# Identification of Risk Factors for Delayed Time Schedule in Summarecon Serpong Playfield Preschool Project

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Keywords: Delay, Risk Factors, Risk Identification, Project, Construction.

Abstract: Construction tasks are generally carried out beneath surroundings characterised with the aid of using various diploma of hazard and uncertainties, which could end result from 'acknowledged', 'acknowledged-unknown', and 'unknown-unknown' situations (Smith, 1999). Delays withinside the mission that may be as a result of numerous elements, each inner and outside elements. However, it can't be denied that during Indonesia stage of mission put off is pretty excessive and may be as a result of numerous elements, each inner and outside elements. The motive of this take a look at is to investigate the elements of put off withinside the implementation of the Playfield Preschool Summarecon Serpong mission. Final effects of the take a look at there are variations of opinion concerning the elements inflicting mission delays among mission people and teachers who're specialists withinside the area of production control. Based at the descriptive take a look at effects of the 6 classes of put off, it changed into discovered that the thing inflicting the best put off changed into the monetary class. More certain studies is wanted which may be analyzed greater deeply into the elements inflicting mission delays aside from the monetary class.

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## 1 INTRODUCTION

In Indonesia, the extent of mission delays is pretty excessive, primarily based totally on studies carried out with the aid of using 168 respondents who're contractors, one hundred fifteen of whom stated that delays in tasks frequently arise. The percent of put off withinside the mission, it changed into discovered that withinside the first role eighty two respondents had a percent of delays beneathneath 1%, then withinside the 2nd role sixty one respondents had a put off percent of 1-five% as reported in Widhiawati (2012).

Delays withinside the mission that may be as a result of numerous elements, each inner and outside elements. Apart from inner and outside elements, in general, a mission has a production control representative in order that a mission can run in step with the deliberate time, however in center to decrease tasks that is frequently neglected. Playfield Preschool is one in every of the faculties positioned in a constructing that has been finished to be particular withinside the Summarecon Digital Center mall, Gading Serpong, Tangerang. This is because of the growing want for the network withinside the area of schooling which isn't matched with the aid of using the provision of vacant land. To get round this, many colleges were set up in purchasing centers/mall or different transformed homes.

The Summarecon Serpong Playfield Preschool improvement mission includes 2 mission elements, specifically the development of a swimming pool and the development of a faculty section. In the absence of a production control representative at the mission, maximum contractors aren't privy to the elements that may reason delays withinside the mission. Where if a production mission stories a put off, the time for the finishing touch of the mission that has been said withinside the agreement record wishes to be increased. In addition to permitting extra prices and

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others to arise, it's far important to become aware of and examine the hazard elements that reason the mission put off. The motive of this take a look at is to investigate the elements of put off withinside the implementation of the Playfield Preschool.

## 2 LITERATURE REVIEW

### 2.1 Overview of Delay in Construction

Delay is partial unusable implementation time in step with plan, consequently inflicting a number of the sports that accompanied have become behind schedule or cant be finished on time table deliberate Ervianto (2005). In every other words, put off may be appeared because the end result of now no longer being fulfilled time table plans which have been made, because of situations fact isn't the equal/in step with the modern situations the time table is made. Delay can as a result of the proprietor, contractor or brought on herbal situations and surroundings past the cap potential human or known as pressure majeure.

The production commercial enterprise is a commercial enterprise with excessive dangers, dangers including monetary, political, safety and hazard dangers at some stage in the implementation itself ought to be controlled and treated well with the aid of using the contractor. Meanwhile, at the part of the mission proprietor, from the selection making withinside the layout level to the level in which the constructing is bodily operated, the mission proprietor is confronted with unsure situations concerning the very last final results of the mission. On time, on price and as predicted are the 3 hazard occasions that exist in every mission and of route have an effect at the conduct of the mission proprietor. Risk is taken into consideration an occasion that isn't positive to arise, however if the occasion takes place it's going to reason price overruns Wang (2013).

