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ANALYSIS OF FACTORS CAUSING INFORMATION SYSTEMS PROJECTS DELAYS IN IT CONSULTING COMPANY

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ABSTRACT

As a banking IT consulting firm, the company carries out many projects. Every project is always prepared as well as possible, however not all projects go according to plan, and the issue of delay has received considerable critical attention. Due to delays the company suffered a loss of time and costs, project delays are also declared as failed project categories. This study aims to analyze the effect of poor requirements management, complexity, and employee issues on the occurrence of delays in IS/IT projects in the company. Data collection was carried out by distributing questionnaires to 138 employees of the company. The study used a quantitative approach with the SEM-PLS method and the data was processed using the SMART PLS v.3.3.3 application. The results of the hypothesis test show that poor requirements management and employee issues have a positive effect on project delays, while complexity does not have a positive effect on project delays. The results of this study are expected to be the basis for evaluating the company for better project sustainability.

Keywords: *Information System, Project Management, Project Delay, Project Failure, SEM-PLS.*

1. INTRODUCTION

A project has a different size and shape, one of the project's attributes is that the project is uncertain [1], because each project is unique, it can sometimes be difficult to clearly define its goals, estimate how long it will take to complete, or determine how much it will cost. In addition to these internal factors, external factors also cause uncertainty, such as the role of consultants, suppliers, etc. to overcome this issue in information system development projects, project management is needed to ensure that the development of information systems goes according to plan.

This IT Consultant company, cooperates with many clients from various industrial fields, especially in the banking sector. This company has many employees who work as IT professionals. In practice, IT employees are divided into groups to work on a project. The project group consists of the Project Manager, QA, Business Analyst, and Developer (Frontend and Backend).

In carrying out the information system project, the company certainly manages the project so that it runs well, however, the data obtained since 2020 related to the project being carried out, there are 11 projects with six of them experiencing delays from 1 to 3 months.

As explained earlier, a team is formed to work on a project, and the roles and individual problems of the team itself affect the sustainability of the project, such as lack of human resources, human resources capabilities, and high turnover [2]. In large projects that can take time monthly and yearly, there is usually a change of employees, and a change of leadership policy, which has the potential to affect several aspects such as the commitment, motivation, and performance of the individual employees themselves [3].

A project, especially a large and complex project has a greater probability of failure than a relatively small and simple project, a series of reports from the Standish Group quoted from Hughes (2016) suggest that very few large projects are doing well

in the context of punctuality, cost, and scope of projects.

Table 1 Project List From 2020-2021

Project Name	Start Time	Completion Target	Finish	Desc
Octo	January 2020	July 2021	September 2021	Delay
SSB	January 2020	December 2021	December 2021	No Delay
Clicks	September 2020	September 2021	November 2021	Delay
Mobile X	January 2020	April 2021	July 2021	Delay
Pnet	January 2020	May 2021	August 2021	Delay
Support Brimo	October 2019	May 2021	May 2021	No Delay
Dev Brimo	January 2020	September 2020	September 2020	No Delay
SOA	January 2020	July 2020	August 2020	Delay
Support NPCT 1	May 2020	May 2021	June 2021	Delay
BPD	January 2020	May 2021	May 2021	No Delay
IBS	January 2020	July 2021	July 2021	No Delay

The complexity of a project is certainly directly proportional to the various requirements. A clear definition of requirements is very important for what a project is. Without a clear elaboration of the requirements, it is very difficult to develop a stable system. In the case of software projects, requirement management is essential for a successful Project Management [4]. Apart from the stability and quality of the system, clear project requirements are also very influential on project estimation, such as project cost estimation [5].

Project delay is a failure, surely because it has an impact on time, in addition, it can also have an impact on project costs because the longer the project runs, the operating costs will also continue to grow. Therefore, an analysis is needed regarding what factors cause delays in information system projects at this Banking IT Consulting Company.

