1) ranked highest with a mean score of 0.769, followed by the Control Aspect (A3) at 0.732, the Organizational Aspect (A2) at 0.699, the Environmental Aspect (A5) at 0.663, the Work Documents Aspect (A6) at 0.653, and the Budget Plan Aspect (A4) as the lowest-ranked with a mean score of 0.628. All aspects were categorised as good, indicating that construction management performance on this project was carried out satisfactorily.

***Keywords**: Construction management, performance evaluation, airport terminal project, quantitative analysis*

Submitted:	Reviewed:	Revised:	Published:
14 April 2026	28 May 2026	03 June 2026	01 August 2026

INTRODUCTION

Construction management is the study and practice of managerial and technological aspects in the construction industry, as well as being a business capital for construction consultants to provide direction on development projects (Sambis Setiawan, 2021). Construction management can be said to be a job that is carried out with the aim of regulating, organizing and coordinating all work carried out and involved in the construction of a construction project. Construction work can be said to be good and successful if all development implementation can run according to a predetermined plan and deadline (Kim et al., 2021). The development management system in construction work can be said to have an influence on what is expected with the structuring of all construction work activity processes that will be carried out so as to get good and appropriate work results . Construction management has a very high level of complexity (Project Management Institute, 2016). The complexity can be seen from the many parties involved, such as the owner's team, project manager, team leader, planning consultant, supervisory consultant, implementing contractor and others who have different interests and tasks in the project arrangement of the passenger building at Haluoleo Airport Kendari (Zhu, 2019).

Construction Management plays a very important role in the success of a project. The Haluoleo Airport - Kendari passenger terminal building arrangement project is a renovation/development project to provide adequate facilities, the space requirements needed along with other building equipment (Atmadianti, 2014). The project has an area of 4,432 m2 and is managed directly by the Ministry of Transportation of the Haluoleo Airport Kendari organizing unit (dephub.go.id, 2014).

On the other hand, the Haluoleo Airport passenger terminal building is an active airport that is quite dense with passenger traffic activities, therefore good planning is needed, the right implementation method, taking into account everything so as not to interfere with activities that are detrimental to passengers, limited access, limited possibility of using heavy equipment, and other conditions and limitations. Problems often arise due to uncertainty (Cleary & Lamanna, 2022). There are so many technical variables that cannot be ascertained and

so many other sources of risk that cause problems that sometimes fail to be anticipated.

RESEARCH METHOD

Research Design

A process or stage of working on a final project that starts from start to finish. The following is a diagram of the stages of work in the final project research.