### 2.2 Delay Risk Factors in Construction

Project delays may be as a result of numerous elements, each herbal and human elements, in order that the same old agreement files issued with the aid of using the AIA (American Institute of Architects) vary withinside the form of the mission into 3 classes, specifically: Compensable Delay, Excusable/Non Compensable Delay, and Non-Excusable Delay. Research carried out with the aid of using Pinori et al. (2015) to decide the elements that reason delays withinside the mission, there are 22 elements that reason delays withinside the class of Reasonable Delay that merits Compensable Delay (CD), 18 elements inflicting delays withinside the class of Unreasonable Delay /Non Excusable Delay (NED), and five elements that reason put off withinside the Reasonable Delay class however do now no longer get compensation / excusable put off (ED). After the forty five elements are grouped into three classes, then those elements are categorized primarily based totally at the control components reviewed as in Table 1. In a take a look at carried out with the aid of using Pinori et al. (2015).

Table 1: Delay risk factors.

| No | Delay Risk Factors | Delay Type Category | | |
|---|---|---|---|---|
| | | CD | NED | ED |
| A | Planning and Scheduling Aspects | | | |
| 1 | Very strict project schedule setting by owner | ● | | |
| 2 | Incomplete identification of the type of work that must exist | | ● | |
| 3 | Poorly structured / integrated work sequence plan | | ● | |
| 4 | Inaccurate determination of time duration | | ● | |
| 5 | The owner's work plan changes frequently | ● | | |
| 6 | The wrong method of construction / work execution | | ● | |
| B | Scope Aspects and Work Documents (Contracts) | | | |
| 1 | Planning (drawings / specifications) is wrong / incomplete | ● | | |
| 2 | Changes in design / work details at the time of execution | ● | | |
| 3 | Change in scope of work at the time of implementation | ● | | |
| 4 | The process of making a working drawing by a contractor | | ● | |
| 5 | Process of requesting and approving working drawings by owners | ● | | |
| 6 | Disagreement with the rules for creating working drawings | ● | | |
| 7 | There is a lot (often) of extra work | ● | | |
| 8 | There is a request for changes to work that has been completed | ● | | |

Table 1: Delay risk factors (cont.).

| No | Delay Risk Factors | Delay Type Category | | |
|---|---|---|---|---|
| | | CD | NED | ED |
| C | Aspects of Organizational, Coordination and Communication Systems | | | |
| 1 | Limited authority of owner personnel in decision making | ● | | |
| 2 | Qualifications of personnel / owners who are not professional in their fields | ● | | |
| 3 | The owner's biocratic way of inspection and control of work | ● | | |
| 4 | Failure of the owner to coordinate the work of many contractors / sub-tractors | ● | | |
| 5 | The failure of the owner to coordinate the transfer / use of land | ● | | |
| 6 | Delay in providing tools / materials provided by the owner | ● | | |
| 7 | Poor technical and managerial qualifications of personnel in the contracting work organization | | ● | |
| 8 | Poor coordination and communication between parts of the contractor's work organization | | ● | |
| 9 | Occurrence of work accidents | | ● | |
| D | Aspects of Readiness / Resource Preparation | | | |
| 1 | low mobilization of resources (materials, tools, labor) | | ● | |
| 2 | Lack of skills and skills as well as work motivation for field workers | | ● | |
| 3 | The number of workers who are inadequate / in accordance with existing work activities | | ● | |
| 4 | The unavailability of sufficiently definite / appropriate materials as needed | | ● | |
| 5 | Unavailability of work tools / equipment which are adequate or as needed | | ● | |
| 6 | Negligence / tardiness by work subcontractors | | ● | |
| 7 | Funding of project activities that are not well planned (funding difficulties in contractors) | | ● | |
| 8 | Contractor is not paid properly according to his rights (funding difficulties by the owner) | ● | | |
| E | the Inspection, Control and Job Evaluation System | | | |
| 1 | Unscheduled submission of sample materials by contractors | | ● | |
| 2 | The process of requesting and approving samples of materials by the old owner | ● | | |
| 3 | The process of testing and evaluating the material test of the owner is not relevant | ● | | |
| 4 | The work permit approval process is lengthy | ● | | |
| 5 | Failure of the contractor to carry out the work | | ● | |
| 6 | Many work results have to be repaired / redone because of defects / incorrect | | ● | |
| 7 | The process and procedures for evaluating the progress of the work took a long time and through an agreed time | ● | | |
| F | Other Aspects (Aspects beyond the capabilities of the owner and contractor) | | | |
| 1 | The physical condition of the project work field turned out to be not as expected | ● | | |
| 2 | Transportation to project sites is difficult | ● | | |
| 3 | Unforeseen things happen such as fire, flood, earthquake, landslide | | | ● |
| 4 | There was riot / damage, war | | | ● |
| 5 | There was a labor strike | | | ● |
| 6 | The occurrence of damage / damage due to negligence or actions of third parties | | | ● |
| 7 | Changes in the government's political / economic situation or policies | | | ● |