The overall structure of the study takes the form of five sections, including this introduction section. Section Two begins by laying out the theoretical dimensions of the research, The third section is concerned with the methodology used for this study. The fourth Section presents the findings of the research, and in the final section summaries and suggestions of findings are delivered.

2. LITERATUR REVIEW

Project performance has been an interesting topic of research for a long time [6]. A project is a temporary activity undertaken to create a unique product, service, or result. The temporary nature of the project indicates that the project has a definite beginning and end, The end of the project is reached when the project objectives have been achieved or when the project is terminated because the objectives will not or cannot be met, or when the need for the project no longer exists [7]. The characteristics of a project consist of the following five points, namely it has a beginning and an end, has a time frame for completion, the involvement of several people is limited only to implementation, limited resources, and has a sequence of activities and phases [8].

Delay is any event that will have an impact on the end date of project completion, in the context of the project, the delay is the period of delay identified in the contract agreement or greater than the date decided by the contractor and client after the delivery of the project [9]. Delay in a project is one of the indicators of failure [10]. There are several opinions about the success and failure of a project, the success, and failure of a project are usually measured from three aspects, time (business urgency), cost (budget), and quality (product functionality or capability) [3], [11], [12]. The Standish Group International in a series of reports entitled CHAOS report explains that the project is divided into three categories

- Successful: The project was completed on time and within budget, with all features and functions running as carefully as planned.
- Challenged: Projects experience delays or over budgets, and/or not all features and functions are in line with what was planned
- Failure: The project is canceled before it is finished or delivered and never used [13].

Other opinions regarding the success or failure of the project according to Schwalbe are quoted from [10] determined from

- The project meets its planned scope, time, and cost
- The project satisfies customers or sponsors.
- The results of the project meet its main objectives.

The factors that influence project delay from the literature review carried out are poor requirements management [3], [14]–[16] complexity [3], [14], [16]–[18] and employee issues [2], [3], [14].

A clear definition of requirements is very important for a project. Without a clear elaboration of the requirements, it is very difficult to develop a stable system. The percentage of completed projects worldwide is very low, and most failures are associated with vague, ambiguous, or undefined requirements. Another study explains that from previous studies, business people often underestimate the requirements that cause project delays, so that additional time, effort and costs are needed to cover them [5]. In the case of software projects, requirement management is essential for a successful Project Management [4]. Much of the literature discusses the adverse effects of poor requirements, [19] explained that poor requirements management and changes to requirements are one of the causes of project overruns and quality problems in the software being worked on.

Poor requirements lead to poor results that in some cases result in redesign and redevelopment of the software [20].

Many states that the definition of complexity in the realm of the project is still not definitively explained [21]. Definitions of complexity may vary depending on one's experience and expertise [22]. Complexity is defined properties of a system that make it difficult to formulate its overall behavior in a particular language, even when provided with complete, reasonable information about its atomic components and their interrelationships [23]. During industry 4.0 in particular, project complexity is characterized by uncertainty, dynamic environments, and technological redundancy [24].

The complexity that IT developers face makes IT projects recognized by practitioners and researchers as having a significant risk of failure [25].

Some studies explain that the condition of the employee/staff has a strong influence on project performance, such as motivation, relationships between employees, and employee commitment [26], [27]. The turnover rate is also a condition that needs to be considered because employees such as developers have an important role in the progress of SI projects [28]. The length of the project and the occurrence of changes in the middle of the project often affect the motivation and performance of employees which has an impact on the continuity of the project, such as the number of employees leaving, policy changes, etc. [3]. In addition, the influence of an employee's performance on the success of a project is greater than the performance of the project team [29].

