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MINIMIZING RENOVATION PROJECT DELAYS (Case Study: Fuel Station A)

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ABSTRACT

PT XYZ is a PT ABC (Persero) subsidiary under Sub-Holding Commercial & Trading, PT KLM. PT XYZ is responsible for operating COCO gas stations owned by PT ABC. As time goes by, PT ABC's competitors are increasingly developing their business and increasing their outlets, which will become a challenge for PT XYZ. As one of the efforts to deal with this competition, PT XYZ is constantly upgrading and improving the appearance of gas station facilities, ensuring that the facilities function correctly so that customers will feel comfortable and always fill their vehicles at COCO gas stations. This is also stated in the company's strategy and listed in the 5R program (Ringkas (Brief), Rapi (Neat), Resik (Clean), Rawat (Caring), Rajin (Diligent)). To accommodate the above strategy, PT XYZ also allocates a capital goods investment to implement repairs/renovations in the existing Fuel Station. In practice, the project's physical performance gap caused PT XYZ to not achieve the Key Performance Indicator according to the target. The Technical function as the executor function in the implementation of the projects plays a vital role in implementing the project on time, which will undoubtedly affect the project's performance in PT XYZ. The Key Performance Indicator also cascaded to Technical Function as the Construction Accuracy Performance point. The purpose of this study is to find the root causes of the obstacles faced by PT XYZ in project planning and find solutions to solve these problems so that the project can be completed on time and the KPI for Non-Business Development Capital Goods Investment is achieved. To look for problems, research was conducted at a gas station in the Jabodetabek area with specific criteria. Interview methods will be conducted with stakeholders who play a role in the gas station renovation project. The current reality tree method will analyze problem identification to get the root cause. Case studies and literature reviews will be conducted to find a theory to resolve the root cause. PMBOK, especially in the project schedule management and planning process group sections, and Operation Management theory, especially Lean Production, will be used to analyze the project's performance and find a solution. Several alternative solutions will be identified based on the root cause obtained. Then the best alternative solutions will be selected by using AHP (Analytical Hierarchy Process) with the criteria and rating of the results of interviews with stakeholders. An implementation plan for the best alternative solution will be designed and used as a recommendation for the company.

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1. INTRODUCTION

In the last three years, PT XYZ mostly not reached the KPI target, especially in capital good investment performance and investment project physical progress. In 2022, PT XYZ achieved 80% of the Non-Business Development Capital Goods Investment target, whereas the KPI has a base target of 85%. The achievement is around Rp. 61.89 billion from the total of Non-Business Development Capital Goods Investment of Rp. 77.2 billion. So, the gap of the Non-BD Capital Goods Investment in 2022 is Rp. 15,3 billion. The trend of Non-Business Development Capital Good Investment in 2020-2022 is can be seen in figure I.8 as follows:

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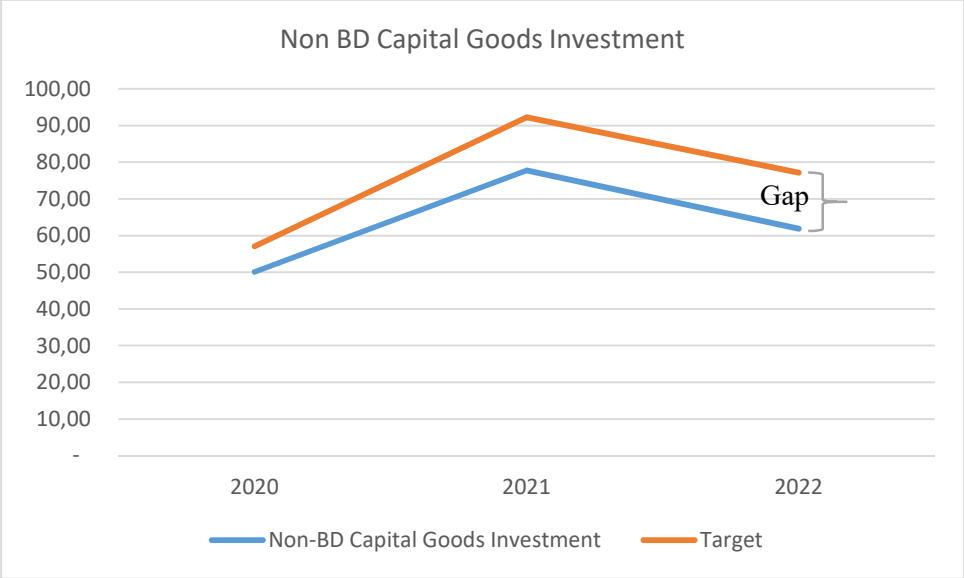

Figure 1 Non-Business Development Capital Goods Investment Trend

To define the problems of unachieved non-business development capital goods investment projects, the author tries to do the case study in Fuel Station A based on the consideration as mentioned above in the project overview chapter 2.1.6. Some crucial points have been renovated in Fuel Station A, except the Canopy item. The Company released Work Order to the vendor on 12th September 2022, and the ideal duration of completion work is 45 calendar days, but the vendor has not completed the works until January 2023, the comparison of the three project's schedule performance in Fuel Station A can be seen in table I.2.

