

## Developing The Organization Integration Through Problem/Solution Tree: A Case Study of EPC Solar Panel Company

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**Keywords :** *Problem and Solution Tree, Organizational Integration, Project Management.*

**Abstract:** *Rapidly growing based on the company's revenue, the scale and number of projects that have been increased every year, the margin of each project has gap that does not meet with the targeted plans. Projects most of the time are over budget, delayed, and company can't identify the risk management they faced from the calculation, construction, until the after-service. ATW has identified these circumstances as challenges to be mitigate. Based on sums of all the projects budget in Q2 in 2024, the highest activities that overbudget compared to the planning is Installation by 74.6%. Compared to the initial budget, the installation cost nearly double. The company want to know what cause the gap of over budget and uncontrollable additional cost and how to improve the budgeting. With Problem and Solution Trees to understand the root caused and the solution, this research explores problems that related to projects to perceive the essentials. Developing Organizational Integration for the company related to organization, project, and cross-departments. Based on the Problem and Solution Tree, the causes are unintegrated and uncoordinated system, lack of standardize procedure, and miss communication in projects. Meanwhile, the system model is organizational integration where will improve the gaps with integrating the cross department and make it sustain for evaluating the closing project. This research's aim is for the expenses to be controlled and monitored to gain the margin and for the company to expand the business.*

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### Introduction

For electricity has already become one of our primer necessities in society, fossil mining activities as the core electricity's raw materials has become the causes of climate change (UN

sources, European Union, and NASA) that cannot be neglected. Keeping our responsibility in environment, people start to alert that it is essential to carefully using limited resources. In these transformative era, renewable energy became a fundamental way to contribute sustaining the environment as mining activities and compact infrastructure for transportation system have become the top two global warming triggers.

Reducing the global warming by replacing the source of our electricity can become Indonesia an answer to it. By choosing renewable energy, we can substitute our massive needs of minerals and coals. Based on Directorate General of Energy and Energy Conservation, in 2025 Indonesia's Government has been targeting 23% of the electricity comes from sustainable energy and 44% in 2030 (esdm.go.id). This far away from what Indonesia has been achieved in 2020, for 11.2% the electricity is using sustainable energy (Wahyuni, E., 2022) and 19.49% by 2024 (Desfika, 2024).

One of the potential sustainable energies in Indonesia is solar power plant. While having an enormous advantage by located in the equator line, Indonesia has a high level of 4.8 kWh/m<sup>2</sup>/day solar radiance to be absorbed, (Wahyuni, E., 2022) a prospect at this time and in the future. In Indonesia, the regulation in the instalment for the rooftop solar panel has been managed to ensure the fair distribution by giving the quota and in cluster, stated in Minister of Energy and Mineral Resources Regulation Number 2 of 2024 on Rooftop Solar Power Plants. ATW Solar is a pioneering EPC (Engineering, Procurement, and Construction) company in solar energy industry since 2017. EPC company is a project's lifecycle company that operate from designing (engineering), preparing the needs (procurement), until site instalment (construction). ATW Solar is an EPC company that generate PV in the rooftops, land, and above the sea, designing the solar panel plant, preparing and purchasing the equipment and materials, managing site instalment, operating the PV, until giving maintenance for the after services.

Rapidly growing based on the company's revenue, the scale and number of projects that have been increased every year, the margin of each project has gap that does not meet with the targeted plans. Projects most of the time are over budget, delayed, and company can't identify the risk management they faced from the calculation, construction, until the after-service. The company has identified these circumstances as challenges to be mitigate.

Based on sums of all the projects budget in Q2 in 2024, the highest activities that over budget compared to the planning is Installation by 74.6%. Compared to the initial budget, the installation cost nearly double. This account includes all the uncontrollable additional expense that occurred during installment. The company want to know what cause the gap of over budget and uncontrollable additional cost and how to improve the budgeting.

