CHAPTER I INTRODUCTION

I.1. Background

In the ever-evolving business landscape, project digitalization has become a key driver of innovation and efficiency, enabling companies to transition from manual processes to digital solutions. A project is defined as a structured effort undertaken to achieve specific goals, like creating services or results within a limited time frame (Project Management Institute, 2021). Even though it is traditionally viewed as an independent initiative, projects in today's point of view play a central role in driving organizational transformation, innovation, and broader societal progress. On the other hand, digitalization enhances operational efficiency and also encourages continuous innovation, ensuring companies' sustained competitiveness in an increasingly digital economy. As a result, digitalization is transforming project management, helping organizations adapt to changing market conditions, make better use of resources, and achieve sustainable growth.

PT XYZ is a state-owned company in Indonesia that is engaged in the telecommunications and information technology industry, specializing in manufacturing, system integration, and digital services. PT XYZ has successfully managed over 2,450 projects and operates through three primary business lines, with two focusing on project management. There is a system integrator business line that provides hardware, software, and network solutions, integrating various subsystems into a cohesive system with minimal customization. This business line supports fiber optic deployment, public street lighting, solar power projects, and Automatic Dependent Surveillance-Broadcast (ADS-B) systems. Meanwhile, the digital business line delivers automated digital solutions to enhance business efficiency with minimal human intervention. Its services include Business-to-Business (B2B) Commerce, Smart Hospital Management Systems, Big Data Analytics, the Internet of Things (IoT), Cyber Defense, and Electronic-Based Government Systems.

One of the current projects undertaken in PT XYZ is the Independent Solar Power Generation Systems Project for the second area in Indonesia, which is a large-scale infrastructure project that involves the installation of solar power systems across 65 distinct locations throughout Indonesia. This project is commissioned by the Ministry of Energy and Mineral Resources of Indonesia as part of the government's strategic initiative to expand renewable energy access.

This Independent Solar Power Generation Systems project handled by PT XYZ consists of:

1. Independent Solar Power Generation Systems Project Region I (2016 – 2018)
   Finished
2. Independent Solar Power Generation Systems Project Region 2 (2023 - 2025)
   On Progress Project – Project Maintenance Phase
3. Independent Solar Power Generation Systems Project Region 3 (Upcoming Project)

Although the project seems like a repeatable activity, each phase of the Independent Solar Power Generation initiative still fulfils the definition of a project, as it is conducted within a defined time frame and aims to deliver solar energy infrastructure tailored to the specific conditions of each region. While the type of output, which is solar power systems, may appear similar across regions, the scope, geographic coverage, logistical planning, and stakeholder involvement vary significantly, making each implementation unique.

Based on the interview conducted with one of the stakeholders involved in the project region 2, the construction has been finished, and it is currently in the project maintenance phase. The maintenance phase has started since the construction is done for each location and will end in September 2025. However, despite the strategic importance of the program, the project has encountered a range of operational challenges that hinder its performance and long-term effectiveness. These challenges have been especially evident in areas related to execution consistency, coordination, and responsiveness.

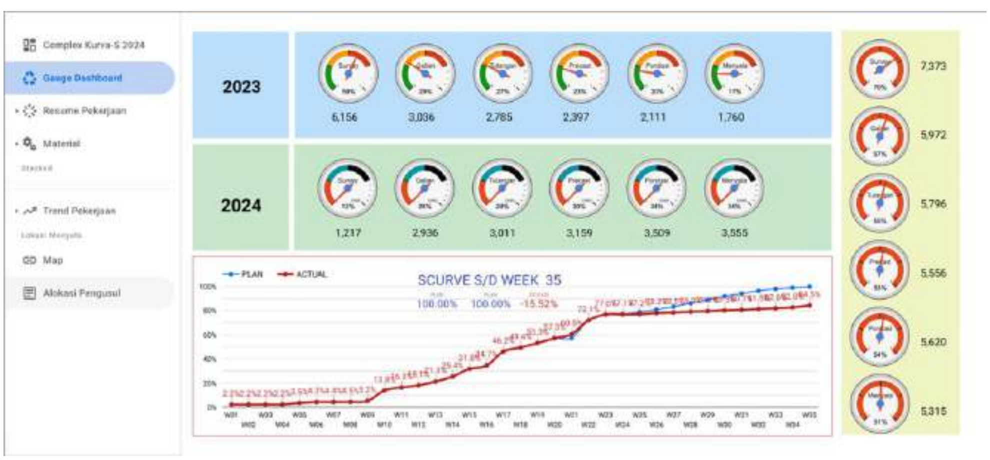

Figure I-1. Project Construction Independent Solar System Generation Project Dashboard

