

# Analysis Of Factors Influencing Contract Time Extension In Projects Of Water Resources Sector For Public Works Department In East Kutai Regency

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**Abstract:** The objectives of this research are: 1) to analyze the factors influencing the extension of contract time on the project, 2) to analyze the most dominant factors influencing the extension of contract time on the project, 3) to analyze the strategy to anticipate and avoid the extension of contract time projects of Water Resources Sector for Public Works Department of East Kutai Regency. The research that will be conducted is included into descriptive research to find out the factors that influence the extension of time towards contract implementation. This research uses survey method by collecting opinion, experience and respondent attitude regarding to problems that have been experienced in project work, by taking primary data through questionnaires and secondary data from related institutions. The result of this research shows that the factors that influence significantly the time extension are: (1) Material Factor with  $\beta$  coefficient value of 0,375; (2) Environmental factor with  $\beta$  coefficient of 0,357; (3) Change Factor with coefficient  $\beta$  value of 0,322. The most dominant factor in influencing the extension of contract time in th water resources sector for Public Works Department of East Kutai is the material factor with the most influential indicator of material scarcity with the highest communal value of 0,905.

**Index Terms:** contract, projects, water resources.

## 1 INTRODUCTION

CONSTRUCTION work or physical field development is a dynamic business field where many things are deemed uncertain according to the characteristics of the project, which is unique, has a non-repetitive implementation period, has an intensity of activity and uses resources that are not constant and involves many disciplines. The ideal conditions for the Construction Executor are when all components of the construction contract with the service user are clearly described in the Work Agreement, General Conditions of Contract, Special Conditions of Contract, Technical Specification, Description of Plans, and quantity list [1]. Each project activity in achieving its objectives must meet the limits of the appropriate cost (budget) allocated, on schedule (time) and the end date that has been determined, and according to the quality that is in accordance with the required specifications and criteria [2]. Meanwhile, the keys of timely success are the planning and scheduling of a complete and appropriate project. Extension of time can be considered as a result of the unfulfilled schedule of plans that have been made, because the reality conditions are not the same/not in accordance with the conditions when the schedule is made [3].

The extension of project time is caused by several factors [4]. These factors can come from the implementation (contractor), owner, and other than both parties. The construction project is one form of activity that lasts for a limited time, with certain resources, to achieve results in the form of buildings or infrastructure. One of the purposes of the construction project is the completion of a timely project in accordance with the planned implementation schedule. While, the keys of the successful implementation of the on-time project are planning and scheduling of a complete and appropriate project. In the planning and scheduling processes, the things that need to be understood are the factors that determine the project. Understanding the factors is done by reviewing the stages, such as the scheduling of project activities that basically it is to determine when an activity should start and end. The sequence of activities with their each duration, which have been composed, forms a series of activity scheduling, which is the project execution schedule [5]. The construction executor usually assumes that all information in the contract is in accordance with ideal conditions, but during the execution period, it is often inconsistent with the assumption. This difference in conditions may increase the cost of project implementation, including payments to construction executors depending on the agreement incurred in the contract [6]. According to the data obtained from the Department of Public Works of East Kutai Regency (Recapitulation Activity Field of SDA DPU Kutim District, FY 2014 & 2015), in the implementation of construction projects in the field of water resources often experience extension of time. From the data obtained, it also shows that most contractors who have experienced extension of time are contractors with non-small qualifications. The consequence of extension is loss for both the owner and contractor [7] In the Water Resources project, there are several works that require an extension of time yearly. It is assumed that the factors that cause the extension of time include: 1) Environmental factors (situations): natural changes that occur, socio-cultural issues, topography and the influence of temperature and weather; 2) Material factors: lack of materials, delivery of inhibited materials and others; 3)

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Schedule and control factors: preparation of work schedules and revisions to unavailability of professional construction management, procedures and permits for material use and others; 4) Factors of change: the design changes and design errors made by the planner. The objectives of this research are: 1) to analyze the factors influencing the extension of contract time on the project, 2) to analyze the most dominant factors influencing the extension of contract time on the project, 3) to analyze the strategy to anticipate and avoid the extension of contract time projects of the Water Resources Sector of the Public Works Department in East Kutai Regency.