3. RESEARCH METHODS

The research uses a quantitative approach, with the research objects being Software Developers, DevOps (development and operations), Business Analysts, Quality Assurance, and UI/UX designers in this IT consulting company. The sample studied amounted to 138 people who have been determined by the Slovin formula, the sampling method used is a simple random sampling method, in which each element of the population has the same opportunity and is known to be selected, this method has the least bias and provides generalizations that are most extensive. This sampling design is known as simple random sampling. This sampling design is known as a simple random sampling [30]. The data collection techniques carried out are literature studies, reviews of previous research, and questionnaires. Questionnaires are an efficient data collection mechanism when the study is descriptive or explanatory. In general, questionnaires are less expensive and time-consuming than interviews and observations [31]. The questionnaire is created in an online questionnaire in Google Form. The results of the questionnaire were analyzed using the SEM-PLS method and the software used was SMART PLS v.3.3.3. SEM is one type of multivariate analysis in the social sciences. Multivariate analysis is the application of statistical methods to analyze several research variables simultaneously [32]. Variables indicate measurements of research objects such as individuals, organizations, events, activities, etc. These measurements can be obtained through surveys or observations used to collect primary data and sourced from secondary data databases. SEM can help researchers to analyze unobservable variables that are measured indirectly by indicators. SEM-PLS can work efficiently with small sample sizes and complex models, besides the

assumption of data distribution in SEM-PLS is relatively looser than in CB-SEM. The research model used is as follows:

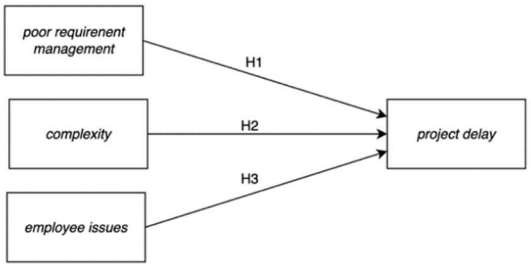

Figure 1 Research Model

As explained earlier, the factors that influence the project delay from the literature review carried out are poor requirements management [3], [14]–[16] complexity [3], [14], [16]–[18] dan employee issues [2], [3], [14]. The hypothesis that will be tested is that:

1. H1: poor requirement management has a positive effect on the occurrence of project delay
2. H2: complexity has a positive effect on the occurrence of project delay
3. H3: Employee issues have a positive effect on the occurrence of project delays.

In this model, poor requirements management, complexity, and employee issues are the independent variable. And dependent variable is project delay. The indicators of each variable can be seen in the table as follow

Table 2: Indicator Variables

Variable	Indicator
poor requirement management (X1)	- Conflicting requirements - Incorrect requirements - Inadequate requirements - Unclear requirements [15] - Continually changing system requirements - Continually changing project scope/objectives [33] - Changing of the interfaces during the activity [18]
Complexity (X2)	- Significant integration & customization required - Use of new technology - Use of technology that has not been used in prior projects - Many Vendors [15]
Employee Issues (X3)	- staff commitment - performance - motivation [3]
Project Delay (Y)	- Schedule Delay - Cost Overruns [2], [34]

And here are the questions that refer to indicators above

Table 3 List Questions

Indicators	Question
Conflicting requirements	Project requirements often collide (conflicting requirements)
Incorrect requirements	Improper project requirements
Inadequate requirements	Incomplete project requirements
Unclear requirements	Existing project requirements are not clear
Continually changing system requirements	Project requirements are always changing
Continually changing project scope/objectives	Scope of the project is always changing
changing of the interfaces during the activity	The system interface is always changing
Significant integration & customization required	Requires complex Integration and Customization

Use of new technology	Using the latest technology
Use of technology that has not been used in prior projects	The technology used in each project is always different
Many Vendors	Involving multiple vendors
Staff commitment	Staff / Employees are less committed to the company
Performance	Staff / Employees have poor performance
Motivation	Staff / Employees are less motivated to work
Schedule Delay	The project is experiencing delays in completion
Cost Overruns	Projects require additional costs

4. RESULTS AND DISCUSSION

From the questionnaire carried out from July 31, 2022, to August 07, 2022, with 138 respondents, 43.9% were respondents with Jakarta membership and 56.1% were Yogyakarta members. Most respondents have worked in the company for more than 1 year (56.8%), and those who worked between 4 months and 1 year were estimated at 40.3% and the remaining less than three months at 2.9%. Regarding their position in project implementation, the highest to lowest number of respondents in a row was 66.9% as software developers, 16.5% as quality assurance, 7.9% as business analysts, 5% as UI/UX designers, and finally, 3.6% positioned as DevOps.