Table 1 Comparison of Each Project in Fuel Station A

No	Item	Duration	Start	Finish	Actual Duration
1	Driveways rejuvenate	45 days	1-3-2022	15-4-2022	45 days
2	Dispensing pump replacement	10 days	10-4-2022	20-4-2022	10 days
3	Canopies rejuvenate	45 days	12-9-2022	Still On Progress	110 days

The Canopy rejuvenation project in Fuel Station A is already running in 110 days, whereas the project should be done in 45 days (the plan can be seen in Appendix E). Based on the observation through the CCTV, the project is still running. This project should be resolved soon because there is a potential loss if the project is continuing delayed, and the root cause should be defined.

Furthermore, stakeholder analysis was conducted to define the issue of this project delays from each stakeholder, which can lead to the root cause of the project's delay problem in Canopy rejuvenation in Fuel Station A.

To gather and collect the issues list from the stakeholder analysis, a semi-structured interview was held with the project user who has a role as the householder in Fuel Station A (Business Unit Head), and surveys or questionnaires with open question type were sent to other stakeholders. The result of the interview and questionnaires are the list of problems/issues identification can be seen in table 2, such as:

Table 2 Problems Identification that Cause Project Delays at Fuel Station A

No	Problems	Description
1	Budgeting is not in accordance with the needs	The renovation plan is related to the budget planned for one year. Sometimes, the renovation plan is based on something other than the user needs, so it will make the scope creep and make the renovation project longer.
2	The renovation plan was submitted late	The unaccommodated needs made the renovation proposal to Business Development Function late.

3	There was no priority plan for the renovation project	The renovation project's goal is not based on the urgent criteria to be renovated.
4	Lack of policy from the owner	The unit price and the work method are not agreed upon before the project starts.
5	Lack of vendor performance	Vendor performance in terms of planning and monitoring is relatively low.
6	The operational time and construction time are asynchronous.	Based on the policy that the fuel station must remain functional.
7	The vendor refuses to continue work.	Some external factors cause price increases, causing the vendor to break the contract's agreed-upon unit price.
8	The project is not part of the renovation plans.	The unaccommodated needs made the renovation proposal late and not on the plan list.
9	High traffic in Fuel Station A causes the renovation process to be inefficient and delayed.	Based on the policy that the fuel station must remain operational, Fuel Station A's traffic is very high; the renovation process is quite challenging.
10	Many obstacles were encountered during the project implementation process.	Based on the policy that the fuel station must remain operational, yet Fuel Station A's traffic is very high, the renovation process is facing many obstacles that cause the project's delay.

2. METHOD

Type and Data Source

The introduction and overview of the PT XYZ are obtained from the secondary data, particularly from the annual report of PT XYZ.

In the Business issue section, the Author seeks data from the primary and secondary data. The gaps discussed in the business issue chapter are data from related functions, and the Author gathers data through observations to learn about prospective losses. The author made a stakeholder analysis to choose the respondent that has a role in the Fuel Station renovation projects in PT XYZ, as shown in Tables I.3 and Figure I.11. Author conducted the interview and sent a questionnaire to chosen respondents based on the stakeholder analysis to identify some of the issues that might cause the gap. The interview process is conducted with the user of this project, particularly in Fuel Station A and Author sends a questionnaire with the open question type to other stakeholders.

To analyze the current situation, data of the projects, such as Bill Of Quantity (BoQ) and project progress documentation, is needed to analyze the project performance based on the Project Management tools. The data was collected directly from the related function. The progress was monitored with observation through CCTV in Fuel Station A.

After the current analysis is conducted through the theory of Operation Management and Project Management, the alternative of solution will be reviewed and selected based on expert judgment. This expert judgment was obtained by a questionnaire survey with the close question type to the related stakeholders.

Analysis Method

The result of the interview and open questionnaire in the business issue chapter is the list of issues that cause the renovation project's delays in Fuel Station A. These issues will be analyzed using The Current Reality Tree to get the root cause.

The data of the current business process will be analyzed using the Lean Production Philosophy which integrated the project process of the renovation project in PT XYZ. VSM (Value Stream Mapping) and Priority Rules will be analyzed based on the goal of the Final Project to enhance the project process that will ensure the delayed project will reduce and to set the project priority, also to find the best improvement.

The data of renovation projects will be analyzed combined with Project Management theory and tools, such as Earned Value Management (EVM), to know the project's performance based on the cost and schedule of the renovation project in Fuel Station A.

After the problem identification and the analysis after the root cause and the current performance have been identified, then the alternatives to the solution will be formulated based on the analysis above. The solution alternatives will then be analyzed by Analytic Hierarchy Process (AHP). The pairwise

comparison and the rating of each alternative will define based on the expert judgment or the priority and interest of the stakeholders. This analysis is mixed between qualitative and quantitative because it combines the surveys conducted to know the rating and the quantitative synthesis process to get the best solution.

The stakeholders who give the expert judgment are the stakeholders with a high interest and power based on the stakeholder analysis and stakeholder mapping. The AHP synthesizing process will be use the SpiceLogic ahp-software and also will be validated with the manual calculation by Author.