## 2.3 Analytical Hierarchy Process (AHP)

Thomas L. Saaty stated: “Analytical Hierarchy Process is a way that may produce a framework for overcoming troubles in a selection without making assumptions that are regarding independence among better and weaker stages of factors”. The definition of the hierarchy is a illustration of a complicated hassle in a multi-stage shape in which the primary stage is the aim with the stages of elements, criteria,

and sub- criteria. Hierarchy will remedy the complicated hassle with interpreting it into a few organizations that are organized right into a hierarchical shape. Then, the ones troubles will seem greater established and systematic. Risk thing fee is then performed, which may be calculated with the subsequent in equation 1.

$$FR = L + I - (L\ x\ I) \quad (1)$$

Where:

FR = Risk Factor, scale 0
-1 L = Risk Probability
I = Risk Impact

# 3 RESEARCH METHOD

## 3.1 Research Framework

This study uses a survey method in the form of a questionnaire which is conducted by analyzing research and final assignments that have been carried out in the field of project management, especially building construction projects. Then the next step is to find factual information about the conditions that occur in the Playfield Preschool project with a survey method in the form of an interview.

The purpose of this study is to identify risk factors of delays that occur in the implementation of the Summarecon Serpong Playfield Preschool project. So that from this research, it is obtained the order of the levels of delay factors that affect all project performance.

The survey method in this study was conducted to determine the dominant factors that occurred. The survey was conducted with two types, in the first type the distribution targets were people who worked on the Playfield Preschool project (contractors, consultants and site managers) and for the second type were academics who had skills in the field of project management. Furthermore, from the results of the questionnaire will be compared and found the factors that cause delays that most affect project implementation. The questionnaire process will explain the type of this research, the research stages will be described as follows:

1. Formulating problems based on previous research studies. Then determine the concepts and research hypotheses on which to base. The questionnaires collected previously were grouped into several main areas:
   a. Labor;
   b. Materials and equipment;
   c. Characteristics of the place;
   d. Managerial;
   e. Finance;
   f. Other factors.
2. Distributing questionnaires to people who have capabilities in the field of construction management and Playfield Preschool project workers (contractors, consultants and site managers). Then compare the results of the two questionnaires.
3. The final stage is to determine priority risk factors with descriptive analysis conducted by interviewing Playfield Preschool project workers (contractors and site managers).

## 3.2 Research Variables

The dependent variable in this study is the time delay that may occur in the project as shown at Table 2.

Table 2: Delay risk factors variables.

| Category | Sub Variable |
|---|---|
| 1. Labors | 1.1 Workforce expertise |
| | 1.2 Labor discipline |
| | 1.3 Work motivation |
| | 1.4 Absence rate |
| | 1.5 Availability of labor |
| | 1.6 Replacement of a new workforce |
| | 1.7 Communication between workforce and advisory bodi |
| 2. Materials and equipment | 2.1 Delivery of materials |
| | 2.2 Availability of materials |
| | 2.3 Quality of ingredients |
| | 2.4 Availability of equipment |
| | 2.5 Quality of equipment |
| 3. Characteristics of the site | 3.1 Surface and below ground conditions |
| | 3.2 Visions or responses to the surrounding environment |
| | 3.3 Physical characteristics of buildings around the project site |
| | 3.4 Storage of materials / materials |
| | 3.5 Access to the project site |
| | 3.6 Workspace requirements |
| | 3.7 Project location |
| 4. Managerial | 4.1 Project supervision |
| | 4.2 Quality of job control |
| | 4.3 Experience of field managers |

Table 2: Delay risk factors variables (cont.).

| Category | Sub Variable |
|---|---|
| 4. Managerial | 4.4 Calculation of material requirements |
| | 4.5 Design changes |
| | 4.6 Communication between consultants and contractors |
| | 4.7 Communication between contractor and owner |
| | 4.8 Schedule for delivery of materials and equipment |
| | 4.9 Schedule of work to be completed |
| | 4.10 Preparation / determination of site design |
| 5. Finance | 5.1 Payments by owner |
| | 5.2 Material prices |
| 6. Other factors | 6.1 Rainfall intensity |
| | 6.2 Economic conditions |
| | 6.3 Work accidents |
| | 6.4 Pandemic |

## 3.3 Research Instruments

The measurement instrument of this study is about the level of respondents' perceptions of the probability and impact of the delay factors given in the questionnaire on the development process of the Playfield Preschool Summarecon Serpong. The data collection tools or instruments in this study used an ordinal scale from 1 to 5 as shown in Table 3. Then for the independent variables used on the probability and impact of respondents can be seen in Table 4 and Table 5.

