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Improving Efficiency In Small Construction Projects: A Project Management Body Of Knowledge Approach

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ABSTRACT

Indonesia's construction sector relies on foreign investment and meeting international standards for quality, safety, and sustainability, which boosts competitiveness in large-scale infrastructure. This study examines CV. PPA, a construction company in East Java, focusing on the Type 48 housing project. Using the Project Management Body of Knowledge (PMBOK) framework, specifically in Project Scope Management and Project Integration Management, the research identifies key inefficiencies in scope definition, resource allocation, and activity integration. Data were gathered through interviews with the company's Director and other employees, analyzed with PMBOK, and used to propose project improvements and derive lessons for future initiatives. Findings highlight practical insights to enhance CV. PPA's project efficiency and offer recommendations for other companies within Indonesia's construction sector, emphasizing structured project management to achieve sustainable growth.

INTRODUCTION

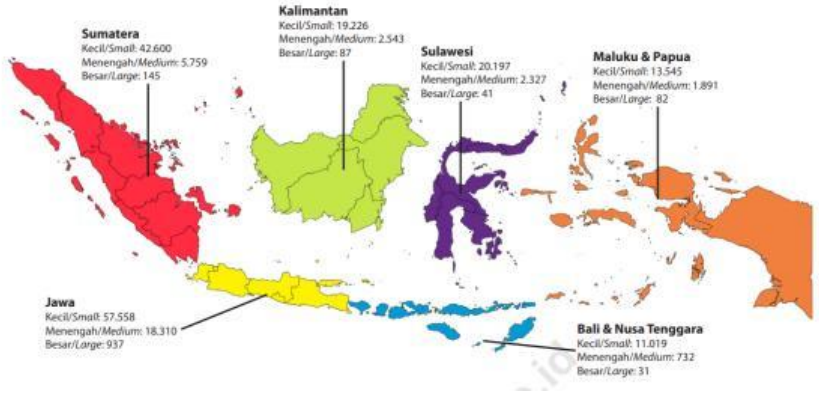
The growth of Indonesia's construction sector relies on foreign investment and adherence to international standards for sustainability, quality, and safety, due to the importance of the building sector to the national economy (Hughes & Hillebrandt, 2004). These factors improve the success and reputation of large infrastructure projects (Komdigi, 2019). Indonesian construction companies must build global business awareness, enabling them to understand international trends, regulations, and customer needs (Garudea, 2024).

In project management, of course, there are many factors that affect the effectiveness of a project, such as communication, clear project objectives, good control documents, and so on (Clarke, 1999).

Foreign investment supports infrastructure development and job creation, aiding economic growth. The construction industry in Indonesia, which includes diverse stakeholders, saw a minor decline in the number of companies from 2021 to 2022, partly due to economic challenges and management issues. Financial mismanagement, ineffective human resources,

and regulatory non-compliance have contributed to company failures, including those of significant state-owned enterprises (BPS, 2022).

Figure 1. Distribution of Construction Companies by Island in Indonesia in 2022 (BPS, 2023a)



When viewed based on the distribution of construction companies by island in Indonesia, construction companies are dominated in Java as shown in Figure 1 which amounts to 76,805 companies or 38.98% of the total national construction companies. On Java Island there are 57,558 small-scale construction companies, 18,310 medium-scale companies and 937 large-scale companies (BPS, 2023a; PUPR, 2023).

Table 1. Number of Construction Companies in Indonesia in the Period of 2018-2022 (BPS, 2023b)

Provinsi	Banyaknya Perusahaan Konstruksi Jumlah				
	2018	2019	2020	2021	2022
ACEH	4490	4913	5448	8614	8273
SUMATERA UTARA	7476	7785	6956	10206	9600
SUMATERA BARAT	5127	5337	5258	6365	5969
RIAU	7736	8423	7798	7807	7352
JAMBI	3146	3154	2958	3381	3022
SUMATERA SELATAN	3366	3720	3554	5592	5499
BENGKULU	1437	1489	1346	1497	1367
LAMPUNG	3584	3658	4073	4336	4125
KEP. BANGKA BELITUNG	1308	1199	928	958	807
KEP. RIAU	2093	2139	2014	2614	2490
DKI JAKARTA	10092	10092	9714	14505	14410
JAWA BARAT	10871	11908	11098	12884	13508
JAWA TENGAH	10991	11895	11453	15961	16211
DI YOGYAKARTA	1650	1683	1791	1900	1839
JAWA TIMUR	20753	20838	19430	24596	23752
BANTEN	3016	3395	3144	7270	7085
BALI	2169	2163	1865	2008	1861
NUSA TENGGARA BARAT	3098	3822	3698	4093	3938
NUSA TENGGARA TIMUR	5659	6035	5871	6073	5983
KALIMANTAN BARAT	5456	5550	5458	7701	7364
KALIMANTAN TENGAH	1816	1832	1912	2350	2090
KALIMANTAN SELATAN	3924	4094	3710	4439	4205
KALIMANTAN TIMUR	4854	4936	4488	6824	6948
KALIMANTAN UTARA	1624	1651	1313	1456	1249
SULAWESI UTARA	2539	2574	1995	2479	2108
SULAWESI TENGAH	3545	3496	3088	4008	3762
SULAWESI SELATAN	10416	11221	11017	11424	11288
SULAWESI TENGGARA	3391	3548	3287	3601	3345
GORONTALO	864	799	721	878	793
SULAWESI BARAT	1318	1245	1198	1396	1269
MALUKU	2075	2236	1823	2347	1967
MALUKU UTARA	2497	2506	2122	2238	2007
PAPUA BARAT	3028	3702	3417	3453	3602
PAPUA	5167	5830	5382	8149	7942
TOTAL	160576	168868	159308	203403	197030