Source: PT XYZ

In the execution of the Independent Solar Power Generation System Project, PT XYZ currently utilizes a Looker dashboard to monitor the progress of construction activities spanning from 2023 to 2024. This dashboard includes visual indicators for various construction components such as surveying, excavation, reinforcement, precast, foundation, and activation stages, and presents real-time data through gauges and s-curve analytics. However, despite this advancement, the existing dashboard is exclusively limited to the construction phase and does not extend into the project maintenance period, particularly for the years 2024 to 2025, in other words, the dashboard is no longer used since the end of 2024. This gap creates a critical blind spot in the project lifecycle, as the maintenance phase is essential to ensuring long-term system reliability, stakeholder accountability, and sustainability of the installed solar systems. Therefore, progress tracking, performance validation, and issue escalation become extremely fragmented because of the absence of a specialized real-time monitoring system for maintenance activities.

Table I-1. Error Data Project Monitoring Maintenance

KC Monitored	**Percentage of Error/Missing Data**
KC G*****	4,69%
KC T********	17,39%
KC P**********	13,25%
KC T**********	50%
KC K*****	40,83%
KC M*****	39,34%

Due to the non-existent project maintenance monitoring dashboard, or even the dashboard that provides an overall progress of the project, further analysis in several locations monitored during the maintenance phase reveals critical weaknesses in data accuracy and completeness. As shown in Table I-1, several monitored locations show a significant level of missing or data errors. The variances show that there are insufficient controls in the current system to ensure consistent, trustworthy, and comprehensive data reporting across locations. In order to provide a more thorough problem background identification, an interview was conducted to observe the several problems addressed in this phase.

Table I-2. Problem Background Identification

Problem Description	Indicator	Observed Value	Target Value
Reporting in this project is handwritten, scanned, and verified manually, delaying insights and action.	Monitoring System / Dashboard Access	No	Yes
Weekly progress reports are often late or missing due to manual report submission and scanning.	% of Locations Submitting Reports On-Time	40%	> 90%
There is no live project tracking.	Monitoring System / Dashboard Access	No	Yes
Poor synchronization between project teams.	% of Locations Using Structured Digital Reporting	0%	100%
Several locations use non-uniform report templates.	% of Locations Using Standardized Format	52%	100%
Submissions have no user identity, timestamps, or audit trail which is reducing transparency.	% of Reports With User/Time Metadata	0%	100%

The results of the problem identification from the interview, shown in Table I-2, revealed several critical issues rooted in the absence of a digital monitoring system that are affecting the suboptimal project performance. One of the most striking observations was the reliance on manual reporting systems, where the reports were documented by hand, scanned the reports, and manually verified, which often caused delays in decision-making and reduced the accuracy of field data. Other than that, there is no real-time tracking, standardized templates, or even a digital reporting platform, and consolidating progress data across 65 locations became both time-consuming and inconsistent.