Table 4: Probability scale variable.

| Scale | Rating | Information |
|---|---|---|
| 1 | Very small | It will be very unlikely to happen |
| 2 | Small | It is unlikely that this will happen |
| 3 | Moderate | It is equally likely that it happened or did not happen |
| 4 | Big | Most likely it could happen |
| 5 | Very large | It is certain that it will be possible |

Table 5: Variables of impact scale.

| Scale | Rating | Information |
|---|---|---|
| 1 | Very small | Impossible so it doesn't affect time (no delay) |
| 2 | Small | There was a delay of 2 days in a period of 4 weeks |
| 3 | Moderate | There was a delay of 3-4 days in a period of 4 weeks |
| 4 | Big | There was a delay of 4 - 5 days in a period of 4 weeks |
| 5 | Very large | There was a delay of 6 - 7 days in a period of 4 weeks |

## 3.4 Analytical Hierarchy Process (AHP)

Analytical Hierarchy Process (AHP) will be considered in this research. This method is used to determine the quality or value of risk factors that may affect the project from the most influential or dominant to the small one. Quantitative data were obtained from tabulations. This will be analyzed to determine which factors have the most influence on project delays depending on the respondent's experience in working on the project. Table 6 shows the numerical ratings that will be used in the AHP method.

Table 3: Instrument Scale.

| Probability | | | | | Impact | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |

Table 4 displays a scale for the respondents to provide an opinion on the probability that can occur if the delay factor occurs in the project. In Table 5 a scale is displayed for respondents who can give their opinion on the impact of the time delay that occurs if the delay factor occurs in the project. Linkert's five-point scale is used because it can align conflicting goals and offer sufficient choice because there are two or three choices that measure the strength of an opinion. In addition, some previous studies have recommended the use of this scale. Dillman et al. (2009).

Table 6: Numerical rating (Source: Saaty's Scale of Relative Importance (2005)).

| Scale | Numerical Rating | Reciprocal |
|---|---|---|
| Extremely Preferred | 9 | 1/9 |
| Very Strong Extremely | 8 | 1/8 |
| Very Strongly Preferred | 7 | 1/7 |
| Strongly to Very Strongly | 6 | 1/6 |
| Strongly Preferred | 5 | 1/5 |
| Moderately to Strongly | 4 | 1/4 |
| Moderately Preferred | 3 | 1/3 |
| Equally to Moderately | 2 | 1/2 |
| Equally Preferred | 1 | 1 |

Risk Category is a method to determine risk into groups based on the level of risk and to determine the category of these variables by using Table 7.

Table 7: Risk category (Source: RSNI (2006)).

| FR Value | Category | Handling Steps |
|---|---|---|
| >0.7 | High Risk | Risk reduction must be carried out to a lower level |
| 0.4 – 0.7 | Average Risk | Improvement steps are needed within a certain period |
| <0.4 | Low Risk | Corrective steps are taken whenever possible |

# 4 ANALYSIS

Based on the objectives of the descriptive analysis, each category was separated into its own level. Then each table from the tabulation results of the questionnaire data will be corrected for some differences. The comparison between type I and type II questionnaires depends on the highest mean value of each category for both types of questionnaires. In Table 8 the results of tabulation of data from each type of questionnaire which are sorted by the largest mean value to the smallest mean value, so that the ranking of each type of questionnaire is obtained.