If we look at the number of construction companies in Indonesia which reached 197,030 companies in 2022, this is actually a decrease in the number of companies compared to 2021 which amounted to 203,403 companies as shown in Table 1. This decrease reached a percentage of 3.13%, which means that many companies have experienced bankruptcy over the past year (Li, Jin, Li, Meng, & Hu, 2022; Permatasari & Mindhayani, 2024). In the construction services industry, there are many things that become important points to prevent companies from bankruptcy or losses in projects. For example, important things caused by internal company factors are the company's ability to make project planning, both in making work contracts with related companies (Mahamid, 2024), registering insurance before project activities are carried

out, selecting competent and professional human resources so as to minimize actions such as corruption and dishonesty (Sohail & Cavill, 2019). In addition, companies are also required to be able to calculate the project cost budget according to the needs during the implementation of project activities (Yuliana, 2019). Then there are several external factors such as problems with the community around the project area, the monetary crisis or changes in the political situation that have an impact on the company and several other obstacles (Rui, Ismail, & Hussaini, 2015).

Of course, this is something that researchers do not want, because the hope is that more and more construction service companies in Indonesia are qualified and can continue to develop Indonesia in the field of infrastructure, and can compete with construction companies that are international in scale. The decline in the number of construction companies is certainly one of the interesting topics to research and hopefully find the best solution to reduce the same incident in the future (Garudea, 2024). This research focuses on CV. PPA, a construction company in East Java, the province with the highest number of construction firms. The study seeks to address operational and management challenges within the company, such as lack of financial bookkeeping, project planning deficiencies, and ineffective human resource allocation, with the goal of providing solutions to support its growth and sustainability.

Business Issue

Construction contractor company CV. PPA, since its inception until now, has carried out the entire project without specific project management guidelines, apart from that it has also not been able to find and determine which projects are considered successful in terms of their effectiveness from the first project until now. In this research study, the author took a case study of the Type 48 House Area Construction Project carried out by CV. PPA from August until estimated completion in November 2024 (for the timeline per house), with a scope of work for 70% of the construction of 1 house completed, then the next house will start, and so on. Several problems were discovered during the project, including, craftsmen who often missed scheduled work, the material specifications received did not match the request for bids, and effective methods had not been implemented for each housing project implementation, as well as calculating resources. Some of these problems can cause deficiencies in project performance, and slow down project performance so that deadline targets are not met.

LITERATURE REVIEW

The review typically progresses from a general overview to a more specific focus, ultimately identifying the research gap that the proposed study seeks to address (Creswell & Creswell, 2018).

Construction Project Delay

Construction project delays are generally caused by three main factors: implementation constraints in the field, poor cash flow management, and labor conflicts (Viles, Rudeli, & Santilli, 2020). This third factor covers almost 80% of the total causes of delays, with several other sub-factors that often appear such as changes during construction, ineffective management, technical errors, economic constraints, and low productivity. The success of project construction is usually measured by three indicators: cost, quality, and time (Al Fath, Herwindiaty, Wibowo, & Sari, 2024). Waste in construction projects in Indonesia is also influenced by factors such as design changes, slow decision-making, lack of skilled workers, inadequate methods, and minimal coordination (Garudea, 2024). To overcome this problem, it is recommended that contractors should have build good relationships with suppliers, maximize local resources, train workers regularly, and increase transparency and cooperation between related parties (Thohirin et al., 2024).

Project Management Body of Knowledge (PMBOK)

Organizes project management processes into five process groups to guide projects from initiation through completion, which are Initiating (defines a new project or phase and gains authorization to begin; Planning (defines project scope, sets objectives, and determines actions to reach project goals); Executing (focuses on completing project tasks to meet requirements); Monitoring and Controlling (tracks and adjusts project performance, implementing changes as needed); Closing (formally completes or closes a project, phase, or contract).

Each process group connects through inputs and outputs, where the outcome of one process feeds into another. These groups are further divided into 10 Knowledge Areas that represent essential project management functions throughout the project, which are Integration Management (coordinates all elements of the project); Scope Management (ensures the project covers all required work); Schedule Management (ensures timely completion); Cost Management (involves budgeting and controlling costs); Quality Management (ensures deliverables meet standards); Resource Management (identifies and manages project resources); Communications Management (manages information flow); Risk Management (identifies and manages risks); Procurement Management (oversees external purchases); Stakeholder Management (manages stakeholder relationships and engagement) (PMI, 2017).

In this study, the focus is narrowed to two Knowledge Areas, which Project Integration Management and Project Scope Management (for improving integration coordination and project organization).

Project Integration Management

It discusses how the various elements of project management must be integrated to involve allocating resources, balancing competing needs, selecting the best approach, customizing processes, and managing linkages between project knowledge areas (PMI, 2017). These knowledge areas are found in all process groups, starting from Initiating, Planning, Executing, Monitoring and Controlling, and Closing Process Group. In the initiating process, there is the Develop Project Charter activity. In the planning process, there is the Develop Project Management Plan activity. In the executing process, there are 2 activities, namely Direct & Manage Project Work and Manage Project Knowledge. In the monitoring & controlling process, there are 2 activities, namely Monitor & Control Project Work and Perform Integrated Change Control.

Project Scope Management

This Knowledge Area ensures that the project includes all the necessary work and only the work required to complete the project successfully (PMI, 2017). The six group processes that take place throughout the project cycle include; Plan Scope Management (determining how the project scope will be defined, validated, and controlled); Collect Requirements (identifying stakeholder needs and expectations to form the basis of the project scope); Define Scope (developing a detailed description of the project and its products); Create WBS (Work Breakdown Structure, to divide the project scope into smaller elements for easier management); Validate Scope (ensuring that project deliverables meet requirements and are approved by stakeholders); and Control Scope (monitoring the status of the project scope and managing changes that may occur).

