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Influence of Internal Factors on Work Schedules in the Papua Region

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ABSTRACT. *Scheduling for construction projects in Papua experienced many challenges relating to the internal and external influences. This research aims to investigate the effect of internal factors such as labor skill, materials availability and cost, equipment, funding, and project complexity on the construction project duration overruns in Papua. The methodology of the study is quantitative as data has been collected with the help of Likert-scale questionnaire from contractors, consultants, workers and public works (PU) officials from different cities of Papua. Analysis was conducted using multiple linear regression with SPSS software, indicating that internal factors affect the degree of delay in project schedules by 35.1%. The result underlines that there is a high need for enhancing labor skill and managing material, equipment and fund to reduce project delay in Papua. The result of this study may be used as a guidance for project owners and local government to develop countermeasures to solve project delays as per the local nature of the Papua.*
KEYWORDS: *internal factors, work schedule, construction project, Papua.*

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I. INTRODUCTION

Scheduling work is a critical aspect of the planning and execution for any size of construction project. The development of a productive timeline requires more than technical organization, it is also affected by some internal dynamics of the company or teams which are considered as external factors. In the Papua area, these difficulties are compounded by the distinct geographical, social and cultural features, as well as poor infrastructure compared to any other part of Indonesia.

In fact, the economic growth and national development will be increasingly meaningful if it is supported by growing infrastructure development and construction in Papua. Considering that the challenge of geography inaccessibility in Papua is insurmountable, work in this region will frequently face work schedule delays. One of the leading causes of these delays is internal sources such as poor labour skills, inefficient planning, and resource mismanagement (Lokobal, Sumajouw, & Sompie, 2022).

Internal elements of construction projects are such as the competencies and knowledge of the labour, project design and scheduling, team cell operations, management of resources, and the quality of supervision (Kuncahyo & Permatasari, 2017). Unsurprisingly, use of unpainted panels lead to reduced labour efficiency, less efficient use of time and increasing risk of delays. This is quite related to Papua where the level of skilled labours and modern project management is still low as compared to other parts of Indonesia.

Furthermore, research conducted by Mandasari, Marsudi, and Sholichin (2022) related to the Management of Construction Implementation of the PLTM Prafi Dam in Manokwari, West Papua, revealed that unrealistic project schedules combined with a lack of internal supervision can lead to significant time deviations. They emphasize the necessity of implementing technology-based project management systems such as Microsoft Project Manager to enhance schedule monitoring and enable more efficient task distribution.

Recent research by Tawer, Rusim, and Rante (2023) in West Papua has shown that internal elements such as organizational capability, synergy within the organization, and workforce effectiveness have a significant impact on construction project performance. They emphasize that internal resource management is crucial to ensure the continuity of work schedule implementation at the project site.Furthermore, Kuncahyo and Permatasari (2017) emphasize that worker motivation and expertise are also vital aspects of internal factors influencing project productivity levels. When work spirit is high and supported by appropriate training, time efficiency and the quality of results can improve substantially. This shows that the management of human resources within the organization is directly related to the timeliness of project completion.

Yet, the study on how internal matters influence working time in Papua remains very scant. Most of the previous research have only mentioned external risk factors or geographic condition (Lokobal et al., 2022) and have not explored deeper on how risk management, motivation, and supervision as internal factors contribute to delay in the projects. Hence this research is taken to fill that gap to analyze empirically to what extent internal factors effect in the project work schedule of a construction project particularly in Papua.

By taking the problem that has already existed as reference, this research focuses on the analysis of the influence of internal factors to work schedule in Papuan area. It is anticipated that this study will comprehensively explain each internal factor's function and contribution and derive the most useful strategies for schedule management in peculiar regions such as Papua. Thus, the study could be a useful reference for project implementers and local government as well as other stakeholders in poverty reduction in the region to reduce delays and improve efficiency of task execution.