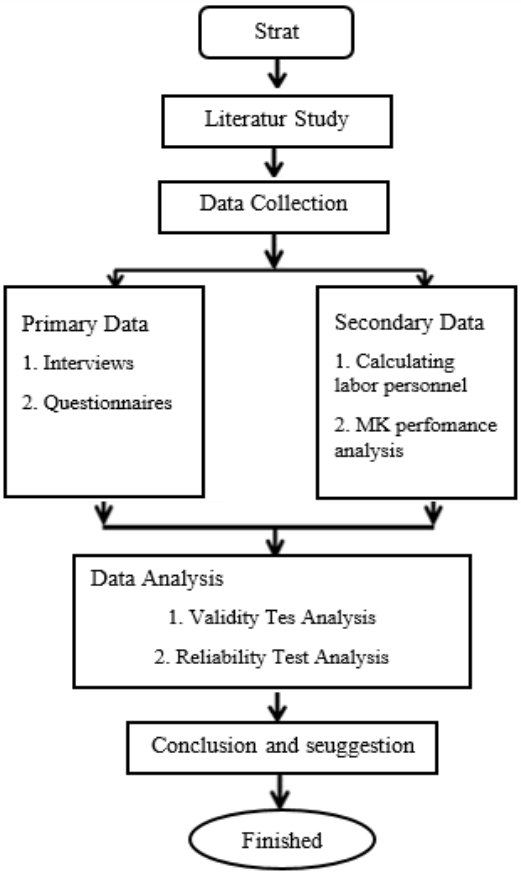

Figure 1. Flow Chart

This research uses quantitative data, namely data collected and processed to find or get how much influential factors in the application of construction management in the arrangement of the Haluoleo Kendari Airport passenger terminal building. The target respondents are respondents who are engaged in the construction services business or involved in the project, the number of respondents is 30 persons who will be given a questionnaire. In this study also uses qualitative because based on the quality of an object generally unable to be explained in the form of numbers and statistics, qualitative data is presented using descriptive explanations (Azmat & Siddiqui, 2023). Qualitative data is able to describe the object of research on the project of organizing the passenger terminal building of the Haluoleo Kendari airport in detail with a description that cannot be explained numerically.

Research Variables

This research variable is divided into 2, namely, a. The dependent variable (Y) in this study is influenced as a result of the independent variable, to find out how much influence the performance of a project consultant has on other projects on the Kendari haluoleo airport passenger terminal building arrangement project. This variable aims to apply to all workers / staff, be it project leaders, owners, project managers, and consultants.

Independent variables (X) that affect or cause changes / emergence of dependent variables. In this study, the independent variables (X) are the Planning Aspect, Organizational Aspect, Control Aspect, Budget Planning Aspect (RAB), Environmental Aspect and Work Document Aspect.

Data Collection Methods

Data collection techniques that will be used to collect data, both in the form of qualitative and quantitative data consisting of:

a. Primary data is data obtained from the first source or place of the object directly without going through intermediaries (Sugiyono, 2020). Primary Data aims to find data that is not written, or data that has a high level of accuracy. The survey conducted is by: Direct observation, the aim is to produce unwritten data that can only be obtained by field observations and interviews directly with respondents of the Management Consulting Company PT. Varia Internusa Perdana.
b. Secondary data aims to obtain institutional data obtained directly from the relevant agencies, which will then be processed with available analytical tools. This technique is needed to facilitate researchers in processing data, and making the targets needed in research. Both primary and secondary data collected were separated according to the characteristics of the data. Descriptive data is separated from numerical data, or qualitative data is sorted from quantitative data and then ready to be analyzed.

Data Analysis Methods

a. The Validity Test aims to find whether the sample of the study is valid or invalid. This test was carried out using the SPSS program, as for the minimum requirements of testing with 30 respondents, the validity requirement is if the calculated R (Pearson Correlation) value> R table (0,361) and level of significance (α) of 0.05.
b. Correlation Analysis using the Product Moment formula from Pearson with this

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formula, a correlation number (r value) will be obtained which can be used to explain the relationship between the variables studied (Cleary & Lamanna, 2022). The value of r can be calculated with an error rate or significance of 5% or 1%. Correlation analysis data is generated using the SPSS program for all question variables.

c. Reliability test is carried out to test the stability and consistency of question items when measuring again with the same subject. Reliability measurement is done using Cronbach's alpha. From the test results, it is analyzed by comparison with the r table which is sought by interpolating the number of items of the reliability coefficient question (Analysa et al., 2019).

RESULT AND DISCUSSION

Research Location

Location :Haluoleo Airport Kendari, Souteast Sulawesi
Activities :Structuring Of Passenger Terminal Building
Source of cost :SP-DIPA: 022.05.2.288436/2017 Date 07/12/2017
User/Owner : Ministry of Transportation

Figure 2. Research Location

Project Description

Haluoleo Airport is an active local airport in Kendari City, this airport has undergone several improvements in terms of Aerobridge / Garbarata facilities that make it easier for passengers to enter the airport departure and arrival terminal area and get to the aircraft (Menteri Perhubungan Republik Indonesia N.D.). The airport apron is now experiencing an expansion that is likely to accommodate approximately 8 aircraft, therefore the terminal building will experience expansion, to changes in design, building renovations both in terms of arrangement, additional space and change of space functions (Fredy Kurniawan, 2013). This ongoing project will also be useful for the next 15 years.