## 2 RESEARCH METHOD

The research that will be conducted is included in descriptive research to find out the factors that influence the extension of time towards contract implementation [8]. This research uses survey method by capturing respondents' opinions, experiences and attitudes about problems that have been experienced in project work, taking primary data through questionnaires and secondary data from related institutions. Based on the factors influencing the extension of time, then the factors are determined followed by determining the variables to be used as items that will be measured in the form of questionnaires. The population of this study are personnel who know the conditions and who are directly involved in the work of the Water Resources Project of the Public Works Department in East Kutai Regency. The populations taken are 15 contractors consisting of directors, Site Manager and Field Supervisors from the owners as many as 19 people consisting of The Commitment Maker Official/Activity Technical Executing Official (PPK/PPTK), field coordinator and field supervisor. While from the element of Consultants, they are as many as 13 people consisting of Site Manager and Inspector. In this study, samples were drawn from people who were considered experienced and directly involved in water resources projects that were over time, randomly using disproportionate stratified random sampling [9]. Questionnaires are used for data collection [10]. Statement item related to what factors that lead to an extension of time towards the implementation of the Water Resources Project contracts of the Public Works Department of East Kutai Regency and which factors dominate the most time leading to the execution of project contracts using Likert scale with range 1 to 4 to avoid the middle value (hesitant) which is difficult to interpret between agree and disagree, so that the firmness of the respondents is obtained in answering questions from the questionnaire. The items in the research variables are designed with positive questions, so the number one as the respondent's code of response which is very negative on one of the questions, while the number four is to give a very positive response to one of the questions.

## 3 RESULT AND DISCUSSION

### 3.1 Result of Multiple Linear Regression Analysis

Regression analysis was used to obtain the factors that influence the extension of contract time on the projects of the Water Resources Sector of the Public Works Department in East Kutai Regency. In data analysis, multiple linear regression analysis is used by doing several stages to look for the relationship between independent and dependent variables. Based on the results of data analysis by using software IBM SPSS 20, not all independent variables has

significant value. The independent variables that have significant value (significant effect on the extension of contract time in East Kutai Regency's Public Works Project in Water Resources sector) are Materials (X1), Environment (X5), and Changes (X6). While the variables that do not have significant value (influential but not significant extension of contract time on projects of Water Resources Sector in the Department of Public Work of East Kutai Regency are Manpower (X2), Equipment (X3), Finance (X4), Government (X7), Contract (X8) and Schedule and Control (X9). Regression model obtained can be seen in Equation (1)

$$Y = -10,038 + 0,375 X_1 + 0,229 X_2 + 0,226 X_3 + 0,175 X_4 + 0,357 X_5 + 0,322 X_6 + 0,153 X_7 + 0,163 X_8 - 0,001 X_9 + \epsilon \quad (1)$$

Value  $R^2$  is a coefficient of determination which essentially measures how far the ability of the regression model in explaining the diversity of the dependent variable (Y) that is equal to 0,623. It means that the regression model obtained can account for 62,3% of the time variable extension variable (Y). R value is a correlation that explains the closeness of the relationship between the independent variable (X) and the dependent variable (Y) of 0,789. Then, to determine the independent variable (Factor) that has the most dominant influence over the extension of time on contract implementation in Water Resource Project of the Public Works Department in East Kutai Regency can be done by comparing the standardized coefficient value of each independent variable (factor) to Y. The most dominant variable of its effect on the time extension on the contract implementation of Water Resources Sector Project of the Public Works Department of East Kutai Regency is a variable that has significant influence and has the greatest standardized value of  $\beta$  Coefficients. Variable (factor) which has value of standardized  $\beta$  coefficient is the biggest. It means that in this research the most dominant influencing factor on the extension of time on contract implementation in the project of Water Resources of Public Works Department of East Kutai Regency is Material (X1). It means that the extension of time on the contract implementation on the projects of the Water Resources Sector of the Public Works Department of East Kutai Regency is influenced by Material (X1) source. The positive standardized value of  $\beta$  Coefficient indicates that the better the Material (X1), the better the extension of time on contract implementation in East Kutai Regency's Public Works Department of Water Resources project.

### 3.2 Simultaneous Regression Hypothesis Test

TABLE 1: SIMULTANEOUS HYPOTHESIS TEST RESULTS

Hypothesis	Value	Decision
$H_0 : \beta = 0$ (there is no significant influence among X1, X2, X3, X4, X5, X6, X7, X8, X9 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$F_{count} : 5,876$ $p\_Value : 0,000$ $F_{table (0,05, 9, 4)} : 2,1178$	$H_0$ is rejected
$H_a : \beta \neq 0$ (there is a significant influence among X1, X2, X3,		

X4, X5, X6, X7, X8, X9 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency)  
 $\alpha = 0,05$