Table 8: Results of type I dan type II questionnaire data tabulation.

| Ranking | Category | Mean Value Type 1 | Mean Value Type 2 |
|---|---|---|---|
| 1 | Finance | 9.8 | 12.514 |
| 2 | Labor | 8.286 | 11.4 |
| 3 | Site Characteristics | 8.286 | 10.8 |
| 4 | Materials and Equipment | 7.8 | 10 |
| 5 | Other Factors | 7.25 | 9.62 |
| 6 | Managerial | 6.54 | 8.971 |

As seen in Table 8, the project delay category ranking on the two types of questionnaires is different, where in the type I questionnaire the financial category has the highest mean value while in the type 2 questionnaire it is the labor category that has the highest mean value. This difference is due to the type II questionnaire obtained from academics with various experiences in project management, had an effect on the project was the financial category and the labor category. After interviewing Playfield Preschool project workers, according to them the factor category that most often became a factor for delays in project implementation was the financial category.

Differences of opinions can arise due to differences in place, equipment and workers due to the timing of the project. Thus, from the results of these comparisons, the focus of testing the Analitycal Hierarchy Process (AHP) is the financial category.

## 4.1 AHP Analysis Result

The paired matrix will analyze the probability and impact, so that the paired comparison matrix is obtained. Then, the form will get 5 (five) element values to be compared. Table 9 and Table 10 show the paired matrix

Table 9: Impact pairwise comparison matrix.

| | Very High | High | Moderate | Low | Very low |
|---|---|---|---|---|---|
| Very high | 1 | 3 | 5 | 7 | 9 |
| High | 0.33 | 1 | 3 | 5 | 7 |
| Moderate | 0.2 | 0.33 | 1 | 3 | 5 |
| Low | 0.14 | 0.2 | 0.33 | 1 | 3 |
| Very low | 0.11 | 0.14 | 0.2 | 0.33 | 1 |
| Amount | 1.78 | 4.67 | 9.53 | 16.33 | 25 |

Table 10: Probability pairwise comparison matrix.

| | Very High | High | Moderate | Low | Very low |
|---|---|---|---|---|---|
| Very high | 1 | 3 | 5 | 7 | 9 |
| High | 0.33 | 1 | 3 | 5 | 7 |
| Moderate | 0.2 | 0.33 | 1 | 3 | 5 |
| Low | 0.14 | 0.2 | 0.33 | 1 | 3 |
| Very low | 0.11 | 0.14 | 0.2 | 0.33 | 1 |
| Amount | 1.78 | 4.67 | 9.53 | 16.33 | 25 |

### 4.1.1 Element Quality

Calculation of the quality of the elements in each element of the matrix, both the quality of the elements on the impact and the quality of the elements on the infrastructure and project field conditions encountered.

The results obtained from questionnaire II data for the category of the highest tardiness factor were the labor category then the material and equipment category, while the Playfield Preschool project workers argued that the category of late factors that probability. The results of the calculation of the impact element quality are shown in Table 11.

Table 11: Calculation quality element of impact and probability.

| | Very High | High | Moderate | Low | Very low | Amount | Mean | Percentage |
|---|---|---|---|---|---|---|---|---|
| Very high | 0.562 | 0.642 | 0.525 | 0.429 | 0.360 | 2.518 | 0.504 | 100.00 |
| High | 0.185 | 0.214 | 0.315 | 0.306 | 0.280 | 1.301 | 0.260 | 51.66 |
| Moderate | 0.112 | 0.071 | 0.105 | 0.184 | 0.200 | 0.672 | 0.134 | 26.68 |
| Low | 0.079 | 0.043 | 0.035 | 0.061 | 0.120 | 0.337 | 0.067 | 13.40 |
| Very low | 0.062 | 0.030 | 0.021 | 0.020 | 0.040 | 0.173 | 0.035 | 6.87 |
| Amount | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 5.000 | - | - |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 0.562 | 0.642 | 0.525 | 0.429 | 0,360 | | |
| | | | | | 0.185 | 0.214 | 0.315 | 0.306 | 0,280 | | |
| | | | | | 0.112 | 0.071 | 0.105 | 0.184 | 0,200 | | |
| | | | | | 0.079 | 0.043 | 0.035 | 0.061 | 0,120 | | |
| | | | | | 0.062 | 0.030 | 0.021 | 0.020 | 0,040 | | |
| 1 | 3 | 5 | 7 | | 0,504 | | 2,739 | | 0,504 | = | 5,440 |
| 0,33 | 1 | 3 | 5 | | 0,260 | | 1,409 | | 0,260 | = | 5,416 |
| 0,2 | 0,33 | 1 | 3 | x | 0,134 | = | 0,696 | : | 0,134 | = | 5,183 |
| 0,14 | 0,2 | 0,33 | 1 | | 0,067 | | 0,338 | | 0,067 | = | 5,011 |
| 0,11 | 0,14 | 0,2 | 0,33 | | 0,035 | | 0,176 | | 0,035 | = | 5,074 |
| | | | | | | | | | Ammount | | 26,124 |

Figure 1: Matrix Consistency and Hierarchy Test.