3. RESULT AND DISCUSSION

Analysis

Lean Philosophy

Holweg et al., 2018 in their journal find that the lean philosophy allows for an integrative framework to understand the value and define the purpose at the macro level of the major project and to act as an integrator of best practices at the meso- and micro-levels of the projects**.**

Waste elimination is one of the goals of service operations. Examples of waste are defective products, overproduction, inventories, excess motion, processing steps, transportation, and waiting. Based on Operation Management, waste is defined as anything that doesn't add value from the customer's perspective. Holweg and Maylor, 2017 in their journal stated that eliminating waste in lean thinking can be described in the project as the insufficient definition of project outcomes that lead to defects and rework, interface losses due to poor coordination across functions and stakeholders, and a mismatch between process layouts and task that lead to operational inefficiencies. In this paper, lean thinking can be implemented and assessed to improve the project at Fuel Station A and other projects.

The author will analyze if the project implementation is ideal based on the lean production theory. We can adapt the process to the renovation project's implementation in PT XYZ From the figure II.2. If the process is adjusted in the implementation of PT XYZ, then the process will be like in figure IV.1 below.

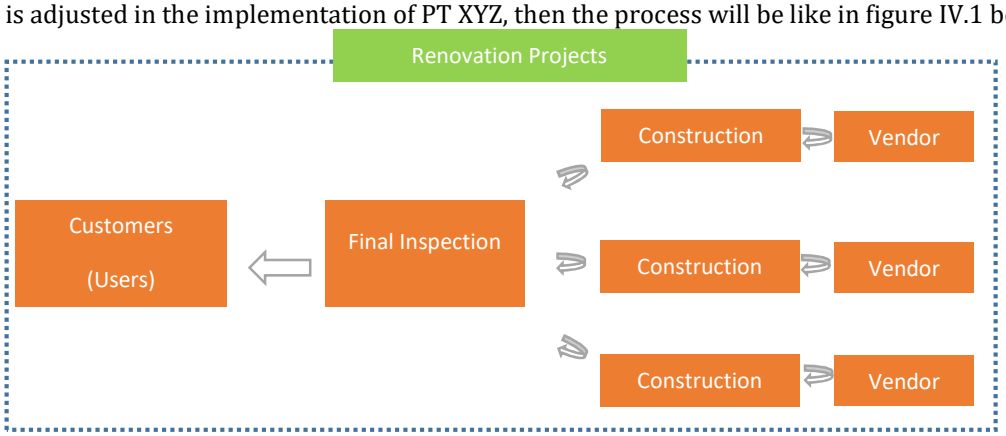

Figure 2 Lean Process in Renovation Projects of PT XYZ

The Canopy Rejuvenation project can be defined as part of the process above that each has the process from the vendor selection to the construction process, then to final inspection, until handed over to the customers.

The elimination of waste, one of the essentials to production, leans principle is to eliminate the waste. Waste is an activity that takes input (material or information, cost, time, space, and labor) but does not add the value needed by the customers.

There were seven prominent types of waste: (1) waste from overproduction; (2) waste of waiting time, (3) transportation waste, (4) inventory waste, (5) processing waste, (6) waste of motion, and (7) waste from product defect. Based on the journal of Holweg et al., 2016 comparison of wastes in manufacturing and major projects can be seen in the table IV.1 below:

Table 3 Comparison of Wastes in OM and Projects (Holweg, et al.,2016)

Wastes in OM	Wastes in projects
Overproduction	Over Checking
Waiting	Delay
Transportation	Defects and rework

Inventory (excess)	Inflexibility in responding to the emergence
Processing	Inappropriate processing
Motion	Unnecessary movement
Defects	Failure

Value Stream Mapping

Value Stream Mapping (VSM) is a flowcharting tool usually used to develop the lean process. Based Jacobs and Chase, 2018 in Operation and Supply Chain Management, the technique is to visualize products flows through various processing steps.

In terms of the Canopy Rejuvenation project in Fuel Station A, Value Stream Mapping (VSM) has been analyzed from the initial process of the project's request from the customer/users to the Technical Function in PT XYZ. The current state Value Stream Mapping (VSM) can be seen in the figure below.