Hypothesis testing of regression model simultaneously uses F test. In F distribution table, F value of  $F_{table}$  with *degrees of freedom* (df)  $n1 = 9$  and  $n2 = 41$  is 2,702. If the value of the F counting result is compared to  $F_{table}$ , then the calculation result of  $F_{count}$  is greater than  $F_{table}$  ( $5,876 > 2,1178$ ). In addition, the p-value is 0,000. If p-value is compared to  $\alpha = 0,05$  then p-value is less than  $\alpha = 0,05$ . From both comparison, it can be taken decision that  $H_0$  is rejected at level  $\alpha = 0,05$ . Thus, it can be concluded that there is a significant influence simultaneously among X1, X2, X3, X4, X5, X6, X7, X8, X9 on the time extension on contract implementation of Water Resources Sector of Public Works Department in East Kutai Regency.

### 3.3 Partial Regression Model Test

Partial regression model testing is used to determine whether each independent variable forming individual regression model has a significant influence on the time extension on the contract implementation of Water Resource Project of the Public Works Department in East Kutai Regency or not. To test the relationship, t test is used, which is by comparing the value of  $t_{count}$  and  $t_{table}$  independent variable forming regression model is claimed to have significant effect if  $t_{count} > t_{table}$  or p-value  $< \alpha : 0,05$ . Partial regression model test is as follows.

#### a. Material Factor (X1)

Hypothesis testing of the Material Factor regression coefficient (X1) can be written in the Table 2.

**TABLE 2: HYPOTHESIS TESTING OF MATERIAL FACTOR REGRESSION COEFFICIENT (X1)**

Hypothesis	Value	Decision
$H_0 : \beta = 0$ (there is no significant influence between Material Factor X1 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{count} : 3,003$ p-Value : 0,005 $t_{table (0,05, 42)} : 2,020$	$H_0$ is rejected
$H_a : \beta \neq 0$ (there is a significant influence between the Material Factor X1 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$		

Material Factor (X1) has a regression coefficient of 0,375. By using SPSS software, t test statistic is obtained at 3,003 with p-value equal to 0,005. The statistical value of t test is greater than  $t_{table}$  ( $3,00 > 2,020$ ) and also p-value is smaller than  $\alpha =$

0,05. This test indicates that  $H_0$  is rejected. Therefore, it can be concluded that the material factor (X1) has a significant influence on the time extension on the contract implementation of Water Resources Project of the Public Works Department in East Kutai Regency. Coefficients with positive signals indicate that the better Variable Material (X1) will affect the better the time extension in the contract implementation of Water Resources Project of the Public Works Department in East Kutai Regency.

#### b. Labor (X2)

Hypothesis testing of Labor Factor regression coefficient (X2) can be written in Table 3.

**TABLE 3: HYPOTHESIS TESTING OF LABOR FACTOR REGRESSION COEFFICIENT (X2)**

Hypothesis	Value	Decision
$H_0 : \beta = 0$ (there is no significant influence between Labor Factor X2 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{count} : 1,918$ p-Value : 0,064 $t_{table (0,05, 42)} : 2,020$	$H_0$ is accepted
$H_a : \beta \neq 0$ (there is a significant influence between Labor Factor X2 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$		

Labor Factor (X2) has a regression coefficient of 0,229. By using SPSS software, t test statistic is obtained 1,918 with p-value equal to 0,064. The t test statistic value is smaller than  $t_{table}$  ( $1,918 < 2,020$ ) and also p-value is greater than  $\alpha = 0,05$ . This test indicates that  $H_0$  is accepted. Hence, it can be concluded that the factor of Labor (X2) does not have significant influence on the time extension on the contract implementation of Water Resources Project of the Public Works Department in East Kutai Regency. Coefficients marked positive indicate that the better Variable of Labor (X2) will influence the better time extension on contract implementation of Water Resources Project of the Public Works Department in East Kutai Regency.

#### c. Equipment Factor (X3)

Regression coefficient hypothesis testing of Equipment Factor (X3) can be written in Table 4.