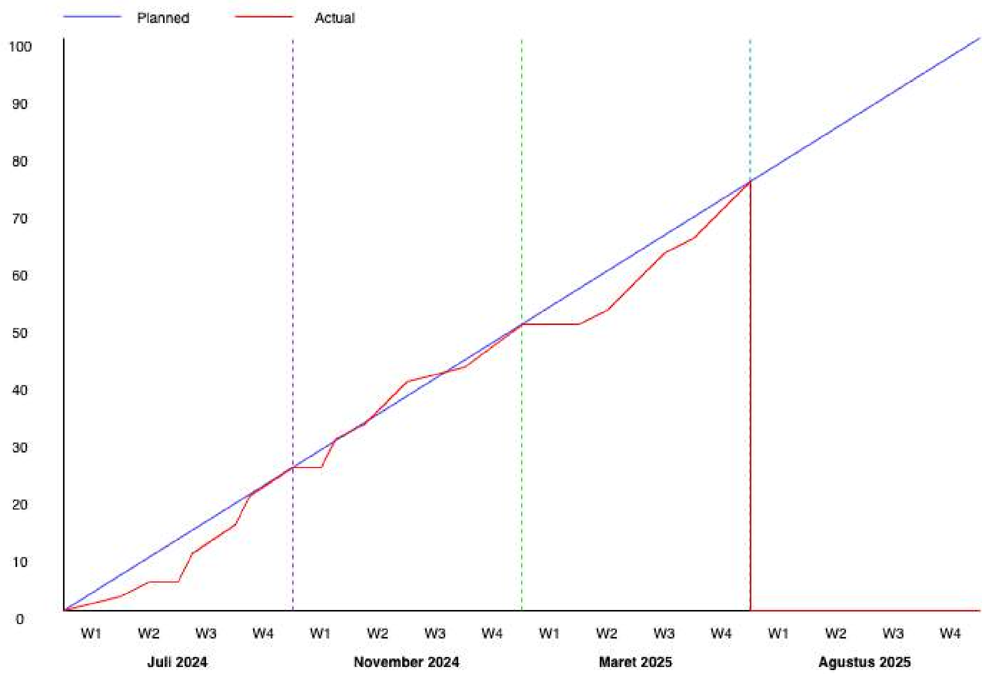

Figure I-2. S-Curve Project Maintenance

The S-curve shown in the Figure I-2 was provided to validate the weekly progress reports that are often late or missing. It illustrates delays and inconsistencies in actual project progress compared to the planned schedule. These gaps, especially around key maintenance periods in July, November, and March, reflect late or missing weekly reports. This is mainly caused by manual reporting methods such as handwritten forms and scanned submissions, which often lead to slow data processing and incomplete records. The lack of a centralized, real-time monitoring system makes it difficult to track maintenance activities accurately and respond quickly when problems occur.

Figure I-3 shows the Ishikawa diagram or fishbone diagram based on the elaboration from the observation, the data from Table I-1 for the Independent Solar Power Generation Systems Project: Maintenance Phase of PT XYZ. The diagram shows the visualization of four main factors of an integrated system, including man (people), method, machine (system), and information, based on the interview, project documents, and evidence that has been conducted or analyzed.