METHODS

This study uses a case study approach, analyzing CV. PPA's Type 48 House Construction Project to explore cost-efficiency strategies. Project Integration Management and Project Scope Management were guided by Project Management Body of Knowledge (PMBOK) knowledge areas. Examine internal project management processes and methodologies within the organization to identify areas of improvement, analysis and discussion, until producing lessons

learned, and the limitations of the problems discussed in this research are only within the scope of the project integration management and project scope management of the type 48 housing project.

The research method used is Qualitative Method. The qualitative method that will be carried out is in the form of direct interviews with the Director and supported by other employees. In theory, qualitative methods is about gaining a thorough grasp of a phenomenon is the main goal of qualitative research, which analyses data in the form of words, pictures, or sound (Rijal Fadli, 2021). So it is hoped that the use of the methods can produce object findings that can be analyzed specifically for the problem, as well as recommendations for CV. PPA is right on target and has a direct impact on improvement.

The data analysis method in this study aims to produce findings in accordance with the initial research objectives. The stages of this data analysis method include:

1. Interview Results: Information from interviews with experts was collected and processed to provide an in-depth understanding of the project. This data is used as a reference in evaluating the project management performance of CV. PPA based on PMBOK.
2. PMBOK Guide: This guide is used to systematically summarize and evaluate the data owned by the company, starting from the start-up stage to project closure, with the aim of increasing project success through structured and measurable management.
3. Analysis Results: The results of this analysis process become the basis for maximizing future project work.
4. Recommendation: Researchers provide advice to companies for future development as well as recommendations for future researchers to explore issues that have not been discussed in this study.

Each of these steps aims for the analysis to provide a thorough evaluation and sustainable solutions for the project. Data collection for this research involved the use of primary and secondary data to ensure the freshness of the data. This process included defining the scope of the research, collecting information through interviews, documents, and making minutes to record the information.

The steps in data collection started from an unstructured interview with the Director of CV. PPA, which acts as respondent. The interviews were guided by a list of questions prepared by the researcher. The Director also provided important documents required for data analysis in this research study, which is the company report that consists of the cost budget plan, Work Breakdown Structure (WBS) table, schedule plan, and activity sequence plan for the Type 48 House project. Because the company does not yet have a website, secondary data cannot be obtained from its online sources. Secondary data used for this research study can include general causes of project delays, and other possible problems found during the implementation and monitoring & control processes in the project.

a. Primary Data
   Information sources carried out using the methods above are good for data collection research in this case, because they directly target the objectives, in order to obtain clear standards and parameters from the Company and refer to the general standards of applicable regulations. The data required is primary data obtained from Company archive documents, including; Work Breakdown Structure (WBS) table, material requirements for project implementation, sequencing plan, schedule, RAB (Cost Budget Plan), average number of workers and average projects per month, organizational structure, and employee feedback and performance on project quality.
b. Secondary Data
   Secondary data in this research study is in the form of information sources collected and analyzed by previous parties or previous researchers which can be obtained from journals, reference books, government statistical data and so on. In the case of CV. PPA, secondary

data can be in the form of regulations governing the structure of contractor companies in Indonesia, scope of work, problems commonly found in the project implementation or execution process (project delays, inefficient projects), average working hours and wages of local workers. These data can be a benchmark for writers in conducting analysis to evaluate this company.

RESULTS

Interpretation of the Data

Based on the interview results, the findings were divided into areas of knowledge, existing conditions and the relationship of questions to business issue and supporting questions. Knowledge Area consists of the scope/aspects of the discussion. Existing Conditions consist of problems, obstacles and challenges that occur in the type 48 house construction project. Relationship to business issue consists of the relationship with the root cause of the problem of ineffectiveness of the type 48 house construction project and the possibility of reducing delays and ineffectiveness of the type 48 house construction project. Supporting points consist from the main points from the interview results. The following are the results of an interview with the CV. PPA's Director listed in Table 2.

Table 2. Interview Results

No	Knowledge Areas	Existing Conditions	Relation to Business Issue	Supporting Statement
1	Schedule	The affected work is experiencing delays in the project schedule	Can be the cause of less effective and efficient project schedule planning, which can affect resource and procurement management as well	The work that should have been carried out according to the target schedule, experienced setbacks because it was hampered by craftsmen who were often absent from work, and caused by materials that did not meet the requested specifications.
2	Resources	The handyman is often not present on a scheduled basis (at least every Monday or up to a week, every month)	Can be an accumulative cause of slowing down project performance/lack of resource management, and is related to lack of schedule management	Most of the craftsmen's livelihood is as owners of rice fields in their villages, generally craftsmen work on harvesting rice fields, or helping with repairs on neighbors'/family's houses in the village. Apart from that, there is no clear handling of this matter, because the Board of Directors feels they cannot do anything because they consider it an uncontrollable factor.
		Have not implemented effective calculations and methods for home contractor	Can be a guide for allocating resources so that it can run in accordance with organizational culture	Lack of allocation of supervisors or foremen. Because the foreman has to work at 3 locations for each person, whereas in each location there are 3-5 houses

		work		
3	Material Procurement	The material that arrives does not match the request (request specifications are not met by the supplier)	Can be the cause of delays in project deadlines	Feedback from employees generally complained that the material that arrived did not match the requested specifications (such as sand being too fine, etc.)
		The wages of craftsmen are below average (Rp. 80,000.00-Rp. 100,000/day) compared to the wages of local craftsmen (Rp. 130,000.00-Rp. 150,000.00)	This could be input for preparing an implementation roadmap to resolve this problem	Craftsmen are often absent from work and the wages of craftsmen are the lowest compared to the wages of local craftsmen

Source: Data Processed, 2024

Data regarding the planning schedule for the type 48 house construction project functions as a project management tool, used to organize and integrate project activities from start to finish. Become input in analyzing parts of the work, details regarding time, sequence, duration, and scope of project work as targets or baselines during project actualization to achieve project goals, and understand how time and resources are allocated, as well as to monitor overall project progress.