II. LITERATURE REVIEW

The prospects of executing development projects are on the one hand determined by internal factors in the project implementers' hands; these factors influence whether or not a task can be finished in time or has to be put on hold. Several studies of delay causes in Indonesia show that there are consistencies among them: problems human resources, material, equipment, financial and management related matter become the most dominant causes of delays. In consequence, it is necessary to study the effect of these internal factors, particularly in the context of Papua, given that it faces problems of logistics and accessibility.

Project Management Theory

Project schedule management is the process of estimating the length of the activity, activity sequencing, schedule development, and schedule control to ensure that the project is completed in the agreed time (Cooper, 2014; PMBOK Guide, 6th Edition, 2017). In the Papua case, time management is important due to multidimensional problems, including complicated geographical features and ever-changing environmental conditions.

Internal Factors in Construction Projects

Internal factors In internal factors Construction projects knowledge are those project activities which are originated from inside project team or organization and have an impact on project performance including meeting of project schedules. The internal factors can be related to planning, human resources, financial management, availability of equipment, and cooperation among parts while implementing projects (Lokobal, Sumajouw & Sompie 2022). inefficiency in these internal facets is frequently the source of work delays in Papua as local companies still have little ability supervision and management. In addition, significant gap between the planned and actual duration can be caused by poor internal management particularly on scheduling and supervising field activities (Mandasari et al., 2022). As an illustration, they draw from the construction project at the PLTM Prafi Dam in Manokwari, West Papua, where scheduling was based on experience rather than agregated capacity, and work diverged from earlier forecasts. Therefore, for the region, the separation of internal issues is the pivotal determinant of a successful timeline of project.

Workforce Performance and Competency

Performance and ability of workforce are very important components among internal factors to impact the accuracy of project schedule. Kuncahyo and Permatasari (2017) argue that personal competence of technical skill, experience, and motivation were the major contributors that affect the quality of work execution in the field. Their research in West Papua indicates that a low-skilled workforce can bog down the pace of work, particularly for technical stages such as building and finishing. Tawer, Rusim, and Rante (2023) also mention that competence of the worker was linked to discipline and working in a group. In relation to road works at West Papua, they confirmed that delays stem from 'poor coordination among workers and inadequate supervision of the project authorities, of course! which is a good eye-opener. Consequently, the advancement for capabilities and training for local workers is the key approach to improve project time management in Papua.

Materials and costs

Materials and the cost of materials are two factors that must be controlled so that projects can run as expected. Deliveries' delays, building materials shortages, and increasing prices may cause disturbance in work flow on the project site. Rizal and Kurniawan (2021), the inefficiency of material management and the increase in material costs were the greatest contributors to the delay of dam construction. Research from Rahmawati (2020) also explains that errors on cost estimation can make the money for material buying run out which can cause the project activities to be stopped (Rizal & Kurniawan, 2021; Rahmawati, 2020).

Equipment

Project implementation is subject to the availability and the working condition of the equipment because most of the construction work is highly machine and heavy equipment dependent. Lack of equipment or mechanical breakdowns may cause postponement of the work. According to the study, conducted by Suryani and Hartono in 2020, Factor of equipment, is a contributing factor which causes the highest delays in high-rise building projects execution in Surabaya. In addition, Mulyadi (2019) focuses that efficient management of equipment, i.e. through maintenance and appropriate scheduling of equipment usage, can enhance time efficiency in performing a project (Suryani & Hartono, 2020; Mulyadi, 2019).

Budget and Financing

Budgeting and untimely financing are among the main factors causing project delays in Indonesia. Discrepancies in payments from project owners or issues with cash flow can hinder the process of purchasing materials, paying worker wages, and renting equipment. Research conducted by Setiawan and Lestari in 2021 revealed that financing issues play an important role in delays in the completion of construction projects. Similar findings were reported by Yusuf in 2020, who stated that projects implemented with effective budget management tend to have fewer delays compared to those experiencing unstable cash flows.