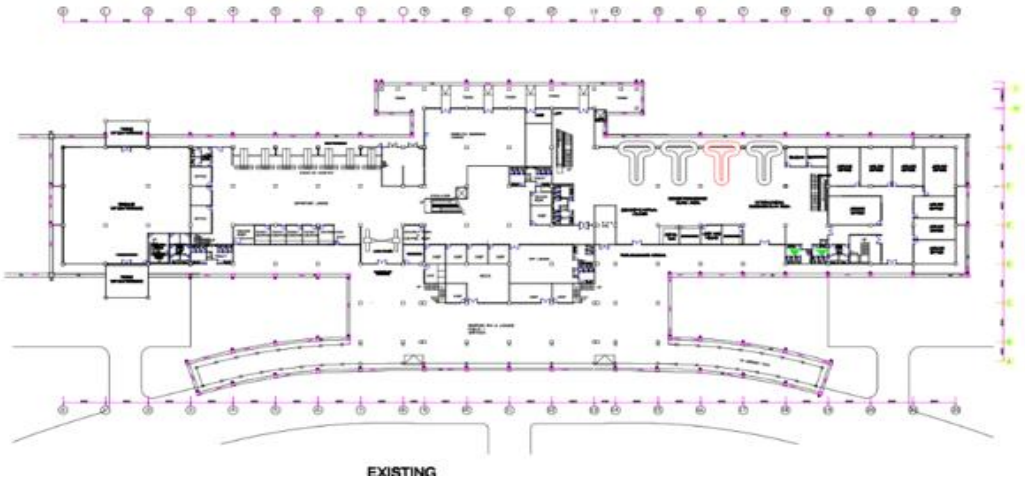

Figure 3. Existing Floor Plain 1

Figure Description:

- The check-in area is moved to zone A, there are only 14 checkin counters and will be increased to 20 checkin counters.
- The VIP Lounge space will be moved to zone D and change the function of the space as an airline's office area and service facilities.
- The Domestic boarding lounge area will become zone D, namely as a VIP Lounge Room.
- Airline office area (zone F) this room will retain its function but only the spatial arrangement is changed and has additional space
- Area (Zone C) there is an additional space that will be used as an entrance hall, arrival to carry out passenger chek-in activities.
- Ex Hotel area which is no longer functioned and will become a passenger waiting room / boarding pass.
- The multipurpose room area is diverted for booths (shops) selling typical Kendari's products and some are made as offices.

Figure 4. 1st Floor Planning Arrangement

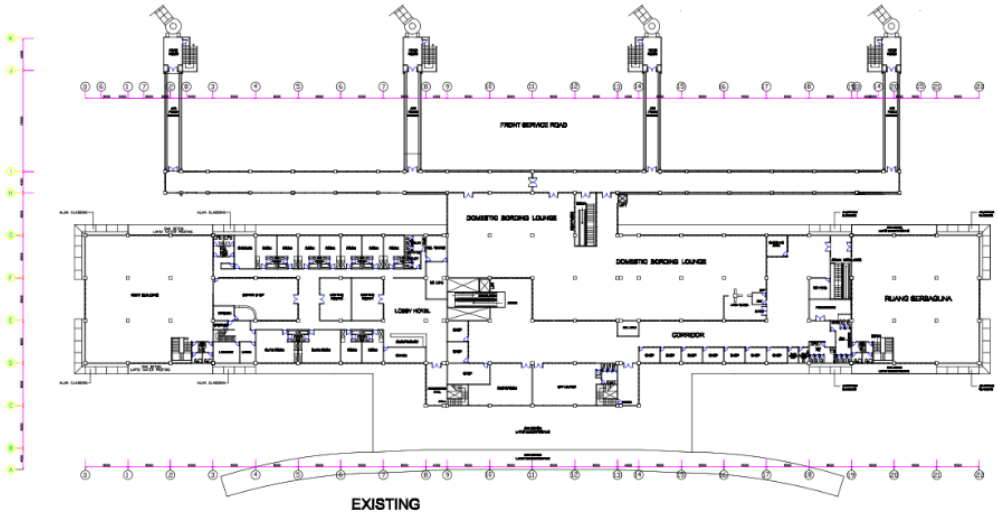

Figure 5. 2nd Floor Plan (existing)