**TABLE 4: REGRESSION COEFFICIENT HYPOTHESIS TESTING OF EQUIPMENT FACTOR (X3)**

Hypothesis	Value	Decision
$H_0 : \beta = 0$ (there is no significant influence between the Equipment Factor X3 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works	$t_{count} : 1,895$ p-Value : 0,067 $t_{table (0,05, 9, 4)} : 2,020$	$H_0$ is accepted

Department of East Kutai Regency)  
 $\alpha = 0,05$

$H_a : \beta \neq 0$  (there is a significant influence between the Equipment Factor X3 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency)  
 $\alpha = 0,05$

Equipment Factor (X3) has a regression coefficient of 0,226. By using SPSS software, t test statistic is obtained 1,895 with p-value equal to 0,334. The test statistic value t is smaller than  $t_{table}$  ( $1.895 < 2.020$ ) and also p-value is greater than  $\alpha = 0,05$ . This test indicates that  $H_0$  is accepted. Therefore, it can be concluded that the Equipment factor (X3) does not have significant influence on the time extension on the contract implementation of Water Resources Project of the Public Works Department in East Kutai Regency. Coefficients with positive signals indicate that the better Variable Equipment (X3) will affect the better time extension on the contract implementation of Water Resources Project of the Public Works Department in East Kutai Regency.

**d. Financial Factor (X4)**

Regression coefficient hypothesis testing of Equipment Factor (X3) can be written in Table 5.

**TABLE 5: REGRESSION COEFFICIENT HYPOTHESIS TESTING OF FINANCIAL FACTOR (X4)**

Hypothesis	Value	Decision
$H_0 : \beta = 0$ (there is no significant influence between the Financial Factor X4 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{count} : 0,686$ $p\text{-Value} : 0,497$	$H_0$ is accepted
$H_a : \beta \neq 0$ (there is a significant influence between the Financial Factor X4 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{table} (0,05, 9, ) : 2,020$	

Financial Factor X4 has a regression coefficient of 0,175. By using SPSS software, t test statistic is obtained 0,686 with p-value equal to 0,497. The test statistic value t is smaller than  $t_{table}$  ( $0.686 < 2.020$ ) and also the p-value is greater than  $\alpha = 0,05$ . This test indicates that  $H_0$  is accepted. Hence, it can be concluded that the financial factor X4 does not have significant influence on the time extension on the contract implementation of Water Resources Projects of the Public Works Department in East Kutai Regency. Coefficients with positive signals

indicate that the better the Financial Variable X4 will affect the better the time extension in the contract implementation of the Water Resources Projects of the Public Works Department in East Kutai Regency.

**e. Environmental Factor (X5)**

Regression coefficient hypothesis testing of Environmental Factor (X5) can be written in Table 6.

**TABLE 6: REGRESSION COEFFICIENT HYPOTHESIS TESTING OF ENVIRONMENTAL FACTOR (X5)**

Hypothesis	Value	Decision
$H_0 : \beta = 0$ (there is no significant influence between Environmental Factor X5 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{count} : 3,199$ $p\text{-Value} : 0,003$	$H_0$ is rejected
$H_a : \beta \neq 0$ (there is a significant influence between Environmental Factor X5 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{table} (0,05, 9, 41) : 2,020$	

Environmental Factor X5 has a regression coefficient of 0,357. By using SPSS software, t test statistic is 3,189 with p-value equal to 0,003. The t test statistic value is greater than  $t_{table}$  ( $3.189 > 2.020$ ) and also the p-value is smaller than  $\alpha = 0,05$ . This test indicates that  $H_0$  is rejected. Hence, it can be concluded that the Environmental Factor X5 has a significant influence on the time extension on the contract implementation of Water Resources Project of the Public Works Department in East Kutai Regency. Coefficients with positive signals indicate that the better the Environment Variable X5 will affect the better the time extension in the contract implementation of Water Resources Projects of the Public Works Department in East Kutai Regency.

**f. Change Factor (X6)**

Regression coefficient hypothesis testing of Change Factor (X6) can be written in Table 7.

**TABLE 7: REGULATION COEFFICIENT HYPOTHESIS TESTING OF CHANGE FACTOR (X6)**

Hypothesis	Value	Decision
$H_0 : \beta = 0$ (there is no significant influence between the Change Factor X6 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{count} : 2.640$ $p\text{-Value} : 0,013$	$H_0$ is rejected
$H_a : \beta \neq 0$ (there is a significant influence between the Change	$t_{table} (0,05, 9, 41) : 2,020$	

Factor X6 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency)  
 $\alpha = 0,05$

Change Factor X6 has a regression coefficient of 0,322. By using SPSS software, t test statistic is 2,640 with p-value equal to 0,013. The test statistic value t is greater than  $t_{table}$  ( $2.640 > 2.020$ ) and also the p-value is smaller than  $\alpha = 0,05$ . This test indicates that  $H_0$  is rejected. Hence, it can be concluded that the Change Factor X6 significantly affects the time extension on the contract implementation of Water Resources Projects of the Public Works Department in East Kutai Regency. Coefficients with positive signals indicate that the better Variable of Change X6 will affect the better time extension on contract implementation of Water Resources Project of Public Works Department in East Kutai Regency.