This research conducts a systematic theoretical foundation to developing solution of the over budget and uncontrollable additional expenses in company's projects. With Problem and Solution Trees to understand the root caused and the solution to it, this research explores problems related to the and analyzing problems in the company that related to projects to perceive the essentials. Then developing Organizational Integration for the company related

to organization, project, and cross-departments. For the company to maintain the advance system, Change Management in project delivers organization to forward changes.

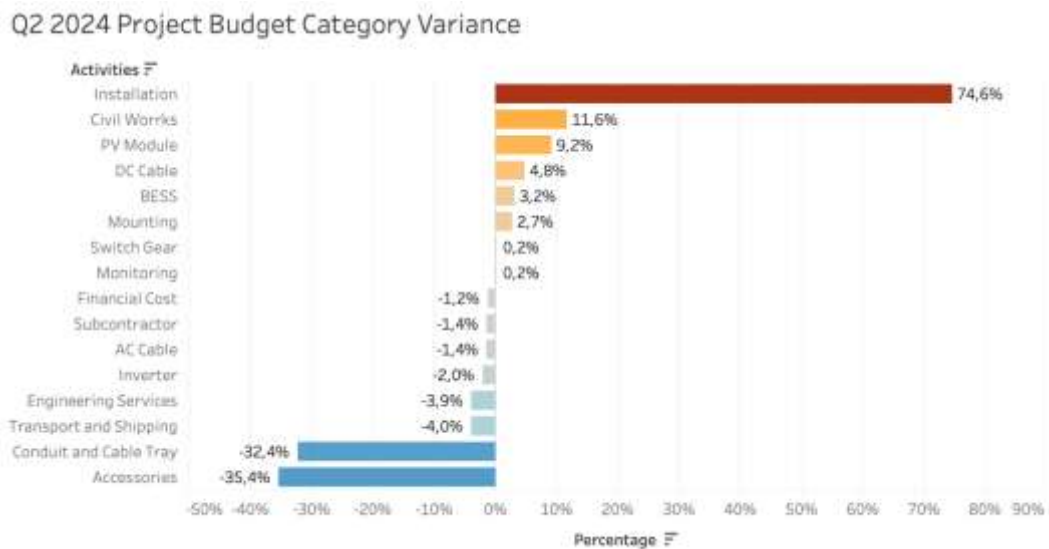


Figure 1. Q2 2024 Project Budget Category Variance

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#### - Theoretical Foundation

Based on guidance book that published by EU EP7 STEP UP project, Problem and Solution Tree is an overview analysis tool that facilitate complex challenges into solutions by detailing the cause and effect of the issues. This framework provides stages of problem/solution tree. The steps are defining the core problem, identifying the causes of the problem, identifying the consequences of the problem, developing a solution tree and using the tree to identify the opportunities and support project design.

MIT (Massachusetts Institute Technology) has released a Resource Framework that contain the issues and tools related to problem/solution framework. The study, Urban Upgrading, evaluates the situation in a developing country, from the root cause to the solution that impact the country. This study was describing the issues related to the urban situations. From the stakeholder view, the social condition, to the scope of the program. Briefly, the framework uses the tools to decide the priorities, planning, executing, until evaluating in upgrading the environment.

Kiss, L. (2024), Parrish, A-M., et al (2023), and Jahroh, S., et al (2022) were using problem and solution tree (PAST) analysis to outline, illustrate the problem. This research will focus on using the tree to state and visualized the problem and the solution.

#### Developing the Organizational Integration

Olsson, T., et al (2024) and Aubry, M. (2018) conduct research to acknowledge the impact of organizational integration in managing long-term target benefit in projects. Based on previous research, different mechanisms have been observed from each scope of the management and summarize into integrated system. The studies separate the linked mechanisms between project-to-organization, organization-to-project, project-to-project, and cross-organizational to cross-organizational. By these mechanisms, each has a function behind to integrate the targeted benefits.

Demirkesen, S., et al (2017) have seen that the impact on the framework in the integration management and project management in construction industry that have been proposed can be used. This research will use the integrate organizational as a beginning to future developing in project management.