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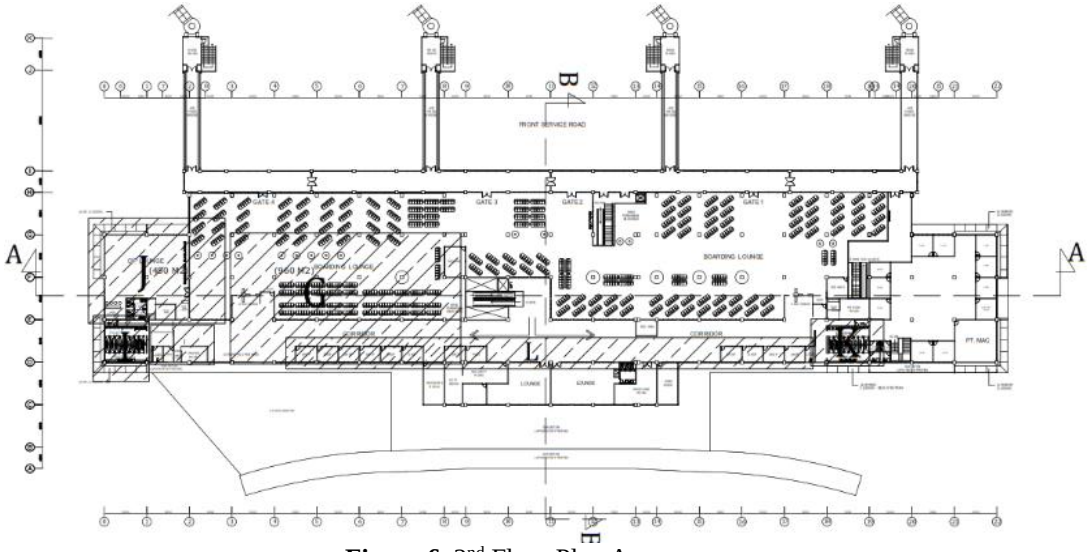

Figure 6. 2nd Floor Plan Arrangement

There are zones that will be worked on, starting from zone A – K:
Zone A : Wide the check in counter
Zone B : Departure lounge widening
Zone C : Expansion/addition of space for entrance hall
Zone D : VIP Lounge
Zone E : Change the function of space as an airlines office area and service facilities
Zone F : Airline office area
Zone G : Expansion for passenger hall / lounge while waiting for the chekin queue
Zone H : Service Area addition of Km / WC room for passenger arrival
Zone I : Service Area additional Km / WC space for Bordiang pass / Departure
Zone J : Cip Lounge
Zone K : Service Area additional Km/Wc room for Boarding pass/Departure
In this study consisted of 30 respondents, in practice, the questionnaire will first be explained about the purpose and objectives of this study (Meredith & Zwikael, n.d.). Data obtained from questionnaires to 30 respondents. The explanation of the data results from respondents can be seen from table 1 below:

Table 1. List of questionnaire respondents

No	Respondents	Amount	Percentage
1	Owner	1	3.33%
2	Project Manager	1	3.33%
3	Team Leader	1	3.33%
4	Contractor	6	20.00%
5	Consultant	8	26.67%
6	Administration	2	6.67%
7	Logistics	1	3.33%
8	Workers	10	33.33%
	Total	**30**	**100.00%**

Table 1 shows that of the 30 respondents in this study, 10 people (33.33%) were workers, 8 people (26.67%) were consultants, 6 people (20.00%) were contractors, 2 people (6.67%) were admins, 1 person (3.33%) was an owner, 1 person (3.33%) was a project manager and 1 person (3.33%) was a team leader and 1 person (3.33%) was a logistician. The majority of respondents were 10 people (33.33%) workers.