Scheduling Planning

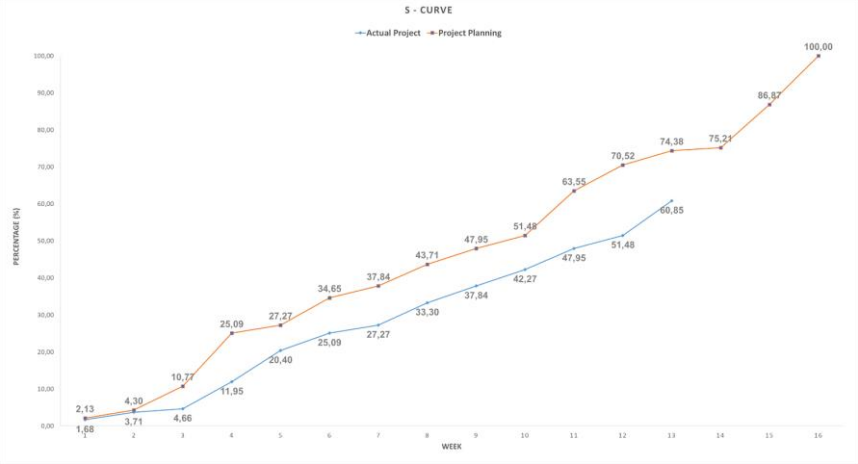
Table 3. Scheduling Planning and WBS of House Type 48 Construction Project by CV. PPA

WBS	Uraian Pekerjaan	DURASI	START (M/D/Y)	FINISH (M/D/Y)	Agustus 2024				September 2024				Oktober 2024					November 2024		
					1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3
1	Pekerjaan Persiapan		Tue 8/6/24	Fri 8/9/24																
1.1	Pembersihan Lahan	2	Tue 8/6/24	Wed 8/7/24																
1.2	Pemasangan Bowplank	1	Fri 8/9/24	Fri 8/9/24																
2	Pekerjaan Geotek		Sat 8/10/24	Thu 8/29/24																
2.1	Galian Tanah Pondasi	6	Sat 8/10/24	Fri 8/16/24																
2.2	Urugan Pasir Bawah Pondasi	1	Sat 8/17/24	Sat 8/17/24																
2.3	Urugan Tanah Kembali	5	Sat 8/17/24	Thu 8/22/24																
2.4	Urugan Tanah di Bawah Lantai	2	Wed 8/28/24	Thu 8/29/24																
2.5	Urugan Pasir di Bawah Lantai	1	Wed 8/28/24	Wed 8/28/24																
2.6	Pemasangan Pondasi	4	Fri 8/23/24	Tue 8/27/24																
3	Pekerjaan Struktur		Wed 8/28/24	Sat 10/12/24																
3.1	Pekerjaan Kolom		Sat 9/14/24	Sat 9/28/24																
3.1.1	Pembesian Kolom	7	Sat 9/14/24	Sat 9/21/24																
3.1.2	Pemasangan Bekisting	2	Mon 9/23/24	Tue 9/24/24																
3.1.3	Pembongkaran Bekisting	1	Sat 9/28/24	Sat 9/28/24																
3.1.4	Pengecoran	1	Wed 9/25/24	Wed 9/25/24																
3.1.5	Curing	2	Thu 9/26/24	Fri 9/27/24																
3.2	Pekerjaan Balok		Sat 9/28/24	Wed 10/9/24																
3.2.1	Pembesian Balok	5	Sat 9/28/24	Thu 10/3/24																
3.2.2	Pemasangan Bekisting	1	Fri 10/4/24	Fri 10/4/24																
3.2.3	Pembongkaran Bekisting	1	Wed 10/9/24	Wed 10/9/24																
3.2.4	Pengecoran	1	Sat 10/5/24	Sat 10/5/24																
3.2.5	Curing	2	Mon 10/7/24	Tue 10/8/24																
3.3	Pekerjaan Sloof		Wed 9/4/24	Sat 9/14/24																
3.3.1	Pembesian Sloof	5	Wed 9/4/24	Mon 9/9/24																
3.3.2	Pemasangan Bekisting	1	Tue 9/10/24	Tue 9/10/24																
3.3.3	Pembongkaran Bekisting	1	Sat 9/14/24	Sat 9/14/24																
3.3.4	Pengecoran	1	Wed 9/11/24	Wed 9/11/24																
3.3.5	Curing	2	Thu 9/12/24	Fri 9/13/24																
3.4	Pekerjaan Atap		Wed 10/9/24	Sat 10/12/24																
3.4.1	Pemasangan Atap Baja Ringan	4	Wed 10/9/24	Sat 10/12/24																
3.5	Pekerjaan Pelat		Wed 8/28/24	Wed 9/4/24																
3.5.1	Pemasangan Bekisting	1	Wed 8/28/24	Wed 8/28/24																
3.5.2	Pembongkaran Bekisting	1	Wed 9/4/24	Wed 9/4/24																
3.5.3	Pengecoran	1	Thu 8/29/24	Thu 8/29/24																
3.5.4	Curing	4	Fri 8/30/24	Tue 9/3/24																
4	Pekerjaan Arsitektur		Mon 10/14/24	Fri 11/22/24																
4.1	Pekerjaan Dinding		Mon 10/14/24	Wed 11/20/24																
4.1.1	Pemasangan Bata Merah	1	Mon 10/14/24	Mon 10/14/24																
4.1.2	Pekerjaan Plesteran Dinding	4	Tue 10/15/24	Fri 10/18/24																
4.1.3	Pekerjaan Acian Dinding	5	Sat 10/19/24	Thu 10/24/24																
4.1.4	Pengecetan Dinding	3	Sat 10/26/24	Tue 10/29/24																
4.2	Pemasangan Lantai Granite	2	Tue 11/19/24	Wed 11/20/24																
4.3	Pekerjaan Plafond Gypsum	1	Fri 10/25/24	Fri 10/25/24																
4.4	Pekerjaan Kayu		Wed 10/30/24	Fri 11/15/24																
4.4.1	Pemasangan Kusen Pintu	5	Wed 10/30/24	Mon 11/4/24																
4.4.2	Pemasangan Kusen Jendela	9	Wed 10/30/24	Fri 11/8/24																
4.4.3	Pemasangan Pinta Kayu	4	Sat 11/9/24	Wed 11/13/24																
4.4.4	Pemasangan Jendela Kayu	6	Sat 11/9/24	Fri 11/15/24																
4.5	Instalasi Listrik		Thu 11/21/24	Thu 11/21/24																
4.5.1	Box Sekring MCB	1	Thu 11/21/24	Thu 11/21/24																
4.5.2	Stop Kontak	1	Thu 11/21/24	Thu 11/21/24																
4.6	Pekerjaan Perlengkapan		Sat 11/16/24	Fri 11/22/24																
4.6.1	Kloset Jongkok	1	Sat 11/16/24	Sat 11/16/24																
4.6.2	Tandon Air	1	Fri 11/22/24	Fri 11/22/24																
4.6.3	Bak Cuci Piring Stainless	1	Mon 11/18/24	Mon 11/18/24																