#### Maintaining the Change

Jääska, et al (2025) concluded the relationship of change and project management for delivering organization changes. The change process includes the middle management and top management as a prior key to change the integrated system. The research was using change management, to directing furture developing in project management structure.

This research using the change management to create timeframe and activities for the company to sustain the change of the integrating implementation based on AlManei, M., et al (2024).

#### Company Problems

In Figure 2.1, gaps that occurred in the company most of it are connect and happened during installation and within projects activities. This research based on project department and the effect it has concerns the company as Chapter 1 in Figure 1.4, the overbudget and uncontrollable additional cost. For future analysis, this research is using situation within projects.

This research's conceptual framework divide by 5 stages. The Planning Stage that listing all the company problem, choosing the department related, and deciding the method. Choosing the method (Problem and Solution Tree) and preparing the question and scope are in the Preparing Stage. This research is using interview, FGD (Forum Group Discussion), observation as an intern, site's visit, and literature review as foundation.

Understanding the root caused and strings that connect through implementing Problem and Solution Tree, then making the implementation through designing the Organization Integration. To be able to implement the design, the changing management will describe the timeline frame and how to manage.

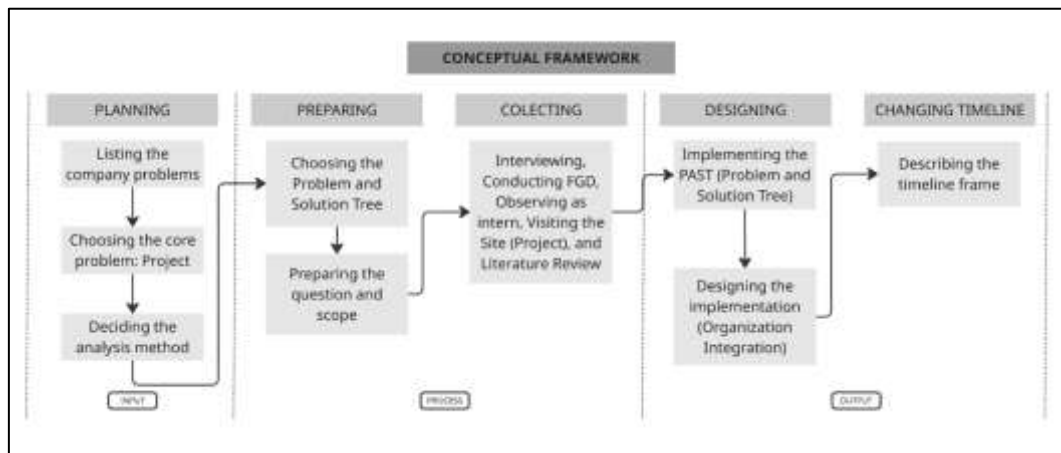


Figure 2. Conceptual Framework

## Research Method

This research is using qualitative method that the data collection gathered by semi-structure interview, forum group discussions and observation real-time in the company. The data collection started in early November 2024, until early January 2025 in ATW Sollar, Jakarta. The research is aimed to fill the gap in the company that has complexity in cross-department related.

## Research Design

This research is a qualitative research base on Walker, H., et al (2025) that conduct research of "Understanding the role qualitative methods can play in next generation impact assessment" stated about the method of qualitative is to, "the roles of qualitative methods is to integrating values and the perspectives, provide rich, contextual information, embracing and respecting complexity, supporting and broadening the scope." This research will analyse the data provided, process it through the Problem and Solution Tree and make the solution implacable.

## Data Collection Method

Stated in Chapter 2, this research using interview, FGD (forum group discussion), observation, and literature review. The data collection began as the writer become an intern that specify to solve the problem. Using semi-structure interview and CA (Conversational Analysis) (Junnier, F., 2024) to describe the situation, forum group discussion with the Project Manager and Supply Chain Manager, and President Director. Adapting with the help of books, framework and previous research, this case study analyses key factors, methodologies and provide insight that matter according to the gap.