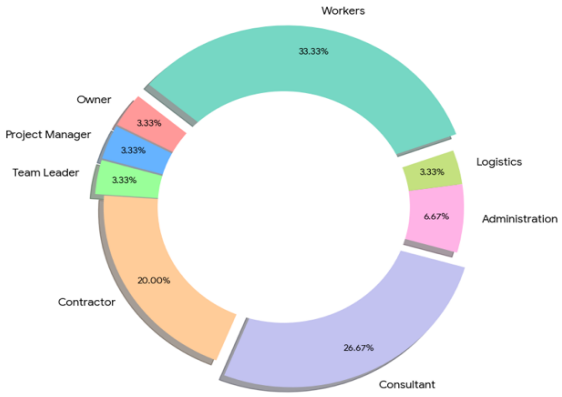

Figure 8. Distribution of respondents by position

Age categories in this study are grouped into 4 categories and it can be seen that out of 30 research respondents 13 people (43.33%) aged 31-40 years, 8 people (26.67%) aged 41-50 years, 5 people (16.67%) 51-60 years and 4 people (13.33%) aged 20-30 years.
Respondents based on education are grouped into 3 categories, namely D3, S1 and S2. It can be seen in table 3 that 21 respondents (70.00%) have a Bachelor's degree (S1), 5 people (16.67%) have a Diploma (D3) and 4 people (13.33%) have a Master's degree.

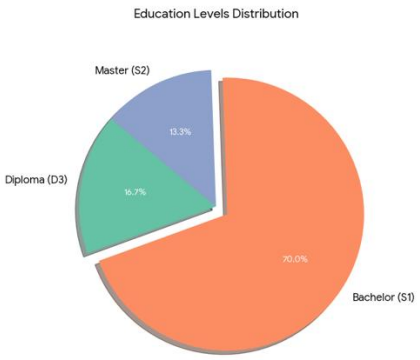

Figure 9. Education Level

Questionnaire Results

After distributing questionnaires to all respondents, the results obtained are then processed into data tabulation, which serves to make it easier to read the results and questionnaires. Then from the data tabulation, testing will be carried out with validity tests, correlation tests and reliability tests(Gunasekara et al., 2021). The minimum test requirements with a total of 30 respondents are validity requirements if the calculated R (Perason Correlation) value> R table (0.361) and level of significance (α) of 0.05.

Table 2. Table Reliability Test Results

Case Processing Summary			
		N	%
Cases	Valid	30	100.0
	Excluded[a]	0	0
	Total	30	100.0

Reliability Statistics	
Cronbach's Alpha	N of Items
.911	44

It can be seen for the Cronbachs's Alpha value with a total of 44 variables is 0,911 with a very good category, which means it can be concluded that the item is reliable. From the results of the analysis that has been processed using the SPSS program and continued using Microsoft Excel to find the average value of the Construction Management Aspect then sorted according to the ranking of the correlated variables in the correlation test. It can be concluded that the performance factors of Construction Management are as follows:

a. Planning Aspects (A1) this aspect has the highest average value of 0.769 with a good category.
b. The Control Aspect (A3) is ranked 2nd in the construction management stage with an average value of 0.732 in the good category.
c. The Organizational Aspect (A2) with an average value of 0.699 with a good category is ranked 3rd to the construction management factor.
d. Environmental Aspects (A5) with an average value of 0.663 with a good category
e. Aspects of Work Documents (A6) with an average value of 0.653 with a good category
f. Cost Budget Plan Aspect (A4) with an average value of 0.628 with a good category

This report presents the Likelihood Index analysis derived from a structured survey of 30 respondents involved in the airport passenger terminal building construction project. The likelihood index for each risk item is calculated using the following formula:

$$\text{Index} = [(\Sigma \text{ score} \times \text{frequency}) / \text{total respondents} - 1] / 4 \times 100 \quad (1)$$

The index is normalized to a scale of 0–100. Classification thresholds: High ≥ 60 | Medium 35–59 | Low < 35.