The Work Breakdown Structure (WBS) created by this company is still in the form of a table using codes from the division of job descriptions. The Job Description is a brief work list of each task that must be completed in this type 48 house construction project. Duration refers to the estimated amount of time to complete each activity, usually measured in days, weeks or months, but in this case it is measured in days. This duration is calculated based on estimates that take into account the difficulty of the job and available resources. The start date is the time at which the activity is expected to start, while the end date is the time at which the activity is expected to finish. This date is important for determining the overall project schedule and identifying potential delays. In this type 48 house construction project, CV. PPA has made a description of the work plan for each activity as shown in Table 3.

In the work process that has been ongoing to date there have been several obstacles explained by the CV. PPA in the previous section so that you can see the comparison of the S-curve of the actual project and the planning project in Figure 3.

Figure 3. S-Curve Actual



Obstacles in the type 48 house construction project

In the first week this project started, there were already deviations between the project plan and the actual project, this was due to problems with damaged equipment so that the land clearing process could not be carried out effectively and optimally.

Then in the 4th week, the deviation between the project plan and actual project was seen to be greater, namely -13.14%. This is due to the absence of many craftsmen and unfavorable weather conditions so that work is paramount to safety conditions. The absence of craftsmen is due to work in the village, and work on other projects in a shorter time (5-7 days) and with a higher salary so the craftsmen prefer to take on these projects. The foreman could not prepare a replacement craftsman because there was no confirmation from the absent craftsmen. Because of this, the work ended up being slower and not optimal because there were no craftsmen.

DISCUSSION

Knowledge Areas and Project Management Process Groups Analysis

Based on the results of interviews with the director of CV. PPA, the author carried out assessments in the two PMBOK Knowledge Areas below, including Project Integration Management and Project Scope Management by creating checklist tables for each document requirement in input & output, and the methods that have been guided in the PMBOK Guide Book. Instructions for data analysis for writers are to check the list of input, tools & techniques and output requirements for each Knowledge Area and the process. After the interview with the

director and receiving data was carried out, the author provided a recap in the form of questions and checklists on a list of documents or methods that had or had not been fulfilled or carried out by the company in the management of this type 48 house construction project.

Figure 4. Project Management Process Group and Knowledge Area Mapping (PMI, 2017)

Knowledge Areas	Project Management Process Groups				
	Initiating Process Group	Planning Process Group	Executing Process Group	Monitoring and Controlling Process Group	Closing Process Group
4. Project Integration Management	4.1 Develop Project Charter	4.2 Develop Project Management Plan	4.3 Direct and Manage Project Work 4.4 Manage Project Knowledge	4.5 Monitor and Control Project Work 4.6 Perform Integrated Change Control	4.7 Close Project or Phase
5. Project Scope Management		5.1 Plan Scope Management 5.2 Collect Requirements 5.3 Define Scope 5.4 Create WBS		5.5 Validate Scope 5.6 Control Scope	

Project Integration Management

The type 48 house construction project by CV. PPA is still ongoing until the target is completed in the 3rd week of November 2024, so the closing process will not be discussed in this study. Each activity consists of several document requirements needed to carry out each activity as a guide to achieving project scheduling planning with effective and efficient results.

Input

Input is a data, documents, and information that must be owned by the company or project as a basis for analyzing project integration management at each step before carrying out work or projects. The following in Table 4 shows a checklist of input documents in a type 48 house construction project carried out by CV. PPA.

Table 4. Input Table of Project Integration Management

Knowledge Areas	Initiating Process Group			Planning Process Group		Executing Process Group				Monitoring and Controlling Process Group				Closing Process Group	
4. Project Integration Management	4.1 Develop Project Charter (Pg. 77)			4.2 Develop Project Management Plan (Pg. 83, 85, 86)		4.3 Direct and Manage Project Work (Pg. 92, 94, 95)		4.4 Manage Project Knowledge		4.5 Monitor & Control Project Work		4.6 Perform Integrated Change Control (Pg. 116,		4.7 Close Project/Phase (Pg. 124)	
Input	☑		Business Document	☐	Project Charter	☐	Project Management Plan	☐	Project Management Plan	☐	Project Management Plan	☑	Project Management Plan	☐	Project Management Plan
	☑		Agreements	☑	Outputs from Other Processess	☐	Project Documents	☐	Project Documents	☐	Project Documents	☑	Project Documents	☐	Project Documents
	☑		Enterprise Environmental Factors (EEF)	☑	EEF	☑	Approved Change Requests	☑	Deliverables	☐	Work Performance Information	☐	Work Performance Reports	☐	Approved Change Requests
	☑		Organizational Process Assets	☑	Organizational Process Assets	☑	EEF	☑	EEF	☑	EEF	☑	EEF	☐	EEF
						☑	Organizational Process Assets	☑	Organizational Process Assets	☑	Organizational Process Assets	☑	Organizational Process Assets	☐	Organizational Process Assets
										☐	Agreements	☑	Change Requests	☐	Project Charter
														☐	Accepted Deliverables
														☐	Business Documents
														☐	Agreements
														☐	Procurement Documentation