Building Complexity

Budget issues and late funding are among the leading causes of project delay in Indonesia. Differences in payments from the project SME or related problems with cash flow can delay the purchase of materials, payment of worker wages or lease of equipment. The results of research by Setiawan and Lestari in 2021 shows that financial problems are one of the factors in delaying the completion of the construction project. Like this result is also reported by Yusuf (2020) who stated that projects executed with good budget management generally suffer shorter delay than those that encountered unpredictable cash flows.

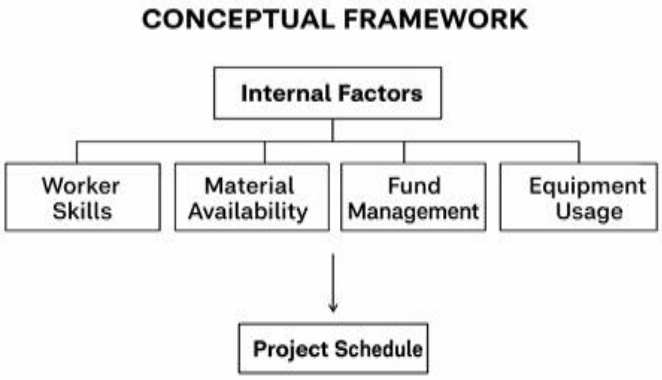
Conceptual Framework

The conceptual framework of this study refers to Sugiyono's theory (2017) and is formulated as follows:
Independent Variables:

1. Internal Factors (X): worker capabilities, availability and cost of raw materials, equipment, and budget.
2. Project Schedule / Project Time Performance (Y): delays or timeliness in completing work according to the baseline schedule (measurable through indicators such as percentage of on-time completion, deviations in days from the baseline schedule, and similar metrics).

Hypothetical Relationships:
H1: Internal factors (X1) have a significant influence on the project schedule (Y).

Figure 1. conceptual framework



III. RESEARCH METHODS

This research is a quantitative research using associative-causal design to investigate the correlation and the effect of internal and external related parties on the construction project schedule in Papua area. Type of study - this type of a study was selected in order to get an objective view of the factors, which lead to project delay and on-time project completion, by analyzing numeric data and performing statistical analysis utilizing the SPSS application.

Location and Time of Research

The study area was focused on a number of finished and ongoing building projects in Papua and was internal. The subjects of this study are contractors, consultants, project managers, field supervisors and project owners (PU) that have direct involvement in the process execution on the field.

Population and Sample

The population including all experience holder and user involved in Construction Project in Papua. The sample was purposively selected with the respondents being those who have experience and knowledge on the causes of delay in projects. At least 50 respondents was required in order to satisfy the criteria for data validity and reliability.

Data Collection Technique

The original phrases for this sentence are: Primary data was collected by means of closed questionnaires employing a 1–5 Likert scale, which were distributed online. The tools of the investigation contained a number of internal indicators (the capacity of human resource, materials, costs, equipment, budget, payments, the complexity of the building)

Data Analysis

Data were processed and analyzed by executing the following commands in SPSS software:
Testing for Validity and Reliability. Instrument validity was assessed via Pearson Product Moment correlation analysis and reliability analysis was performed using the Cronbach's a procedure with an α of more than 0.70.

Data Analysis Techniques

The collected data were processed using statistical software (SPSS). The analyses included classical assumption tests (normality, multicollinearity, heteroscedasticity), multiple linear regression to test the influence of internal and external factors on project schedules, as well as partial (t-test) and simultaneous (F-test) tests to identify the dominant factors. The coefficient of determination (R^2) was used to measure the extent to which the independent variables explain the variation in project work schedules.

IV. RESEARCH RESULT

This study was carried out by sending a questionnaire to construction project stakeholders in the Papua area, the contractors and supervisory consultants and project owners (PU). Out of the 95 questionnaires were sent, 60 were collected and 50 of which were valid for analysis. This approach was applied to elicit direct responses from the project participants who have practical experience in the field to represent the true situation of ICoC in Papua at the time of conducting the research.