Table 3. Summary Statistics

Total Risks	Average Index	Highest Risk	Lowest Risk
44	**59.1**	**82.5 (#21)**	**13.3 (#32)**

Table 4. Risk Category Summary

Category	No. of Items	Average Index	Level	Dominant Risk
Natural	3	**76.1**	**High**	Priority
Political	4	**71.0**	**High**	Priority
Project	4	**66.0**	**High**	Priority
Technical	8	**63.9**	**High**	Priority
Economic	4	**63.3**	**High**	Priority
Environmental	3	**61.4**	**High**	Priority
Criminal	3	**56.1**	**Medium**	Monitor
Safety	2	**51.3**	**Medium**	Monitor
Human	7	**48.3**	**Medium**	Monitor
Financial	6	**44.3**	**Medium**	Monitor

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The structural evaluation of the risk matrix categorizes 44 variables into nine distinct dimensions, differentiated by their average index and strategic response levels. Five categories are classified under the "High" level, requiring immediate "Priority" mitigation. Among these, Natural risks present the most severe threat with the highest average index of 76.1 (3 items), followed by Political risks (4 items, Index: 71.0) and Project risks (4 items, Index: 66.0). Technical (8 items, Index: 63.9), Economic (4 items, Index: 63.3), and Environmental risks (3 items, Index: 61.4) also remain critical operational bottlenecks. Conversely, the remaining four categories fall into the "Medium" level, designated for continuous "Monitor" protocols. These include Criminal risks (3 items, Index: 56.1), Safety risks (2 items, Index: 51.3), Human risks (7 items, Index: 48.3), and Financial risks (6 items, Index: 44.3). Collectively, these findings imply that while social, safety, and financial parameters are moderately stable, the overarching project success depends heavily on a proactive response toward natural, institutional, and technical challenges.

Table 5. Detailed Likelihood Index by Risk Item

No.	Risk Description	Index	Level
	Political Risks		
1	Media coverage counterproductive to project execution	**69.2**	**High**
2	Lack of coordination between agencies & contractor	**71.7**	**High**
3	Input from agencies causing design changes	**75.8**	**High**
4	Worker permit procedures obstructed by various parties	**67.5**	**High**
	Environmental Risks		
5	Site conditions don't match initial design descriptions	**69.2**	**High**
6	Work disruption in airside/baggage handling areas	**32.5**	**Low**
7	High compensation demands by Air Force (TNI AU)	**82.5**	**High**
	Economic Risks		
8	Inflation affecting material prices during construction	**73.3**	**High**
9	Contract volume doesn't match actual installed work	**74.2**	**High**
10	Worker wage increase demands above standard	**39.2**	**Medium**
11	Delays in progress payments (milestones) by owner	**66.7**	**High**
	Financial Risks		
12	Delayed payments from contractor to material suppliers	**57.5**	**Medium**
13	Unprofessional financial management by contractor	**62.5**	**High**
14	High operational and overhead costs	**28.3**	**Low**
15	Payment cuts due to owner dissatisfaction	**30.8**	**Low**
16	Delayed progress due to contractor lacking operational funds	**60.8**	**High**
17	Use of funds outside contract specifications	**25.8**	**Low**
	Natural Risks		
18	Project delays due to weather (heavy rainfall)	**70.0**	**High**
19	Incomplete field surveys of existing conditions	**81.7**	**High**
20	High groundwater levels causing piling work delays	**76.7**	**High**
	Project Risks		
21	Delays in material delivery from outside Kendari	**82.5**	**High**
22	Special/ME material needs difficult to fulfill	**46.7**	**Medium**
23	Incomplete owner data causing constant design changes	**75.8**	**High**
24	Site measurement errors vs. design specifications	**59.2**	**Medium**
	Human Risks		
25	Minimum labor productivity affecting progress	**37.5**	**Medium**
26	Labor shortage/delays due to holiday breaks	**23.3**	**Low**
27	Labor strikes while the project is underway	**29.2**	**Low**
28	Worker fatigue due to excessive overtime	**68.3**	**High**
29	Insufficient work experience/training for workers	**30.0**	**Low**
30	Poor work quality due to incompetent labor	**72.5**	**High**
31	Subcontractors failing to meet productivity & quality targets	**77.5**	**High**
	Technical Risks		
32	Below-maximum heavy equipment efficiency	**13.3**	**Low**
33	Delays due to use of inappropriate work methods	**74.2**	**High**