From the results of the interview, it was found that in planning the type 48 house construction project, CV. PPA has prepared and used the above documents as input for each activity in the process. However, in the 3rd and 4th activities, namely Direct & Manage Project Work and Manage Project Knowledge in the execution process, the company has not included its Project Management Plan and Project Documents during this process, because respondents stated that during the project work process, they only ensure that the work is carried out to completion, if something undesirable happens, they only handle it appropriately and accept requests that are outside of planning, so they don't reconfirm what provisions are in the initial

planning documents (Project Management Plan and Project Documents) or other specified limitations. Then in the next process activity, namely Monitor & Control Project Work, the company did not prepare a Project Management Plan, Project Documents, Work Performance Information, Agreements, and Work Performance Reports in the Perform Integrated Change Control activity. This is caused by the company's management and monitoring & controlling mechanisms which are only based on instinct and simple manual reports, and have not yet implemented computational reports to be integrated in real-time. Respondents said that because the project was their own project, obtained from the developer themselves, and a word of mouth strategy, it could result in the neglect of detailed requirements such as agreement documents and software systems for reporting actual progress.

Tools & Techniques

In Project Integration Management, the tools and techniques carried out will help in integrating various aspects in a type 48 house construction project. However, in this study, the researchers saw that the results of interviews with the main director of CV. PPA there are several aspects that have not been done which can be seen in Table 5.

Table 5. Tools & Technique Table of Project Integration Management

Knowledge Areas	Initiating Process Group		Planning Process Group		Executing Process Group				Monitoring and Controlling Process Group				Closing Process Group	
4. Project Integration Management	4.1 Develop Project Charter (Pg. 77)		4.2 Develop Project Management Plan (Pg. 83, 85, 86)		4.3 Direct and Manage Project Work (Pg. 92, 94, 95)		4.4 Manage Project Knowledge		4.5 Monitor & Control Project Work		4.6 Perform Integrated Change Control (Pg. 116,		4.7 Close Project/Phase (Pg. 124)	
Tools & Technique	☑	Expert Judgement	☑	Expert Judgement	☑	Expert Judgement	☑	Expert Judgement	☑	Expert Judgement	☑	Expert Judgement	☐	Expert Judgement
	☑	Data Gathering	☑	Data Gathering	☑	Project Management Information System	☑	Knowledge Management	☑	Data Analysis	☑	Change Control Tools	☐	Data Analysis
	☑	Interpersonal & Team Skill	☑	Interpersonal & Team Skill	☑	Meetings	☑	Information Management	☑	Decision Making	☑	Data Analysis	☐	Meetings
	☐	Meetings	☑	Meetings			☑	Interpersonal & Team Skills	☑	Meetings	☑	Meetings		
											☑	Decision Making		

In most of the project work process activities, this company has implemented methods and techniques in preparing integration management. However, in the initiating process, the company had not yet held meetings (kick-off meetings) with various stakeholders to prepare the Develop Project Charter. This management meeting was not held at the beginning of the stage, not formally and was only attended by a small number of parties, because the company considered this to be only a small project and did not attach importance to all parties.

Output

Output is a result obtained in each process carried out at each step. The output obtained can be in the form of documents, deliverables, approved changes or other information that is a direct result of the process carried out. In the output results in the project integration management knowledge area, of course, there are also some document requirements that cannot be issued due to the previous points (inputs and tools and techniques) not being fulfilled as in Table 6.

Table 6. Output Table of Project Integration Management

Knowledge Areas	Initiating Process Group		Planning Process Group		Executing Process Group				Monitoring and Controlling Process Group				Closing Process Group	
4. Project Integration Management	4.1 Develop Project Charter (Pg. 77)		4.2 Develop Project Management Plan (Pg. 83, 85, 86)		4.3 Direct and Manage Project Work (Pg. 92, 94, 95)		4.4 Manage Project Knowledge		4.5 Monitor & Control Project Work		4.6 Perform Integrated Change Control (Pg. 116,		4.7 Close Project/Phase (Pg. 124)	
Output	☐	project Charter	☐	Project Management Plan	☑	Deliverables	☑	Lessons Learned Register	☑	Change Requests	☑	Approved Change Requests	☐	Final Product, Service, or Result Transition
	☑	Assumption Log			☑	Work Performance Data	☑	Project Management Plan Updates	☐	Work Performance Report	☑	Project Documents Updates	☐	Project Documents Updates
					☑	Issue Log	☑	Organizational Process Assets Updates	☑	Project Management Plan Updates	☑	Project Management Plan Updates	☐	Final Report
					☑	Change Requests			☑	Project Documents Updates			☐	Organizational Process Assets Updates
					☑	Project Management Plan Updates								
					☑	Project Documents Updates								
					☑	Organizational Process Assets Updates								

In the Executing process, the company has provided the results of its two activities (Direct & Manage Project Work and Manage Project Work). However, in the process of initiating, planning, and monitoring & controlling, the company has not provided results for the Project Charter, Project Management Plan, and Work Performance Report. At the initiating process, the company did not officially issue the Project Charter in question, because they did not clearly state the components that should be written in the Project Charter, such as boundaries, project risks, deliverables, key stakeholder list, and authority levels. The Project Charter is important to clearly state the project objectives, project success objectives, high-level requirements, project risks, boundaries, deliverables, milestone schedule, key stakeholder list, financial resources, who is responsible for continuing or not continuing this project, and level authorities who assume responsibility for implementing this project. Then the Project Management Plan was not produced as input for the next process because they only created documents for planning purposes manually and did not include baselines, additional information for handling risks, such as possible requests during the execution process and so on. Work Performance Reports are not created because their mechanism uses manual reports, is in sections or is not integrated with other sections, and is not routinely recapitulated.