#### g. Government Factor (X7)

Regression coefficient hypothesis testing of Government factor (X7) can be written in Table 8.

**TABLE 8: REGULATION COEFFICIENT HYPOTHESIS TESTING OF GOVERNMENT FACTOR (X7)**

Hypothesis	Value	Decision
$H_0 : \beta = 0$ (there is no significant influence between the Government Factor X7 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{count} : 1,253$ $p\text{-Value} : 0,219$	$H_0$ is accepted
$H_a : \beta \neq 0$ (there is a significant influence between the Government Factor X7 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{table} (0,05, 9, 41) : 2,020$	

Government Factor X7 has a regression coefficient of 0,153. By using SPSS software, t test statistic of 1,253 with p-value is 0,219. The test statistic value t is greater than  $t_{table}$  ( $1,253 < 2,020$ ) and also p-value is greater than  $\alpha = 0,05$ . This test indicates that  $H_0$  is accepted. Therefore, it can be concluded that the Government Factor X7 does not have significant influence on the time extension on the contract implementation of Water Resources Projects of the Public Works Department in East Kutai Regency. Coefficients with positive signals indicate that the better the Government Variable X7 will affect the better the time extension in the contract implementation of Water Resources Projects of the Public Works Department in East Kutai Regency.

#### h. Contract Factor (X8)

Regression coefficient hypothesis testing of Contract Factor (X8) can be written in Table 9.

**TABLE 9: REGULATION COEFFICIENT HYPOTHESIS TESTING OF CONTRACT FACTOR (X8)**

Hypothesis	Value	Decision
$H_0 : \beta = 0$ (there is no significant influence between the Contract Factor X8 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{count} : 0,648$ $p\text{-Value} : 0,522$	$H_0$ is accepted
$H_a : \beta \neq 0$ (there is a significant influence between the Contract Factor X8 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{table} (0,05, 9, 41) : 2,020$	

Contract Factor X8 has a regression coefficient of 0,163. By using SPSS software, t test statistic is obtained 0,648 with p-value equal to 0,522. The test statistic value t is smaller than  $t_{table}$  ( $0.648 < 2.020$ ) and also p-value is greater than  $\alpha = 0,05$ . This test indicates that  $H_0$  is accepted. Thus, it can be concluded that the Contract Factor X8 does not have significant influence on the time extension on the contract implementation Water Resources Projects of the Public Works Department in East Kutai Regency. The coefficient marked positive indicates that the better the Contract Variable X8 will affect the better the time extension in the contract implementation of Water Resources Project of the Public Works Department in East Kutai Regency.

#### i. Schedule and Control Factor (X9)

Regression coefficient hypothesis testing of Schedule and Control Factor (X9) can be written in Table 10.

**TABLE 10: REGRESSION COEFFICIENT HYPOTHESIS TESTING OF SCHEDULE AND CONTROL FACTOR (X7)**

Hypothesis	Value	Decision
$H_0 : \beta = 0$ (there is no significant influence between the Schedule and Control Factor X9 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{count} : 0,005$ $p\text{-Value} : 0,996$	$H_0$ is accepted
$H_a : \beta \neq 0$ (there is a significant influence between the Schedule and Control Factor X9 towards the time extension on execution of contracts for the Water Resources Sector of the Public Works Department of East Kutai Regency) $\alpha = 0,05$	$t_{table} (0,05, 41) : 2,020$	

Schedule and Control Factor X9 has a regression coefficient of -0,001. By using SPSS software, t test statistic is 0,005 with p-value equal to 0,996. The test statistic value t is smaller than  $t_{table}$  ( $0.005 < 2.020$ ) and also p-value is greater than  $\alpha = 0,05$ .

This test indicates that  $H_0$  is accepted. Therefore, it can be concluded that the Schedule and Control Factor X9 does not have significant influence on the time extension on the contract implementation of Water Resources Projects of the Public Works Department in East Kutai Regency. Coefficients with negative signals indicate that the worse Schedule and Control X9 will affect the better time extension on the contract implementation of Water Resources Projects of the Public Works Department in East Kutai Regency.