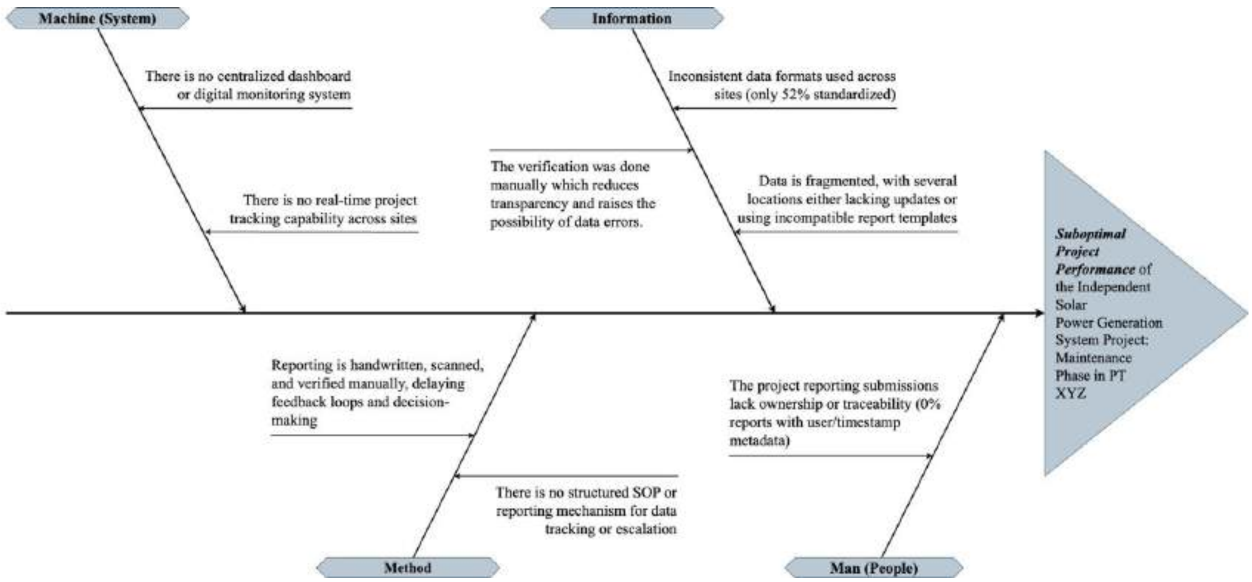

Figure I-3. Ishikawa Diagram

According to the root cause observation, the main problem in the Independent Solar Power Generation Systems Project: Maintenance Phase is the suboptimal project performance. In the man (people) category, issues were found in the accountability, like project reporting lacks ownership or traceability, with 0% of reports containing user identity or timestamp metadata. These human and procedural gaps further reinforce the urgency for an integrated, digital monitoring and reporting solution that can standardize practices, improve visibility, and enhance responsiveness across all project locations.

In the method category, three issues were identified, including that reporting is still handled manually, handwritten, scanned, and later verified, which causes delays in data availability and decision-making. Last, there is no structured SOP or mechanism in place for tracking project deviations or triggering escalations, leaving the project vulnerable to undetected risks and delayed responses. In the information category, the data submitted from different project sites was found to be inconsistent, with only 52% of locations using standardized reporting formats. Moreover, manual verification processes have increased the likelihood of data errors and reduced transparency, while fragmented and non-uniform data submissions have complicated consolidation and analysis. As for the machine (system) category, three key issues are identified. First, the data submitted from different project sites was found to be inconsistent, with only 52% of locations using standardized reporting formats. Second, manual verification processes have increased the likelihood of data errors and reduced transparency. Third, fragmented and non-uniform data submissions have complicated consolidation and analysis.

Based on the identified root causes from the fishbone, proposed alternative solutions will be provided and designed to directly address the suboptimal project performance problem in the Independent Solar Power Generation System Project: Maintenance Phase in 65 Locations in Indonesia. Each of the proposed solutions aligns with the relevant PMBOK 6th Edition Knowledge Area.

Table I-3. Alternative Solution

Root Cause	**Alternative Solution**
There is no centralized dashboard or digital monitoring system	Designing the Project Management Information System (PMIS) to Enable Centralized Monitoring and Tracking
There is no real-time project tracking capability across sites	
Data is fragmented, with several locations either lacking updates or using incompatible report templates	
Reporting is handwritten, scanned, and verified manually, delaying feedback loops and decision-making	Implementing a Digitalization Reporting Process and Automating Verification in Project Management Information System (PMIS)
The verification was done manually which reduces transparency and raises the possibility of data errors.	
There is no structured SOP or reporting mechanism for data tracking or escalation	Incorporating SOP Workflows and Communication Management Features

	into Project Management Information System (PMIS)
The project reporting submissions lack ownership or traceability (0% reports with user/timestamp metadata)	Implementing User Access Controls and Audit Trail Functionality in Project Management Information System (PMIS)
Inconsistent data formats used across sites (only 52% standardized)	Standardizing Templates and Data Entry Structures within Project Management Information System (PMIS)

According to Table I-3, issues related to the absence of a centralized dashboard, lack of real-time tracking, and fragmented data reporting across multiple project sites are addressed through the development of an integrated digital system. Therefore, these interconnected issues and solutions lead the author to propose the main solution of designing a Project Management Information System (PMIS). It will function as a comprehensive solution that addresses the most critical and frequently grouped problems by enabling centralized, standardized, and real-time management of project data and is expected to enhance visibility, accountability, and timely decision-making across all project locations, ultimately optimizing the performance of the Independent Solar Power Generation System Project. However, before proceeding with the development of the Project Management Information System (PMIS) framework, this research will focus on systematically mapping user needs and technical attributes to guide the design of a Project Management Information System tailored specifically for improving the monitoring, control, and execution performance of the project. The output of this research will consist of the identification and prioritization of user needs, the translation of these needs into technical features using the Quality Function Deployment (QFD) method, and the design of a Project Management Information System (PMIS) framework. This includes a detailed specification of system features, functional requirements, and interface layout, which will be visualized through a low-fidelity prototype to demonstrate the proposed solution conceptually. However, this research does not include the development or deployment of a functional dashboard or software application.

