# Analysis of On-Site Material Control Risk Factors In Building Construction Design Projects in the National Capital City (IKN)

## ABSTRACT

Construction projects in every activity will always have risks that will occur, including in the construction of material control. Therefore, it is necessary to analyze what risks will occur and how much impact material control will have in the implementation taking place in the field. The purpose of this study is to determine the risk factors that arise and control technology in the implementation of on-site material control in apartment building design projects based on factor analysis and CDE (Common Data Environment) management. The population and data management of thihs study are MK (Construction Management) consultants and implementing contractors of apartment building design projects in the national capital (IKN). Data analysis uses primary and secondary data. The results of the study show 3 risk criteria that arise in the implementation of apartment building design projects based on factor analysis, namely design error risk factors, implementing Human Resources (HR) risk factors, and material management risk factors. and a technology management is needed to be able to monitor the results of the material that will be processed in the field so that this use can direct the on-site material system to the right target

Keywords: Risk, Management, Technology, Construction.

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## I. INTRODUCTION

#### Background

Along with the development of technology, construction projects are also growing rapidly with various innovations. In East Kalimantan, there has been an increase in the construction of flats carried out by the Directorate General of Public Housing to support the readiness of civil servants, the National Police, and the State Intelligence Agency in providing housing for the construction of the new National Capital City. The relocation of the IKN to the island of Kalimantan is a strategic step by the government to improve Indonesia's capabilities and civilization, as well as to realize a just economy. The planning of the IKN aims to create an area that reflects the identity of the nation and is sustainable. The reference for housing development refers to Presidential Regulation No. 63 of 2022. The construction of flats must be carried out in a timely and effective manner, especially in controlling the use of construction materials.

#### Formulation of the problem

In the current construction project has a target of acceleration and quality in the building to be worked on, one of the important buildings that is being accelerated in the development in the nation's capital is flats. as it is very necessary to have an understanding of material control strategies to understand the organization of appropriate materials, so that in this study the formulation of the problem that will be raised is the risk factors that affect the control of on-site materials and how to control on-site materials in design and build projects.

#### Meaning

Understanding and reviewing on-site material control in design and construction projects in the nation's capital. **Objective** 

- 1) Knowing the risks that affect on-site material control in design and build projects.
- 2) Know the on-site material control process for field work.

#### Scope of problem

1) This research specifically discusses the causes of the risk of controlling construction project materials in the Indonesian Republic Police (POLRI) flats and the State Intelligence Agency (BIN) flats.

2) Sources of information on material data and designs carried out in the field using real usage in the construction design and construction of the POLRI and BIN flat projects.

## II. Literature Review

Material management can be interpreted as a management system that is needed in planning and controlling the quality of materials, the amount of materials, and the placement of equipment on time, at a good price and in accordance with the needs (Bell and Stukhart, 1986). Material control in construction projects includes planning material needs, procurement, receipt, storage, distribution to the work area, and recording and monitoring its use (Hadi, 2014). Inefficient management can cause waste, delays in work, and increase project costs. According to Hinze (2011), good material control must consider factors such as project location, accessibility, type of material, and technology used. In design and build projects, the design and construction processes take place simultaneously, so that design changes can directly affect material planning. The following are some of the main risk factors in material control according to various studies:

- Material Factors: inaccurate specifications, incorrect order quantities, damage during storage, and late delivery (Assaf & Al-Hejji, 2006).
- Design & Technology Factors: sudden design changes, lack of coordination between planners and implementers, and minimal use of information technology such as Building Information Modeling (BIM) (Eastman et al., 2011).
- Implementation Factors: incorrect delivery schedules, lack of worker training, and unfavorable weather conditions (Odeh & Battaineh, 2002).
- Managerial Factors: weak monitoring and coordination systems between project teams, and the absence of a good documentation system (Nasir et al., 2003).

Research methodology



## III. Results and Discussion

Factor analysis was conducted with the help of SPSS software using the Principal Component Analysis (PCA) method with Varimax rotation, which aims to reduce 21 risk variables into several main factors that are conceptually related. Previous validity and reliability tests have shown that the data is worthy of statistical analysis (KMO = 0.711 and Bartlett's Test sig = 0.000), so that factor analysis can be continued. This study uses a quantitative method with a factor analysis approach to group risk variables that affect on-site material control. From the results of distributing questionnaires to 35 respondents and processing data using SPSS, four main factors were obtained with eigenvalues > 1 and a total cumulative variance of 70.021%. The following are the results of the analysis:

## Factor 1: Material Risk (19.782% variance)

Dominant variables:

- Delay in material delivery
- Inappropriate material specifications
- Material damage at the project site
- Insufficient material availability

This factor shows that problems with logistics and material quality greatly affect the smoothness of the project.

## Factor 2: Design and Technology Risk (18.527% variance)

Dominant variables:

- Sudden design changes
- Limited supporting technology
- Weak design and implementation coordination

This risk arises due to the characteristics of design and construction projects which are simultaneous between design and construction.

## Factor 3: Implementation Risk (16.775% variance)

Dominant variables:

- Mismatch between plan and realization
- Lack of workforce training
- Supervision and implementation errors

This factor is related to technical constraints and human resources in the field.

#### Factor 4: Management Risk (14.937% variance)

Dominant variables:

- Unsystematic documentation
- Lack of managerial supervision
- Absence of accurate reporting and tracking system

This factor highlights the importance of an effective management and control system. Based on observations and interviews with the project, the current material control process consists of:

- 1. Material requirements planning
- 2. Request and procurement
- 3. Receiving and storage
- 4. Distribution to work sites
- 5. Monitoring material usage

However, several problems were found:

- No digital system for real-time stock tracking
- Storage is not up to standard, causing damage
- Distribution delays due to inaccurate logistics schedules

From Material Control using CDE management, the main functions can be produced:

1) CDE provides a central platform where all project information can be accessed and managed centrally. This reduces the risk of data loss and ensures that all parties can access the latest information.

2) CDE enables efficient document management, including fast and controlled document revision and distribution.

3) CDE provides a centralized platform where all project stakeholders can access the latest information. This includes material documents at the purchasing stage and on site in the field

#### IV. Conclusion

Based on the results of the research and discussion, the following conclusions can be drawn:

1. By using the factor analysis method, from 22 variables, 16 variables were obtained and 3 factors were formed that influenced on-site material control. The three most dominant influencing factors are: design error risk factors, implementing Human Resources (HR) risk factors, and material management risk factors.

2. The use of Common Data Environment (CDE) technology provides a centralized platform where all project stakeholders can access the latest information, including on-site material control documents to be worked on and other information.

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