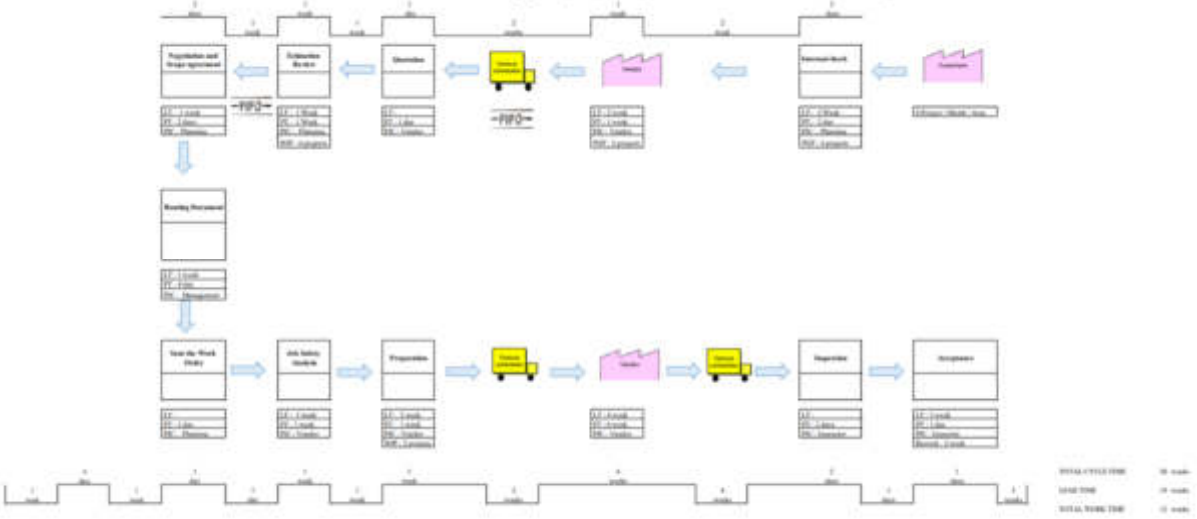

Figure 4 Current State of Value Stream Mapping

Based on the Current State of Value Stream Mapping, the total cycle time of one project is 30 weeks, and the lead time is 19 weeks meanwhile, the entire work time should be 12 weeks. In conclusion, the lead time is more than 63% of the total cycle time. This process is not effective and causes the projects more delays which can lead to the late implementation of other projects and creates more gap in the achievement of Non-Business Development capital goods investment projects' Key Performance Indicator.

Priority Rules

Priority rules are used to determine the sequence of jobs in the queue. The data required for analysis are processing time, due date, or order of arrival. Technical Function usually uses the FCFS (First come, first served) when the order arrives in the department. But, based on figure IV.2, the order arrives sporadically, and all renovation plans have high urgency. Furthermore, there was no standard to decide whether the renovation plan was highly urgent. Five ongoing projects in PT XYZ (outside the Canopy Rejuvenation Project at Fuel Station A) will be analyzed to get the best method of priority rules.

Table 4 Comparison of Several Priority Rules Analysis

No	Rules	Total Flow Time (Days)	Average Flow Time (Days)
1	FCFS	109	21,8
2	SOT	100	20
3	EDD	78	15,6
4	LCFS	119	23,8
5	Random	121	24,2
6	STR	115	23
7	STR/OP	128	25,6
8	CR	108	21,6

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Based on the calculation above, the comparison of total flow time and average flow time for each priority rules can be seen in table IV.11. The result priority rules to process five document planning if use FCFS method, the total time will be 109 days and the average time is 21,8 days. If use SOT method, the total time will be 100 days and the average time is 20 days. If use EDD method, the total time will be 78 days and the average time is 15,6 days. If use LCFS the total time 119 days and the average time is 23,8 days. If use random method total time will be 121 days and the average time is 24,2 days. If use STR method, the total time will be 115 days and the average time is 23 days. If use STR/OP will be 128 days and the average time is 25,6 days. If use CR method the total time will be 108 days and the average time is 21,6 days.

Consider the planning process in Technical function used FCFS method, it is one of the factors that creates more delay. Based on table IV.11, the top three lowest total flow times are EDD, SOT, and CR. These three rules are recommended to be implemented on the internal review in Technical Function to speed up the review process, which can make the projects can be executed immediately.

Earned Value Management (EVM)

Nur Sahid et al., 2022 stated that the performance in the implementation of a project could be measured by indicators that integrate cost and time aspects. Several parameters can become a reference in analyzing project performance, such as BCWS (Budgeted Cost Work Scheduled), BCWP (Budgeted Cost Work Performed), and ACWP (Actual Cost of Work Performed).

- Rp. 629 million was budgeted for six weeks to perform all the work scheduled
- There was a late start. The work should have been started in the first week, but the work is started in 6th week, and the gap is six weeks, indicating the project is very late.
- From the 14th week until the 17th week, the works were stagnant, and the vendor refused to continue because of an unagreed price issue.
- In the 17th week, the work continues to start.
- The CAC or ACWP in week 22nd: Rp. 548.62 million
- The earned value or BCWP in week 22nd: Rp. 511.02 million
- There was a gap between the CAC or ACWP and the earned value or BCWP at the week 22nd, which indicates the project is over budget.
- The Cost Performance Index is:

$$\text{Cost Performance Index} = \frac{\text{Cumulative earned value}}{\text{Cumulative actual cost}}$$

$$\text{CPI} = \frac{511.02}{548.62}$$

$$\text{CPI} = 0{,}93$$

- The Cost Performance Index is 0.93 below one, which indicates that for every Rp. 1 expended, only Rp. 0.93 of earned value was accomplished, and corrective action should be taken.
- Forecasting project cost at completion
  To estimate the cost at completion, there were two ways: determine the forecasted cost at completion (FCAC) or the estimated cost at completion (EAC) based on the actual cost expended, the earned value, and the remaining work to be done.
  In this final project, the Author tries to determine the project cost at completion with the FCAC method, and the formula is as follows:

$$\text{Forecasted cost at completion} = \frac{\text{Total budgeted cost}}{\text{Cost performance index}}$$

$$\text{FCAC} = \frac{\text{TBC}}{\text{CPI}}$$

$$\text{FCAC} = \frac{629.19}{0.93}$$

$$\text{FCAC} = 676.5$$

From the calculation above, we can forecast that the entire project will cost Rp. 676.5 until the project ends. This indicates that the project will have an overrun cost of around Rp. 47 million or 7% of the total budget cost.