4.1 Outer Model

The outer model tests carried out are the Convergent Validity Test and the Discriminant Validity Test. The Convergent Validity at the indicator level was assessed by examining outer loading with a minimum value of 0.7 and an at the variable level was assessed by Cronbach's alpha whose minimum value is 0.7 [35].

The test results show that there are some variables that are worth less than 0.7. The indicators are indicators C2 with a value of 0.231, C3 with a value of 0.443, C4 with a value of 0.230, and PRM1 with a value of 0.588.

Table 4 Outer Loading

Indicator	Outer Loading	Descriptions
C1	0.927	Valid
C2	0.231	Invalid
C3	0.443	Invalid
C4	0.230	Invalid
EI1	0.839	Valid
EI2	0.826	Valid
EI3	0.825	Valid
PRM1	0.588	Invalid
PRM2	0.786	Valid
PRM3	0.775	Valid
PRM4	0.815	Valid
PRM5	0.756	Valid
PRM6	0.814	Valid
PRM7	0.770	Valid
PD1	0.897	Valid
PD2	0.883	Valid

Indicators with less values are written off from the model.

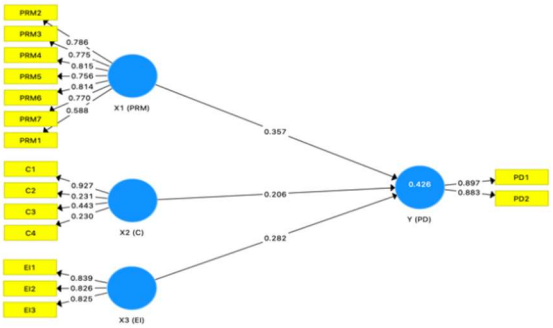

Figure 2 Early Research Model

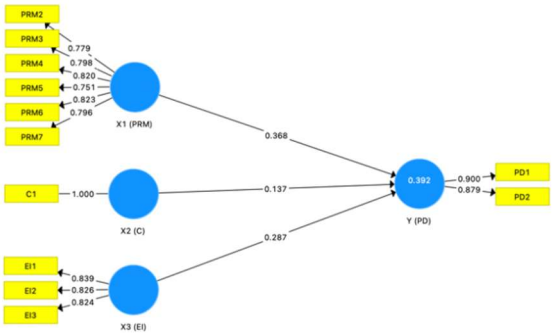

Figure 3 Remedial Research Model

After recalculating, the outer loading value on each indicator exceeds 0.7.

Table 5 Outer Loading on Latest Model

Indicator	Outer Loading	Descriptions
C1	1.000	Valid
EI1	0.839	Valid

EI2	0.826	Valid
EI3	0.824	Valid
PRM2	0.779	Valid
PRM3	0.798	Valid
PRM4	0.820	Valid
PRM5	0.751	Valid
PRM6	0.823	Valid
PRM7	0.796	Valid
PD1	0.900	Valid
PD2	0.879	Valid

Subsequent convergent validity tests were performed against the variables, by looking at the values of *Cronbach's alpha.* The calculation results show a value above 0.7 (minimum limit) in each variable, therefore all variables are valid.