### 3.3 Strategy as an Effort to Overcome Extension of Time

Based on the results of regression analysis, it is found that Material Factor, Environmental Factor, and Change Factor are the factors that influence significantly; while the factors that influence insignificantly are Labor Factor, Equipment Factor, Financial Factor, Government Factor, Control Factor, and Schedule and Control Factor. Furthermore, the factors that significantly influence the time of contract implementation can be explained as follows: Material Factor is the reduction result of manifest variables consisting of: Frequent material scarcity (X1.1), Delivery of late material (X1.2), Material Deficiency (X1.3), Material quality does not meet the specification (X1.4); Environmental Factor is the reduction result of manifest variables consisting of: Socialization of project to old society (X5.1), Weather influence on work activity (X5.2), Road condition to the project location (X5.3); Change Factor is the reduction result of manifest variables consisting of: Planning that has been too long (X6.1), Owner's policy change (X6.2), Change process retardation from planning (X6.3).

#### a. Strategies Used on Material Factor

Material Factor is the variable having the highest standardized  $\beta$  coefficient. It means that, in this research, the most dominant factor influencing the extension of contract time is **Material Factor**. It also means that the extension of contract time is greatly influenced by the Material Factor. Then, to know which indicator that mostly influences time of contract implementation on Material Factor can be seen at the highest communal value in table 4.4. In the table, it is known that the "Often" indicator of material scarcity (X1.1) has the highest communal value of 0,905. Furthermore, the material "Quality" indicator does not meet the specification (X1.4), Material deficiency (X1.3), and Delivery of late material (X1.2).

#### b. Strategies Used on Environmental Factor

Environmental Factor is the variable that has the second largest coefficient  $\beta$  value after Material Factor. It means that the extension of contract time is also significantly influenced by environmental factor. The elements of the indicator that mostly influence the extension of the contract time are on the Environmental Factor. The indicator of the environmental factor influencing mostly the extension of contract time is the Socialization of the project to old community (X5.1) of 0,964. It is followed by Road Condition to the project location (X5.3), and Effect of weather on work activity (X5.2).

#### c. Strategies Used on Change Factor

Change factor is the variable that has the third largest  $\beta$  coefficient value after the Environmental Factor. It means that the extension of contract time is also significantly influenced by change factor. The elements of the indicator that mostly influence the extension of the contract time are on the Change

Factor. The indicators of the the change factor influencing mostly the extension of contract time is Planning which has been too long (X6.1) of 0,931. It is followed by Change process retardation from planning (X6.3) and Owner's policy change (X6.2).

**TABLE 11: STRATEGIES USED TO OVERCOME EXTENSION OF TIME**

Factors	Problems	Strategies
Material	Material scarcity frequently occurs (X1.1)	Make a schedule well in advance of material use Make inventory system
	Material quality does not meet specification (X1.4)	Check directly to the location of material that will be sent Conduct material testing before use
	Material Deficiency (X1.3)	The contractor should immediately bring in material especially non-local to the project site Make inventory system In a certain dimension that is relatively small, pre-printing system can be used
Environment	Delivery of late material (X1.2)	Material ordering is done at the beginning Actively monitor material delivery process Supplier of material should be more than one
	Socialization of the project to the old community (X5.1)	Conduct socialization or approach to the community during the planning process involving village officials, residents, accompanied by consultant planner and owner as technical team Conduct socialization or approach to the community prior to project implementation involving village officials and citizens, as an affirmation
	Road condition to project site (X5.3)	Cco is made for access road maintenance If the constraints are from local people, an agreement with local people is better to make.
Change	The effect of weather on work activity (X5.2)	Increase working hours during good weather
	Planning that has been too long (X6.1)	Owner must ensure planning and execution according to field conditions
	Change process retardation from planning (X6.3) Owner's policy change (X6.2)	Make design changes as soon as possible Break up until the last progress

## 4 CONCLUSION

From the results of research and discussion that have been described in the previous chapter, it can be concluded that:

- Factors that significantly influence the extension of contract time on projects in the field of water resources of East Kutai's Public Works Department are Material Factor with  $\beta$  coefficient value of 0,375, Environmental factor with  $\beta$  coefficient of 0,357, and Change factor with  $\beta$  coefficient value of 0,322.
- The most dominant factor influencing the extension of contract time in the field of water resources of East Kutai's Public Works Department is the material factor, and the

most influential indicator is material scarcity with the highest communal value of 0.905.

- c. The strategies used to overcome in order to avoid contract time extension are: a) replacing rare materials with ready stock material with composition in such a way that the specification is equivalent, b) socializing or approaching the community during the planning process, c) planning which is more complete, so that the results of planning when used in the construction implementation do not undergo significant changes.

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