Project Schedule Management

The entire schedule of the Canopy Rejuvenation Project at Fuel Station A is 45 days. The bar chart can be seen in Table IV.12. But the project is delayed, and the schedule is no longer relevant. To estimate the project's total duration, parametric and three-point estimating tools will be analyzed. the Three-Point Estimating can be calculated with the formula as follows:

$$tE = (t0 + tM + tP) / 3$$
$$tE = (82+45+124)/3$$
$$tE = 83{,}6 \text{ days}$$

Based on the Three-Point Estimating calculation above, the duration of renovation projects is ideally 83,6 days to mitigate the uncertainty and risk happening in the construction field because of safety issues or the high traffic in the Fuel Station, considering the Fuel Station is still needed to operate during the renovation project processes.

Estimate Costs

Estimating cost is one of the processes of Cost Management in PMBOK. Based on the PMBOK, estimating cost approximates the cost of resources needed to complete project work. PT XYZ has implemented the unit price contract for the renovation project's implementation. In the case of Canopy Rejuvenation in Fuel Station A, the unagreed price is one of the problems of the project's delays. The Cost Estimation in PT XYZ using parametric estimating with the data and formula that refers to Analisa Harga Satuan SNI. PT XYZ should use three point estimating that estimates the uncertainty and risk because the accuracy of estimation might be improved. Three-point estimating refers to the following:

a. Most likely (cM): based on the actual work and any predicted expenses.
b. Optimistic (c0): based on analysis of the best-case scenario for the activity.
c. Pessimistic (cP): based on analysis of the worst-case scenario for the activity.

Current Reality Tree

Umble, 2015 stated that Current Reality Tree (CRT) is a key technique in the theory of constraint's logical thinking process. Current Reality Tree (CRT) can be used to identify root causes and uncover the key cause-and-effect relationships.

Based on the result of the interview and questionnaires (Appendix B), the list of problems/issues identified which then can be defined as UDEs (Undesirable Effects) for the project's delays issue in Fuel Station A, are as follows:

1. UDE 1: Budgeting is not in accordance with the needs
2. UDE 2: The renovation plan was submitted late
3. UDE 3: No priority plan for the renovation project.
4. UDE 4: Lack of policy from the owner
5. UDE 5: Lack of vendor performance
6. UDE 6: Based on the fuel station's policy to remain operational, the operational time and construction time are asynchronous.
7. UDE 7: Some external factors cause price increases, causing the vendor to break the contract's agreed-upon unit price and refuse to continue work.
8. UDE 8: The project is not part of the renovation plans.
9. UDE 9: High traffic in Fuel Station A causes the renovation process to be inefficient and delayed.
10. UDE 10: Many obstacles were encountered during the project implementation process.

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Figure 5 Current Tree Analysis (CRT) Diagram

From the diagram in figure II, we can see that the root cause of the project's delays is:
1. There were no priority rules in the renovation project's implementation
2. Lack of technical competencies

Business Solution

Based on the Current Root Cause (CRT) analysis, there was a two-root cause of the delayed projects: There were no priority rules in the implementation of the renovation project and lack of technical competencies. Each root cause is a reference to get the business solution that will be discussed below.

Root Cause 1: There were no priority rules in the implementation of the renovation project.

This root cause is related to the project initiation process. From the renovation plan, and engineering process to the implementation of the Canopy Rejuvenation at Fuel Station A. The business solution alternatives for root cause 1 are:
1. Implement the priority rules in the Technical Function
2. Decentralized the process for the minor and urgent renovation and increase the number of implementing vendor based on the Value Stream Mapping (VSM)
3. Long Term Renovation Planning of Fuel Stations which has age of more than ten years.

Root Cause 2: Lack of Technical Competencies

This root cause is specific to the Canopy Rejuvenation project. It has been analyzed using Earned Value Management (EVM), Project Schedule Management, and Project Cost Management to propose the business solution. Some people's development theory will also be implemented in this business solution.
1. Create the internal workshop to determine the standard of duration, cost estimation, and method of renovation projects that can be implemented in all of the Fuel stations based on the user needs.
2. Involving the training and benchmarking to develop the existing employee so they can manage projects ideally based on the theory and the best practices case that has been implemented.
3. Provide tools for the employee that can make them work effectively to reduce the waste in the project life cycle.

Analytic Hierarchy Process (AHP)

N Isnaini et al., 2020 stated that AHP uses expert judgment to determine the most preferred pair-wise comparison among the selected criteria and sub-criteria.

After the problem identification process in the Current Reality Tree Analysis (CRT), business solution alternatives were defined.

Furthermore, hierarchy tree should be created to know the structure and start synthesizing the alternative based on the Analytic Hierarchy Process. Before the hierarchy tree, the Author tries to determine the criterion. The business solution should be impactful/effective, has low cost, and can be implemented soon to reduce the project delays problem in Fuel Station A and PT XYZ. The criteria based on the research objective are:

a. The effectiveness: Can be implemented to reduce project delays, and the best solution is the most comprehensive.
b. Low cost: means the program will not spend the high cost.
c. Time: How quickly the solution will be implemented.

Furthermore, pairwise comparisons based on the expert judgment's rate are important to decision alternatives and criteria. The expert in this final project is the stakeholders that have the main role in the renovation project, especially stakeholders with a high power and high interest based on the stakeholder mapping.