Table 6 Cronbach's alpha

Indicator	Cronbach's alpha	Descriptions
X1 (PRM)	0.884	Valid
X2 (C)	1.000	Valid
X3 (EI)	0.776	Valid
Y (PD)	0.738	Valid

4.2 Inner Model

The Inner Model is measured by R^2 or Coefficient of determination and path coefficients (β value). The R^2 value ranges from 0-1 and the higher the value (close to 1) the better [35]. The results of the R^2 test in this study were valued at 0.392, which means that the project delay variable was influenced by the poor requirement management variables, employee issues, and complexity by 39%, and the other 61% was influenced by variables that were not studied. The value of 0.392 is included in the good value (greater than 0.25 [35]).

The next Inner Model measurement is by path coefficient. The path coefficient has a standard value between -1 and 1 [35], [36], a value close to 1 indicates the presence of a positive relation and one close to -1 indicates a negative relation. The results of the path coefficient test showed that the exogenous/independent variables studied had a positive influence on the endogenous/dependent variables, where all their values were between 0 and 1.

Table 7 Path Coefficient

Variable	Y (PD)
X1 (PRM)	0.368
X2 (C)	0.137
X3 (EI)	0.287

4.3 HYPOTHESIS TEST

The hypothesis test is performed by comparing t_{count} and t_{table}. A hypothesis is stated to be accepted if $t_{count} > t_{table}$. The t_{count} value for each hypothesis is obtained from SMART-PLS, while t_{table} value is determined by comparing the degree of freedom ***(df)*** and the degree of significance ***(α)***. The significance test carried out is a one-tail test. ***df*** is obtained by the formula n-1 where n is the number of respondents [35], in this study the number of respondents was 139, then by using the above formula, the value of ***df*** is 138, while the signification rate was 0.05. t_{table} used is taken from the https://www.sjsu.edu/faculty/gerstman/StatPrimer/t-table.pdf, since there is no row with ***df*** = 138 then the value used is the closest value to 138 which is ***df*** = 100. Based on the value of ***df*** and ***α*** which is determined above the value of t_{table} = 1.660.

Table 8 Hypothesis

Hypothesis	Variable	t_{count}	t_{table}	Description
H1	X1 (PRM) → Y (PD)	2.549	1.660	Accepted
H2	X2 (C) → Y (PD)	1.160	1.660	Rejected
H3	X3 (EI) → Y (PD)	2.278	1.660	Accepted

a. Poor Requirement Management → Project Delay
The first hypothesis is that poor requirement management has a positive effect on project delay. The test results show that the value of t_{count} (2.549) > t_{table} (1.660), so that the first hypothesis was accepted. This is in accordance with the theory that poor requirement management affects project delay.

b. Complexity→ Project Delay
The second hypothesis is that complexity has a positive effect on project delay. The test results show that the value of t_{count} (1.160) < t_{table} (1.660), so that the second hypothesis is rejected. This is different from the theory that complexity affects project delay.

c. Employee Issues → Project Delay
The third hypothesis is that employee issues have a positive effect on project delay. The test results show that the value

of t_{count} (2.278) > t_{table} (1.660), so that the third hypothesis is accepted. This is in accordance with the theory that employee issues affect project delays.

5. CONCLUSION AND SUGGESTIONS

5.1 Conclusion

This study was conducted to determine which factors have an influence on the occurrence of *delays* in SI / IT projects. Data obtained from questionnaires distributed as many as 138 and analyzed by SMART PLS. After the data analysis process has been completed, the following conclusions are obtained:

- Poor requirement management has a positive effect on the occurrence of project delays
- Complexity does not have a positive effect on the occurrence of project delay
- Employee Issues have a positive effect on the occurrence of project delay

5.2 Suggestions

Some of the suggestions submitted based on the results of research that has been carried out are:

1. Management needs to improve the management requirements of the project being carried out. This involves many stakeholders, especially business analysts, the role of the client is also very large, because the requirements of a system are certainly obtained from the client side. Communication and cooperation between the company and the client must be well established.
2. Employee conditions affect the sustainability of the project and can cause delay. Therefore, the company needs to maintain the condition of employees so that they can work on the project as it should be. Small things can be done such as appreciation in the form of awards, bonuses, and comfort at work.

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