No.	Risk Description	Index	Level
34	Contract work volumes don't match actual field conditions	**77.5**	**High**
35	Inaccurate geotechnical data hindering piling work	**79.2**	**High**
36	Inefficient material utilization causing contractor losses	**71.7**	**High**
37	Heavy equipment shortage/breakdown during piling	**60.3**	**High**
38	Material sample testing fails to meet quality standards	**65.0**	**High**
39	Work methods difficult to implement in the field	**70.0**	**High**
	Criminal Risks		
40	Loss of materials and equipment during execution	**74.2**	**High**
41	Vandalism or damage to tools/materials/facilities	**19.2**	**Low**
42	Minor corruption practices by project workers	**75.0**	**High**
	Safety Risks		
43	Lack of awareness of OHS (K3) among workers	**58.3**	**Medium**
44	Workers falling ill, injured, or fatalities	**44.2**	**Medium**

This study evaluates a comprehensive matrix comprising 44 risk variables classified into nine distinct categories. The empirical results demonstrate a predominantly high-risk profile across the project lifecycle, with specific critical clusters requiring immediate mitigation. Environmental and project risks present the most severe operational threats, highlighted by high compensation demands by the Air Force (TNI AU) (Risk 7) and material delivery delays from outside Kendari (Risk 21), both yielding the highest risk index of 82.5. Furthermore, data inaccuracies within natural and technical risk categories, particularly incomplete field surveys (Risk 19, Index: 81.7) and inaccurate geotechnical data (Risk 35, Index: 79.2), significantly obstruct physical execution like piling works.

In contrast, structural and administrative risks show varying intensities. Technical and human risks exhibit high volatility, driven by subcontractor underperformance (Risk 31) and contractual volume discrepancies (Risk 34), which both score 77.5. Meanwhile, political and criminal risks, such as agency-driven design changes (Risk 3, Index: 75.8) and minor corruption practices (Risk 42, Index: 75.0), underscore critical institutional and governance gaps. Conversely, safety and financial risks are generally moderate to low, as evidenced by low project disruption in specialized areas (Risk 6, Index: 32.5) and minimal fund misappropriation (Risk 17, Index: 25.8). Ultimately, these findings indicate that while financial and safety parameters remain manageable, the project's success heavily relies on resolving high-index institutional, logistical, and technical bottlenecks.

Table 6. Highest-Priority Risks

Rank	No.	Risk Description	Index	Level
1	7	High compensation demands by Air Force (TNI AU)	**82.5**	**High**
2	21	Delays in material delivery from outside Kendari	**82.5**	**High**
3	19	Incomplete field surveys of existing conditions	**81.7**	**High**
4	35	Inaccurate geotechnical data hindering piling work	**79.2**	**High**
5	31	Subcontractors failing to meet productivity & quality targets	**77.5**	**High**
6	34	Contract work volumes don't match actual field conditions	**77.5**	**High**
7	20	High groundwater levels causing piling work delays	**76.7**	**High**
8	3	Input from agencies causing design changes	**75.8**	**High**
9	23	Incomplete owner data causing constant design changes	**75.8**	**High**
10	42	Minor corruption practices by project workers	**75.0**	**High**

Based on the risk assessment matrix, ten critical factors have been identified under the "High" risk category. The primary risks, sharing the highest index score of 82.5, stem from institutional complexities regarding high compensation demands by the Air Force (TNI AU) (Risk 7) and logistics vulnerabilities due to material delivery delays from outside Kendari (Risk 21). Data accuracy deficiencies also present severe technical hurdles, specifically incomplete field surveys (Risk 19, Index: 81.7) and inaccurate geotechnical data delaying piling works (Risk 35, Index: 79.2).