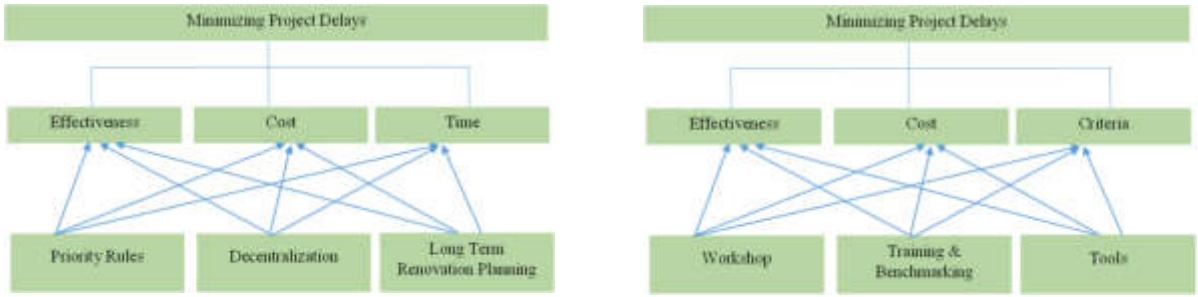

Fig ure 6 Hiearchy Tree For Business Solution 1 & 2

The result of the pairwise comparison can be seen in the appendix I, and the result of AHP for root cause one and root cause 2 are:

a. AHP result for solution of root cause 1

Based on the pairwise comparison and the result of the synthesizing process that can be seen in appendix K, the result can be seen in the figure IV.9. Based on the priorities calculation using the Spicelogic ahp-software, the decentralization option has a highest result, the second position is long term renovation planning option, and the last position is priority rules option. Each alternative has a consistency ratio less than or equal to 0.1. The Consistency Ratio (CR) indicated that there was consistent data so the rating and calculation is acceptable.

The highest priorities calculation means the best alternative solution. So, the Decentralization option is the best solution for the root cause 1 (There were no priority rules in the implementation of the renovation project). Decentralization means decentralized the minor and urgent renovation process and increasing the number of implementing vendors.

Metrics

Option Name	Priorities
Priority Rules	0,247
Decentralization	0,424
Long Term Renovation Planning	0,329

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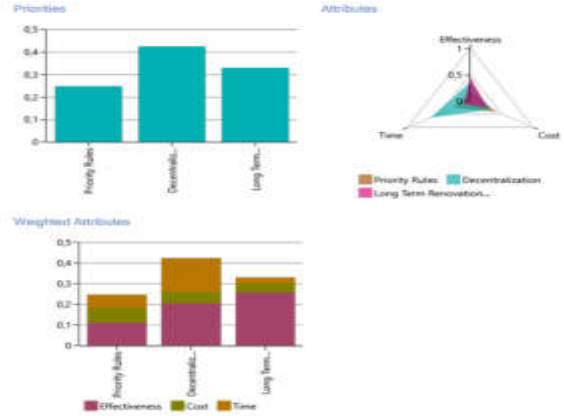

Figure 7 AHP Result for Solution of Root Cause 1

b. AHP result for solution of root cause 2

Based on the pairwise comparison and the result of synthesizing process of the solution or root cause 2, can be seen in the Appendix L and the result is can be seen on the figure IV.10. Based on the priorities calculation using the Spicelogic ahp-software, the workshop option has a highest result, the second position is a training & benchmarking option, and the last position is tools option. Each alternative has a consistency ratio less than or equal to 0.1, as seen in Appendix L.

The highest priorities calculation means the best alternative solution. So, the best solution for the root cause 2 (Lack of technical competencies) is the Workshop option. The workshop option means to create an internal workshop to determine the standard of duration, cost estimation, and method of renovation projects that can be implemented in all of the Fuel stations based on the user needs also improve the people-in-charge awareness to monitor the renovation projects.

Figure 8 AHP Result for Solution of Root Cause 2

The result of AHP is the best business solution based on the pairwise comparison that referred to expert judgment. This best solution will be proposed to be implemented in PT XYZ. Each of the root causes has the best alternative business solutions, such as:

1. Decentralized the processes for the minor and urgent renovation and increased the number of implementing vendors based on the Value Stream Mapping (VSM)

This solution propose to answer the research question of "how to determine the best solution for the renovation project's delays?" and answer the business issue that stated the achievement of Non-BD capital goods investment still has a gap.

Based on the future state of Value Stream Mapping (VSM) in Appendix G, the total project's cycle time for one project is 18 weeks. With the improvement on the project's priority, the customer/user should filter the renovation plan based on importance & urgency. So, the technical planning staff's load is equally

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divided into two processes and makes the work-in-progress project that was previously piled up at one point divided into two processes equally.

Based on the statement in the business issue, there were 23 projects that have not been implemented, but there were eight additional unfinished projects that cause by delay. On the business issue, the gap of Non-BD Capital goods investment is Rp. 15.3 billion.

The decentralization process will minimize the gap from Rp. 15.3 billion to Rp. 6,8 billion or around 55% from the gap until May 2023. So, in May 2023, the Non-BD capital good investment projects are forecasted to achieve Rp. 70.39 billion or 91% of the total investment (Rp. 77.2 billion).

This forecasted target can be achieved with the condition that there should be 31 different dedicated vendor team. The Company should conduct the procurement process to increase the vendor who will implement the projects based on their coverage. From Table IV.15 the vendor needed are: 8 new vendors for the minor renovation projects in each area, 9 qualified vendors for major renovation projects through the tender process, 14 existing vendor with dedicated teams per project, or 7 existed vendor with 2 teams for each vendor.