Table 12: Quality elements of impact and probability.

| | Very low | Low | Moderate | High | Very High |
|---|---|---|---|---|---|
| Quality | 0.069 | 0.134 | 0.267 | 0.504 | 1.000 |

The calculation of element quality in the probability element matrix is carried out in the same way as the impact element matrix shown in Table 13 and Table 14.

### 4.1.2 Consistency and Hierarchy Test

The results in Table 12 must have the same diagonal and consistent values. In finding a consistent value, the maximum eigenvalues ($\lambda_{max}$) must be close to the number of elements (n) and the eigenvalues remain zero.

The figures for each row is 0.504; 0.260; 0.134; 0.067; and 0.035. The vector of the column will be multiplied by the original matrix, giving the value of each row. Then, each value will be divided by the value of the vector concerned. Therefore, it is necessary to calculate the consistency ratio based on Table 13.

**a. Consistency Index (CI)**

Based on Table 13 the value of n (Criteria total / Order matrix) = 5,. Thus, the RI value for n = 5 is 1.12.

$$CI = \frac{(\lambda maks - n)}{(n-1)} = \frac{(5{,}225 - 5)}{(5-1)} = 0.056$$

Table 13: Consistency random index value (CRI).

| Ordo Matrix | RI | Ordo Matrix | RI | Ordo Matrix | RI |
|---|---|---|---|---|---|
| 1 | 0 | 6 | 1.24 | 11 | 1.51 |
| 2 | 0 | 7 | 1.32 | 12 | 1.48 |
| 3 | 0.58 | 8 | 1.41 | 13 | 1.56 |
| 4 | 0.9 | 9 | 1.45 | 14 | 1.57 |
| 5 | 1.12 | 10 | 1.49 | 15 | 1.59 |

Table 14: Probability mean value.

| Financial Category | Very High | High | Moderate | Low | Very low | Probability Mean Value |
|---|---|---|---|---|---|---|
| | 1.000 | 0.518 | 0.267 | 0.135 | 0.069 | |
| Payment by owner | 0 | 2 | 2 | 1 | 0 | 0.431 |
| Material prices | 0 | 0 | 1 | 3 | 1 | 0.148 |

Table 15: Average value of impact.

| Financial Category | Very High | High | Moderate | Low | Very low | Average Value of Impact |
|---|---|---|---|---|---|---|
| | 1.000 | 0.518 | 0.267 | 0.135 | 0.069 | |
| Payment by owner | 3 | 1 | 0 | 1 | 0 | 0.731 |
| Material prices | 0 | 0 | 3 | 2 | 0 | 0.214 |

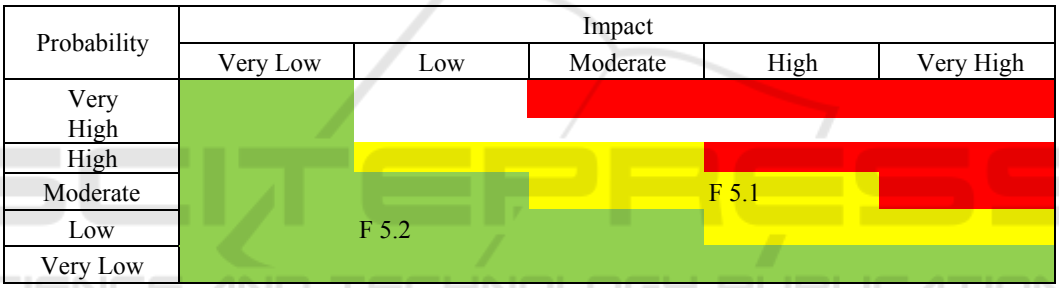


Figure 2: Qualitative risk analysis. Factor (F) Description: F 5.1 Payment by owner, F 5.2 Prices for materials.