The failure to produce a clear and official Project Charter means that this document is not used by the company as input in the next process activity, namely the Develop Project Management Plan Planning process. A Project Management Plan that is not produced means that the company does not have a reference for handling unexpected conditions in the future, such as workers being absent on a scheduled basis and how to handle it, what changes must be estimated and made, or if the material that arrives does not match the request, and how to take preventive measures for other risks. Work Performance Reports that are not produced can also make it difficult for companies to recapitulate and report work progress in real time or if they need the data at a later date as historical data.

Project Scope Management

This Knowledge Area is found in the Planning Process Group (Plan Scope Management, Collect Requirements, Define Scope, and Create WBS) and Monitoring & Controlling Process Group (Validate Scope and Control Scope). Each activity has required documents that should be included to achieve detailed preparation of each scope or work boundaries defining and controlling what is and is not included in the project.

Input

Input is a data, documents, and information that must be owned by the company or project as a basis for analyzing project scope management at each step before carrying out work or projects. The following in Table 7 shows a checklist of input documents in a type 48 house construction project carried out by CV. PPA.

Table 7. Input Table of Project Scope Management

Knowledge Areas	Initiating Process Group	Planning Process Group								Executing Process Group	Monitoring and Controlling Process Group				Closing Process Group
5. Project Scope Management		5.1 Plan Scope Management		5.2 Collect Requirements		5.3 Define Scope		5.4 Create WBS			5.5 Validate Scope		5.6 Control Scope		
Input		☑	Project Charter	☑	Project Charter	☐	Project Charter	☐	Project Management Plan		☐	Project Management Plan	☐	Project Management Plan	
		☑	Project Management Plan	☐	Project Management Plan	☐	Project Management Plan	☐	Project Documents		☐	Project Documents	☑	Project Documents	
		☑	Enterprise Environmental Factors (EEF)	☑	Project Documents	☑	Project Documents	☑	Organizational Process Assets		☐	Work Performance data	☐	Work Performance data	
		☑	Organizational Process Assets	☑	Business Documents	☑	Organizational Process Assets	☑	EEF		☑	Verified deliverables	☑	Organizational Process Assets	
				☑	Agreements	☑	EEF								
				☑	Enterprise Environmental Factors (EEF)										
				☑	Organizational Process Assets										

Respondents said that the entire project planning was only based on experience and did not use certain standards or methods. So, the documents in this Input knowledge area table are not included, including the Project Management Plan for all activities starting from Collect Requirements to Control Scope, Project Charter for the Define Scope activity, and Project Documents for the Create WBS activity, and Validate Scope. In the Validate Scope and Control Scope activities, the company has not used Work Performance Data as a reference point in the monitoring and controlling process, all data collection is still manual and not yet integrated.

Tools & Techniques

In Project Scope Management, the tools and techniques carried out will help in integrating various aspects in a type 48 house construction project. However, in this study the researchers saw that the results of interviews with the main director of CV. PPA there are several aspects that have not been done which can be seen in Table 8.

Table 8. Tools & Technique Table of Project Scope Management

Knowledge Areas	Initiating Process Group	Planning Process Group								Executing Process Group	Monitoring and Controlling Process Group				Closing Process Group
5. Project Scope Management		5.1 Plan Scope Management		5.2 Collect Requirements		5.3 Define Scope		5.4 Create WBS			5.5 Validate Scope		5.6 Control Scope		
Tools & Technique		☑	Expert Judgement	☑	Expert Judgement	☑	Expert Judgement	☑	Expert Judgement		☑	Inspection	☑	Data Analysis	
		☑	Data Analysis	☑	Data Analysis	☑	Data Analysis	☐	Decomposition		☑	Decision Making			
		☑	Meetings	☑	Data Gathering	☑	Decision Making								
				☑	Decision Making	☐	Interpersonal & Team Skills								
				☑	Data Representation	☑	Product analysis								
				☑	Interpersonal & Team Skills										
				☐	Context Diagram										
				☑	Prototypes										

In the method used for the collect requirements activity, this company has not used context diagrams, and in the define scope activity, the company has not taken an approach to interpersonal & team skills, and has not perfected the decomposition that has been made using the WBS table. As can be seen, the WBS table created by the company in the Scheduling Planning table does not include the name of the party responsible for each description of the work to be carried out.

Output

Output is a result obtained in each process carried out at each step. The output obtained can be in the form of documents, deliverables, approved changes or other information that is a direct result of the process carried out. In the output results in the project scope management knowledge area, of course, there are also some document requirements that cannot be issued due to the previous points (inputs and tools and techniques) not being fulfilled as in Table 9.

Table 9. Output Table of Project Scope Management

Knowledge Areas	Initiating Process Group	Planning Process Group								Executing Process Group	Monitoring and Controlling Process Group				Closing Process Group
5. Project Scope Management		5.1 Plan Scope Management		5.2 Collect Requirements		5.3 Define Scope		5.4 Create WBS			5.5 Validate Scope		5.6 Control Scope		
Output		☑	Scope Management Plan	☑	Requirements documentation	☐	Project scope statement	☐	Scope baselines		☑	Change Requests	☑	Change Requests	
		☑	Requirements management plan	☐	Requirements traceability matrix	☐	Project Documents updates	☑	Project Documents updates		☐	Work Performance information	☑	Project Documents Updates	
											☑	Project Documents Updates	☑	Project Management Plan Updates	
											☐	Accepted deliverable	☐	Work Performance Information	

The results or output from Project Scope Management, as can be seen in the table, show that this company has not presented a requirements traceability matrix in the collect requirements activity; project scope statement and project documentation updates on define scope activities; scope baselines in the create WBS activity, work performance information and

accepted deliverables in the validate scope activity; and work performance information on control scope activities.