PROJECT	PIC	EXECUTOR	NOTE	JAN				FEB				MARCH				APR				MAY				AMOUNT (IN BILLION RUPIAH)
				1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
PROJECT 1	Area	Vendor 1. 1	New vendor																					0,068
PROJECT 2	Area	Vendor 1. 2	New vendor																					0,0845
PROJECT 3	Area	Vendor 1. 3	New vendor																					0,068
PROJECT 4	Area	Vendor 1. 4	New vendor																					0,0052
PROJECT 5	Area	Vendor 1. 5	New vendor																					0,0385
PROJECT 6	Technical	Vendor 1-1	Existed																					0,07139
PROJECT 7	Technical	Vendor 1-2	Existed																					0,07139
PROJECT 8	Technical	Vendor S1	Tender																					0,36663
PROJECT 9	Technical	Vendor S2	Tender																					0,36663
PROJECT 10	Technical	Vendor S3	Tender																					0,36663
PROJECT 11	Technical	Vendor S4	Tender																					0,36663
PROJECT 12	Technical	Vendor S5	Tender																					0,36663
PROJECT 13	Technical	Vendor 1-3	Existed																					0,36663
PROJECT 14	Technical	Vendor 1-1	Existed																					1,3
PROJECT 15	Technical	Vendor 1-2	Existed																					0,47
PROJECT 16	Technical	Vendor S6	Tender																					0,1188
PROJECT 17	Technical	Vendor S7	Tender																					0,1188
PROJECT 18	Technical	Vendor 2-1	Existed																					0,16
PROJECT 19	Technical	Vendor 2-1	Existed																					0,08
PROJECT 20	Technical	Vendor 3-1	Existed																					0,43
PROJECT 21	Technical	Vendor 3-2	Existed																					0,20
PROJECT 22	Technical	Vendor 3-2	Existed																					0,20
PROJECT 23	Area	Vendor 4-1	Existed																					0,165
PROJECT 24	Area	Vendor 4-1	Existed																					0,055
PROJECT 25	Area	Vendor 4-2	Existed																					0,33
PROJECT 26	Technical	Vendor S8	Tender																					1,32
PROJECT 27	Area	Vendor 4-2	Existed																					
PROJECT 28	Area	Vendor 4,1	New vendor																					0,033
PROJECT 29	Area	Vendor 4,2	New vendor																					0,165
PROJECT 30	Area	Vendor 4,3	New vendor																					0,022
PROJECT 31	Technical	Vendor S9	Tender																					0,75
																								8,5256563

Figure 9 Business Solution 1 Implementation

2. Create an internal workshop to determine the standard of duration, cost estimation, and method of renovation projects that can be implemented in all of the Fuel stations based on the user needs.

This solution is implemented to support the first solution to integrate the projects with whole aspects. This solution proposes determining some of the project's detail (price, time, and method) and how to approach the Sales Area employee who doesn't have the technical competencies but should contribute through the project monitoring process in the renovation project at Fuel Station.
The step that will use PDCA (Plan, Do, Check, and Action) tools and described below:

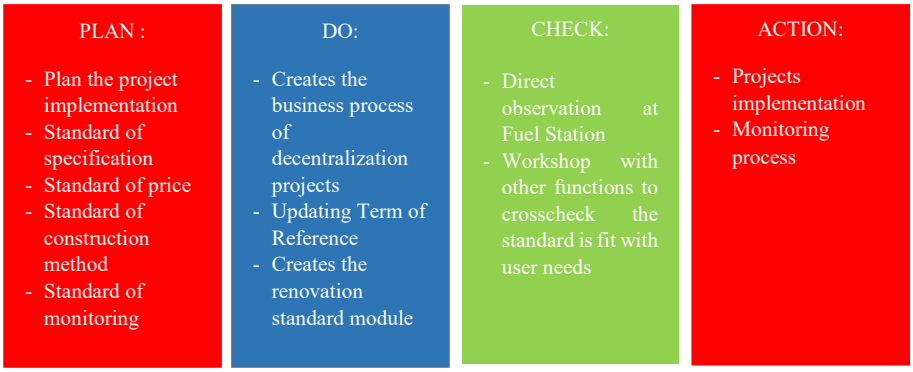

Figure 10 PDCA for Solution 2

Decentralization and internal workshop solutions required the collaboration, not only with Technical Functions, but also with all of the related employee. In this disruption era, agile method is implemented in the whole aspect of life, including personal leadership. Agile in personal leadership, focus on collaboration and communication.

The solution is adapt the pillar of the scrum that always involves transparency, inspection, and adaptation because this solution is implemented multi-cross function. Besides that, the people who in charge in this project should be aware of the objective of the project implementation which can lead to the quality of the monitoring process. The value internalization to achieve the company's objective should be conducted to all of the inspector, user, and engineer. The communication plan also should be identified and standardized.

4. CONCLUSION

According to the business issue faced by PT XYZ that there was a gap between the target and achievement of the Non-BD capital goods investment project around Rp. 15,3 billion. This gap is caused by some factors, and one of the factors is project delays. The case study has been conducted in Fuel Station A to know the problem of the project delays in the renovation projects.