## 4.2 Risk Factor Value Analysis

After obtaining the average value of the impact and probability, the next step is to calculate the risk factor by using equation 2.

$$FR = L + I - (L\ x\ I) \quad (2)$$

The result of the calculation of the consistency index (CI) is 0.056 which indicates that the calculation is consistent because <0.1 where 0.1 is the critical limit of consistency.

### b. Consistency Ratio (CR)

The calculation of the consistency ratio is carried out to ensure that (CR) is less than 10%. If the CR value is greater than 10%, the comparison matrix needs to be improved.

$$\text{CR} = \frac{\text{CI}}{\text{RI}} = \frac{0{,}056}{1{,}12} = 0.05$$

Table 16 shows the recapitulation of the value results of the aggregate variables/risk events.

Table 16: Value of risk factors.

| Financial Category | Probability Mean Value | Average Value of Impact | Risk Factor (RF) |
|---|---|---|---|
| Payment by owner | 0,431 | 0,731 | 0,847 |
| Material prices | 0,148 | 0,214 | 0,33 |

The result of the calculation of the consistency ratio is 0.05 which when viewed in the form of a presentation of 5%. This result is less than 10%, so the hierarchy is consistent and the level of accuracy is high.

### c. Average Value of Impact and Frequency

After passing the test of consistency, hierarchy and accuracy, the next step is to determine the average value of the impact and probability. The calculation results are shown in Table 14 and Table 15.

After calculating the risk factor value of each probability and impact, the rating scale uses RAM. Then an analysis of the probability of each factor that occurs and its impact is carried out to determine the level of risk. Qualitative risk assessment can also help to determine whether these factors require special attention, so that in the future this delay factor can be minimized. Figure 2 gives the qualitative risk analysis matrix.

### 4.3 Risk Category Analysis

Risk category analysis is a way to determine risk categories into groups based on the level of risk that occurs. In determining it, the risk category table is used which is shown in Table 17.

Table 17: Results of the risk category in the financial category with AHP.

| Financial Category | Risk Factor | Risk Level |
|---|---|---|
| 5.1 Payments by Owner | 0,847 | High |
| 5.2 Prices for Materials | 0,33 | Low |

## 5 RESULTS AND DISCUSSION

Discussion of the AHP method, based on the results of Table 17, it is known that the payment by the owner of the financial category is a factor that greatly influences the implementation of the Playfield Preschool project, resulting in delays. This is supported by interviews from Playfield Preschool project workers where the owner is often late in making payments so that project implementation is hampered because as a result of the late payment the goods / materials that are used up should be immediately repurchased instead of being delayed due to lack of funds to buy materials. So it is necessary to review the applicable contract, so that it can be seen that the delay was caused by the contractor or from the owner.

Apart from the factor of payment by the owner, the delay due to indiscipline of workers from the labor category ranks the second factor that influences the delay in this Playfield Preschool project. According to the site manager and the field contractor, the delay is also caused by the indiscipline of the workers which makes the implementation process slow down, because workers are often found lying about the number of attendances on one day at a project site, there are 15 workers and in the afternoon it is reduced to 12, the following day workers reduced to 10 people. This happens every day in this Playfield Preschool project because the worker contract system is daily, not wholesale. Where this hampers the implementation of project work, because it is ineffective and inefficient.

Then the third rank factor which affects the delay in the Playfield Preschool project is the opinion / response of the surrounding environment from the place characteristics category. The location of the Playfield Preschool project which is located in the shopping center / mall area is one of the inhibiting factors, because the process of transporting goods needs to be carried out outside the operational hours of the shopping center/mall. Opinions/responses from the mall are very influential in the project implementation process, where if there is damage to the project area it is necessary to communicate between the site manager /contractor and the mall. Often the mall is slow in dealing with existing project location problems, such as a leak at the project site, it took a long time to finally be handled by the mall.

## 6 CONCLUSIONS

From the analysis and discussion above, it can be concluded that of the 6 categories of delay: Labor, Materials and Equipment, Place Characteristics, Managerial, Financial and Other Factors. The most influential factor of the delay is the financial category, especially an indicator of late payment by owners.

There are difference of opinions on the category of tardiness that is most influential according to the Playfield Preschool project workers and academics. This is because the academics are the stakeholders on a wide range of construction projects with varying field conditions, while the Playfield Preschool project workers give their opinion on what is happening on the project site.

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