Proposed Improvements

Even though CV. PPA is a small-scale, family-managed company, but its implementation must still be guided by internationally recognized project management standards, namely the Project Management Body of Knowledge in the entire planning to execution of this type 48 house construction project. Through the results of the analysis, several deficiencies were found which could then be used as proposed improvements in the case of the type 48 house construction project, including:

- For Project Integration Management:

1. Include a Project Charter at the Develop Project Management Plan stage
2. Include Project Management Plan and Project Documents in the execution process (Direct and Manage Project Work, Manage Project Knowledge), and Monitoring and Controlling Process (Monitor & Control Project Work)
3. Include Work Performance Information and agreements on Monitoring and Controlling Process
4. Include Work Performance Reports in Perform Integrated Change Control activities

- For Project Scope Management:

1. Include documents Project Management Plan for all activities starting from Collect Requirements to Control Scope, Project Charter documents for Define Scope activities, and Project Documents for Create WBS and Validate Scope activities.
2. Create Work Performance Data as a reference point in the monitoring and controlling process so that it is integrated and computed with software that can be accessed by internal projects and companies.
3. Creating Context Diagrams as a tool for the collect requirements activity, taking an approach to interpersonal & team skills in the define scope activity, as well as perfecting the decomposition that has been created with the WBS table.
4. Make requirements traceability matrix on the collect requirement activity, project scope statement and project documentation updates on the define scope activity, scope baselines on the create WBS activity, work performance information and accepted deliverables on the validate scope activity and work performance information on the control scope activity.

Five Major Lessons Learned

The need for registered documents for each activity can be a preventive measure against unwanted events during the project implementation process. The problem of this company in delaying the project schedule for completion of the target, could be the cause of the lack of documents and methods carried out at each stage. Such as:

1. The insufficient number of supervisors or foremen is due to the foreman working concurrently in 3 locations, with 3-5 houses in each location for 1 foreman. This can be anticipated by weighting the work contained in the Project Charter document, along with anticipating & handling risks. However, this company has not created and included these documents in activities that require them, so this information can be missed by all parties, and can result in a lack of supervision of work implementation.
2. The Project Management Plan and Project Documents are not focused enough to be included in activities that require them, this can result in errors in coordination and ineffective quality control. By creating and including this document, it can provide detailed clarity regarding the Scope management plan, Requirements management plan, Schedule management plan, Cost management plan, Quality management plan, Resource management plan, Communications

management plan, Risk management plan, Procurement management plan, and Stakeholder engagement plan.

3. Meetings, agreements, context diagrams, and decompositions are not paid enough attention by the company to be carried out and made clearly and in detail, resulting in various parties being careless in knowing their respective responsibilities to complete the work according to the planned target, as well as knowledge of the various roles in the project. In this regard, respondents also stated that their work mechanism was still a double job, this was due to the absence of these three things in the planning and implementation of this project.
4. Work Performance Information, Work Performance Reports, Requirements Traceability Matrix, Project Scope Statement, Scope Baselines, are useful to make it easier for companies to monitor and control work execution for actual progress, and understand the minimum scope for estimated changes in implementation. Especially if the company needs to look back at the physical percent achieved and remaining in its implementation, to estimate costs and resources that have been used and other information in an integrated manner. With these two components, it can mitigate the risk of work delays caused by the absence of scheduled craftsmen, or materials arriving that do not match demand, as well as storing historical data for CV. PPA projects.
5. The ineffective performance of the type 48 house construction project can be a lesson for planning and implementing the next project, so that it has more boundaries and is integrated with other knowledge area disciplines, and can manage future risks during project implementation.

CONCLUSION

Based on the analysis of Project Integration Management and Project Scope Management in the type 48 house project at CV. PPA, several weaknesses were found in project planning and control. In Project Integration Management, the company does not yet have important documents such as Project Charter and Work Performance Reports, which causes a lack of structured guidance and control. Meanwhile, in Project Scope Management, the absence of documents such as Requirements Traceability Matrix and Scope Baselines resulted in unclear project boundaries, which resulted in less than optimal coordination and supervision. Thorough implementation of PMBOK standards can help improve effectiveness and efficiency in project management at CV. PPA. Below are written lessons learned to assist the company in implementing more effective project management standards, so that future projects can run more efficiently, measurably, and integrated.

1. The need for clear and structured documents for each activity so that it can be a preventive measure in anticipating risks.
2. Ensuring the number of supervisors is in accordance with the needs of the project so that supervision can be optimized, as well as detailing the weight of work in the Project Charter.
3. Hold formal meetings and draw up context diagrams to clarify the responsibilities of each party in the project.
4. Provide Work Performance Information and Requirements Traceability Matrix to facilitate monitoring of project progress and estimating changes that may occur.
5. Use the lessons learned from this project to create a more integrated project plan for future projects, including better risk management and documentation.

SUGGESTION

Future research is recommended to explore a more thorough application of PMBOK standards, including areas such as risk management, quality, and procurement, and evaluate the impact of using project management technology in improving efficiency. In addition, further

studies could develop labor performance assessment and risk management systems specific to small-scale projects, which could help small companies mitigate risks more effectively. Communication and stakeholder engagement approaches also need to be explored to improve collaboration, alongside comparative studies between PMBOK and other methods such as Agile or Lean. Finally, improved project documentation to support organizational learning is essential so that historical data can be used to inform future improvements.

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