To answer the research question of "How to propose alternative solutions to solve the project delays that create a gap in the Non-Business Development Capital Budget Investment projects", The list of problems collected from the stakeholders related with the renovation projects. Furthermore, the analysis based on the Operation Management theory mixed with Project Management theory and the calculation using tools Value Stream Mapping (VSM) and Earned Value Management (EVM) were conducted to know the detail project's problem. Current Reality Tree (CRT) analyzes the root cause of the project delays in Fuel Station A.

There were two root causes; refer to the root cause as a result of a Current Reality Tree (CRT), then the business solution was formulated. The CRT analysis result is that there were no priority rules in the implementation of renovation projects and lack of technical competencies. Referring to the root cause as a result of a Current Reality Tree (CRT), then the business solution was formulated and each of the root cause had three solution alternatives. This statement is aligned with the research question of, "what is the root cause that makes the execution of the renovation project delayed?"

The six solution alternatives are chosen using the Analytical Hierarchy Process (AHP) that is calculated based on expert judgment. So, each root cause has one best solution based on the research question aboves that states "How to determine the best solution for the renovation project's delays?".

The chosen solutions are followed by an implementation plan that can reduce the gap stated in the business issue. The second solution is to complete each other to integrate the renovation project's implementation.

REFERENCES

[1] Smith, L. W. (2000). Stakeholder analysis: a pivotal practice of successful projects. Paper presented at Project Management Institute Annual Seminars & Symposium, Houston, TX. Newtown Square, PA: Project Management Institute.

[2] Umble, M., & Umble, E. (2015). Barking up the right current reality tree. *Industrial Management, 57*(2), 10-15,5. Retrieved from https://www.proquest.com/trade-journals/barking-up-right-current-reality-tree/docview/1669926105/se-2

[3] Proaño-Narváez, M., Flores-Vázquez, C., Pablo Vásquez Quiroz, & Avila-Calle, M. (2022). Earned value method (EVM) for construction projects: Current application and future projections. *Buildings, 12*(3), 301. doi:https://doi.org/10.3390/buildings12030301

[4] Jie, D., & Wei, J. (2022). Estimating construction project duration and costs upon completion using monte carlo simulations and improved earned value management. *Buildings, 12*(12), 2173. doi:https://doi.org/10.3390/buildings12122173

[5] Sedqi, E. R., & Sabreen, B. M. (2020). The factors affecting on earned value management. *IOP Conference Series.Materials Science and Engineering, 901*(1) doi:https://doi.org/10.1088/1757-899X/901/1/012023

[6] Sahid, M. N., Gotot, S. M., Riyanto, A., & Abdul, F. P. (2022). Analysis of earned value concepts from time and cost on construction projects. *International Research Journal of Innovations in Engineering and Technology, 6*(5), 14-28. doi:https://doi.org/10.47001/IRJIET/2022.605002

[7] Zhang, X. (2019). Improving construction productivity by integrating the lean concept and the clancey heuristic model. *Sustainability, 11*(17), 4535. doi:https://doi.org/10.3390/su11174535

[8] Holweg, M., & Maylor, H. (2018). Lean leadership in major projects: From "predict and provide" to "predict and prevent". [Lean leadership in major projects] *International Journal of Operations & Production Management, 38*(6), 1368-1386. doi:https://doi.org/10.1108/IJOPM-02-2017-0100

[9] Herrera, R. F., Mourgues, C., Alarcón, L. F., & Pellicer, E. (2020). An assessment of lean design management practices in construction projects. *Sustainability, 12*(1), 19. doi:https://doi.org/10.3390/su12010019

[10] Maradzano, I., Dondofema, R. A., & Matope, S. (2019). APPLICATION OF LEAN PRINCIPLES IN THE SOUTH AFRICAN CONSTRUCTION INDUSTRY. *South African Journal of Industrial Engineering, 30*(3), 210-223. doi:https://doi.org/10.7166/30-3-2240

[11] Hosseini, Manochehr. (2021). Standardization in Project Planning and Controls – Why? What? and how?. https://www.linkedin.com/pulse/standardization-project-planning-controls-why-what-how-hosseini?trk=public_profile_article_view

[12] Van Goubergen, D., Van Landeghem, H., Van Aken, E., & Letens, G. (2003). Using value stream mapping to redesign engineering project work. *IIE Annual Conference.Proceedings,* , 1-6. Retrieved from https://www.proquest.com/scholarly-journals/using-value-stream-mapping-redesign-engineering/docview/192470614/se-2

[13] Salehudin, Imam. (2014). Re: How can AHP (Analytic Hierarchy Process) be used when multiple respondents are involved?. Retrieved from: https://www.researchgate.net/post/How-can-AHP-Analytic-Hierarchy-Process-be-used-when-multiple-respondents-are-involved/5305a40acf57d7865f8b45f5/citation/download.

[14] Jeffrey, S. A. (2003). *Non-monetary incentives and motivation: When is hawaii better than cash?*(Order No. 3097121). Available from ABI/INFORM Collection. (305295554). Retrieved from https://www.proquest.com/dissertations-theses/non-monetary-incentives-motivation-when-is-hawaii/docview/305295554/se-2

[15] Pinton, M., & Alvair Silveira, T. J. (2020). Human aspects of agile transition in traditional organizations. *Journal of Technology Management & Innovation, 15*(3), 62-73. doi:https://doi.org/10.4067/S0718-27242020000300062