I.2. Problem Formulation

Based on the case of PT XYZ that has been discussed in the background, the problem formulations proposed are:

1. What are the user needs and expectations for improving monitoring, control, and execution performance in the Independent Solar Power Generation System Project: Maintenance Phase at PT XYZ?
2. How can these user needs be systematically translated into technical attributes through the Quality Function Deployment (QFD) method?
3. How can the results of the QFD process be used to define system feature specifications and visualize a conceptual low-fidelity prototype for the Project Management Information System (PMIS) framework?

I.3. Purpose

Based on the case of PT XYZ, including the background and the problem formulation that have been obtained, the purposes of this proposal are:

1. To identify and analyse the user needs and expectations related to monitoring, control, and execution performance in the Independent Solar Power Generation System Project: Maintenance Phase at PT XYZ.
2. To systematically translate the identified user needs into technical attributes using the Quality Function Deployment (QFD) method.
3. To utilize the results of the QFD process to define system feature specifications and visualize a conceptual low-fidelity prototype for the Project Management Information System (PMIS) framework.

I.4. Benefit

Based on the purpose that is stated for the case of PT XYZ, the benefits that will be able to be implemented for the parties involved are:

1. This research will provide a structured foundation for the design of a Project Management Information System (PMIS) features framework specifically tailored to the needs of the Independent Solar Power Generation System Project: Maintenance Phase at PT XYZ.

2. This research will enhance project monitoring, control, accountability, execution performance, and support the optimization of project performance by offering a centralized, standardized, and real-time approach to project data management.
3. The output of this research will contribute to the development of best practices for digital project management systems that can be applied to future infrastructure projects managed by PT XYZ.

This research could be able to become a reference for the next research and a lesson learned for the next project.

I.5. Limitations and Assumptions

Based on the research that will be conducted, the limitations are as follows:

1. The data collection is based on interviews, observations, and project documentation available during the study period, which may be influenced by subjective perceptions of the stakeholders involved
2. The analysis results are specific to the Independent Solar Power Generation System Project: Maintenance Phase of PT XYZ and may not be fully generalizable to other types of projects or different operational contexts.
3. The research is limited to the systematic mapping of user needs and technical attributes to guide the design of the Project Management Information System (PMIS), without including the development, programming, implementation, or testing of the actual system.

Based on the research that will be conducted, the assumptions are as follows:

1. It is assumed that the data collected from interviews, observations, and project documentation accurately reflect the actual project conditions without significant bias.
2. It is assumed that there will be no major organizational, policy, or technological changes during the study that would significantly alter user needs or project management practices at PT XYZ.

It is assumed that any limitations or gaps in the current monitoring, reporting, and project control practices can be improved through digital system intervention supported by proper user-centered design.

I.6. Writing Systematics

This research writing systematics are shown below:

Chapter I **Introduction**

The first chapter includes the background information of the company based on the case of potential solutions, problem formulation, goals for the proposal, advantages of the proposal, and methodical writing on design objects.

Chapter II **Theoretical Basis**

The second chapter includes the theories and broad concepts that are connected or used as the problem and solution. This includes the theories and research findings from earlier studies that are utilized as a theoretical framework to finish the research and the identification of methodology that are suitable for the research.

Chapter III **Design Methodology**

The third chapter covers the problem-solving techniques using the conceptual model. This chapter links project objects with problem-solving steps and provides further explanation on the methodical approach to problem solving.

Chapter IV **Data Collection and Processing**

The fourth chapter is applying the methods of data collection and data analysis (quantitative and qualitative. The data collected will be processed using the chosen methodology and in accordance to the systematic framework.

Chapter V **Validation, Analysis and Implications**

The fifth chapter provides the summary of the data processing and the analysis on the results derived from the competencies. This chapter also contains the adaptation of the recommendations that is made based on the results.

Chapter VI **Conclusion and Suggestions**

The sixth chapter highlights the summary of conclusions from the analysis of the results of the problems carried out, as well as recommendations that can be considered for the company and also for future research.