The respondents in this study are various Project members located in different countries/to the project structure were the Project Manager, Site Engineer, and Foreman, as well as a Technical Field Worker. This contrast gives a big picture of the challenges to project success, or project delay. A majority tend to be aged 26–40, which is a productive age group which brings along the necessary technical and physical capabilities. Most of them posses 6–10 years of experience, which suggest a mature level of expertise to address technical and managerial challenges in the field.

Internal Project Factors

Internal factors are those that arise from within the project execution, which are under the control of the project management. In this paper, a number of major internal factors affecting the timeliness of completion of a project in Papua were identified, including: Worker competence. Human capital could be considered as a vital factor in project success. Several studies suggest that high level of skills, experience, and work motivation have positive influence on work efficiency and productivity. Being able to operate the equipment and having real world experience in the field are the two greatest reasons that support staying on or ahead of project timelines.

The prices of materials and the project cost. Volatile material prices, payments delays from counterparties, and cost overruns of the project frequently cause interruptions in the building process. Poor management in the procurement of materials also causes delays in the schedule, in particular in areas with poor logistic access such as Papua. Equipment used The availability and status of construction equipment directly influence the progress of work. Equipment malfunctions or insufficient supply of adequate tools may prevent the timely completion of a job. Hence, the equipment maintenance and technical readiness in advance of the project commencement are essential measures for risk reduction. Budgeting and financial management. What led to a good project 1. What should be the next step, what can be done ifThere is the stalled cash flow, and the budgets do not forecast as well as the worts of the field supplies of inadequate fores planning evil in this case can hurt to

the work very slightly. An appropriate, systematically structured, adaptive financial management system is needed to keep project implementation on track.

Complexity of the object under construction. Technological-organizational level of complexity of the project (the complexity level of the project influences the completion time). With increasing complexity of the project, coordination, supervision, and resources are required to prevent slippage.

Discussion of Statistical Test Results

Validity Test

The validity test was conducted to determine the extent to which the questionnaire items were able to measure the variables being studied. Based on the results of the analysis using SPSS, all statement items for both the independent and dependent variables had a calculated r-value greater than 0.279 and a significance value less than 0.05. Therefore, it can be concluded that all questionnaire items are valid and suitable for use in this study.

Reliability Test

Table 1. Validity Test Results

Reliability Statistics

Cronbach's Alpha	N of Items
,918	30

The test of reliability was carried out to know whether the research instrument was consistent or not. According to the result of the analysis from SPSS, the value of Cronchbach's Alpha was 0.918 which is much higher than the minimum limit of 0.70. It can be concluded that all items in the questionnaire were highly internally consistent and the instrument of the study is reliable.

Normality Test

Table 2. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		50
Normal Parameters[a,b]	Mean	,0000000
	Std. Deviation	2,15244856
Most Extreme Differences	Absolute	,087
	Positive	,054
	Negative	-,087
Test Statistic		,087
Asymp. Sig. (2-tailed)		,200[c,d]

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

The normal test is to test whether the research data conform to normal distribution. Kolmogorov-Smirnov test was employed resulting SAS output is shown in Fig. Sig. (2-tailed) value was 0.200 >0.05. Hence, the residual data follow normal distribution signifying the assumption for the performing multiple linear regression analysis is satisfied.

Multicollinearity Test

Table 3. Multicollinearity Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	1,378	2,679		,514	,609		
	Faktor Internal	,115	,022	,604	5,247	,000	1,000	1,000

a. Dependent Variable: Keterlambatan

The independence variables have also been tested for multicollinearity. The diabetic status was significantly associated with Tolerance (.100 > 0.10) and VIF (1.00 < 10.00) for all the variables Results. Thus, it is safe to say that no independent variable is a perfect linear combination of the other, and that each have a unique independent effect, hence being suitable to be included in the model.