Furthermore, contractual and operational challenges significantly threaten project performance, highlighted by subcontractor failures in productivity (Risk 31) and volume mismatches

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with actual field conditions (Risk 34), both scoring 77.5. Environmental constraints also emerge from high groundwater levels disrupting piling schedules (Risk 20, Index: 76.7). Lastly, design instability driven by agency inputs (Risk 3) and incomplete owner data (Risk 23) with a shared index of 75.8—alongside minor corruption among workers (Risk 42, Index: 75.0), underscores the need for strict site governance. In conclusion, mitigating these high-level risks requires strategic institutional coordination, supply chain management, precise engineering data, and rigorous supervisory frameworks.

Table 7. Top 5 Lowest-Likelihood Risks

Rank	No.	Risk Description	Category	Index	Level
1	32	Below-maximum heavy equipment efficiency	Technical	**13.3**	**Low**
2	41	Vandalism or damage to tools/materials/facilities	Criminal	**19.2**	**Low**
3	26	Labor shortage/delays due to holiday breaks	Human	**23.3**	**Low**
4	17	Use of funds outside contract specifications	Financial	**25.8**	**Low**
5	14	High operational and overhead costs	Financial	**28.3**	**Low**

The risk matrix identifies five variables categorized under the "Low" risk level, indicating minimal disruptive potential. Technical and security factors present the lowest vulnerability, led by below-maximum heavy equipment efficiency (Risk 32, Index: 13.3) and vandalism or facility damage (Risk 41, Index: 19.2). Additionally, human resource and financial management risks remain highly controlled; labor shortages due to holidays (Risk 26) scored 23.3, while contract funding non-compliance (Risk 17) and high overhead costs (Risk 14) registered low indices of 25.8 and 28.3, respectively. Collectively, these findings imply that while these technical, criminal, human, and financial sub-factors demand routine monitoring, they do not pose immediate structural threats to project execution.

CONCLUSSION

The construction management performance of the Passenger Terminal Building Arrangement Project at Haluoleo Airport, Kendari, is categorized as satisfactory, with all evaluated factors falling into the "good" category. Among the six management dimensions analyzed, the Planning Aspect (A1) ranks highest (mean: 0.769), followed sequentially by Control (A3: 0.732), Organization (A2: 0.699), Environment (A5: 0.663), Work Documents (A6: 0.653), and Budget Plan (A4: 0.628) .

However, a comprehensive synthesis indicates that project success remains highly vulnerable to specific high-priority risks distributed across nine critical dimensions. Severe operational bottle necks are dominated by natural risks (mean index: 76.1) and political risks (mean index: 71.0). Individually, the most disruptive factors sharing the highest risk index (82.5) are institutional complexities regarding Air Force compensation demands (Risk 7) and logistical constraints from material delivery delays outside Kendari (Risk 21). Furthermore, engineering inaccuracies significantly impede physical execution, notably incomplete field surveys (Risk 19, Index: 81.7) and flawed geotechnical data (Risk 35, Index: 79.2). Conversely, safety, human, and financial parameters show moderate-to-low risks, indicating stable baseline control.

In conclusion, while the overall construction management performance is fundamentally robust, long-term project viability depends heavily on mitigating these high-index institutional, logistical, and technical bottlenecks. Stakeholders are recommended to not only advance managerial competencies through professional training but also enforce rigorous supervisory frameworks, strategic supply chain management, and precise data verification to proactively neutralize high-priority risks.

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