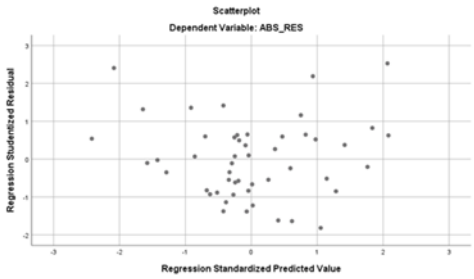
Heteroscedasticity Test

Table 4. Heteroscedasticity Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-,815	1,576		-,517	,608
	Faktor Internal	,021	,013	,226	1,605	,115

a. Dependent Variable: ABS_RES



Testing for heteroscedasticity is to test whether the variance of residuals is equal across observations. From the results of the Glejser test, the p value for internal factors was 0.115 This means there is no symptom of heteroscedascity. Thus, the regression model satisfies the assumption of homoscedasticity and can be used on.

Determination Test (R^2)

Table 5. Determination Test Results (R^2)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,604[a]	,364	,351	2,175

a. Predictors: (Constant), Faktor Internal

The Adjusted R Square is 0.351, indicating that 31.7 % of the variance of the construction project timeliness can be explained by internal and external factors at the same time. The rest 64.9% is affected by some other variable that is not investigated in this research mode.

F Test (Simultaneous)

Table 6. F Test Results (Simultaneous)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	130,201	1	130,201	27,529	,000[b]
	Residual	227,019	48	4,730		
	Total	357,220	49			

a. Dependent Variable: Keterlambatan

b. Predictors: (Constant), Faktor Internal

The F-test results show a significance value of 0.000 < 0.05, indicating that internal and external factors jointly have a significant effect on the timeliness of construction project completion in Papua. Therefore, the regression model is considered fit.

T-test (Partial)

Table 7. T-test Results (Partial)

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1,378	2,679		,514	,609
	Faktor Internal	,115	,022	,604	5,247	,000

a. Dependent Variable: Keterlambatan

The t-test results show that:

- Variable X (internal factors) has a significance value of 0.00 < 0.05, indicating that it has a significant effect on project timeliness.

According to the result of the analysis, the conclusion is that internal process including labor, materials, equipment, financing and the building complexity's have 35.1% effect to work schedules of in the region of papua.

Multiple Linear Regression Test

Based on the results of SPSS data processing, the degree of impact of internal factors and external factors on the timeliness of project completion was analyzed by using multiple linear regression analysis. the following regression equation is obtained:

$$Y=-2{,}133+0{,}123X1$$

Description:

Y = Project timeliness

X_1 = Internal project factors

X_2 = External project factors

Interpretation:

1. The constant value (-2.133) indicates that when all independent variables are zero, the project timeliness value is negative, meaning the project tends to be delayed or not completed on time.
2. The coefficients of X (0.123) are positive, indicating that any increase in internal or external factors will improve the likelihood of the project being completed on time.

V. CONCLUSION

Findings of this research indicate that internal factors such as quality of workforce, supply and price of building materials, management of equipment, finances, and complexity level of the project greatly influence the on-schedule implementation of building projects in Papua. Analysis of data using multiple linear regression technique revealed that the aggregate of these internal factors was accountable for project schedule delay or accuracy by 35.1%. Workforce capacity and availability of materials are the most significant internal factors, among other important factors such as financing, equipment and project complexity. These result suggest that focussing on enhancement of the internal resource management as the primary concerns to decrease delays and increase construction project execution efficiency (particularly in Papua, which exhibits a whole different geographical and social challenge to the rest of Indonesia) is paramount.

This research is suggesting this that the project team involved in project management and the stake holder in Papua should increase emphasis in reinforcing internal factors like acquiring competences, handling material and equipment and enhancing financial planning to have it proceed in a scheduled time meanwhile the plan and the goals of projects are set.

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