## Data Analysis Method

The interview process began with several identical question related to the project continued with question related to the problems that happened cross-departments. Using the related data through uncontrollable additional expenses, in the problem tree the effects

and causes will be describe and in solution tree, it will have output, outcome, and the impact related to the problem tree.

Table 1. Question

Question	Code
What problem that occurred in the department related to the project?	Q1
Why the problem happens?	Q2
What cost does the department and the company loss?	Q3
What will be the right action to closen the gaps?	Q4
How it will closen the gaps?	Q5

The interview will sorting out the interview result and analysis and put into the Problem Tree. Based on EU (European Union) FP7 STEP UP Glasgow Learning Network, the Problem Tree in this research will consist of Core Problem that influence the Primary Cause which led to Secondary Cause, and the causes led to Primary Consequence that company suffered from.

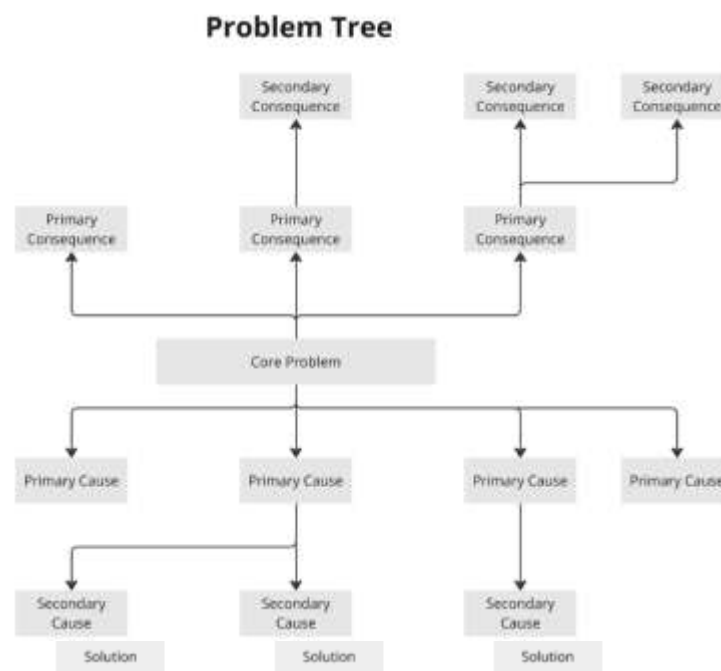


Figure 3. Problem Tree

## Result and Discussion

In this chapter, this research will be executing the methodology and its approach that explain in Chapter 2 and 3 based on previous research that had been done and stated in other research, framework, and books. The first sub-chapter elaborated the interview result with the problem tree. The analysis then continued with solution tree and organizational integration in the Business Solution sub chapter and implementation plan and justification with change management to maintain

### Analysis

The interview and observation focus on four questions from cross-department managers, staff, and supervisor to see different perspectives and the string that attached during projects. The answer comes in several times interview with different perspective to get broader scope in what happen.

Table 2. Question 1

Department	Q1. What problem that occurred in the department related to the project?
Project	Uncontrollable additional expenses and manpower, inconsistent's productivity and performance, uncontrollable risk management, unable to verify the situation that lead to adding the funds, delay materials and equipment, inconsistent performance of blue collar.
Procurement	Sudden change or delay in PR (Product Request) that delay the schedule, different perception in choosing the materials or the equipment,
Sales & Engineering	Different calculation between budgeting and actual cost, sudden change from end-user and developer.
Engineering	Delay giving the design and calculation and different calculation from the blue print and the site location
Site Team and SHE	Being stirred to accept the sudden request from the end-user and developer.
Finance	Uncontrollable urgent and important request that overbudgeting.
Stakeholder	Before the contract or MOU has been cleared there was a project that already begin.
Trading	Delay from procurement, shipping, and payment and unknown and uncoordinated change from procurement and finance that complicate the flow.

Table 3. Question 2

Department	Q2. Why the problem happens?
Project	Between the allocation and the actual situation were different, there were no individual performance's standard evaluation for site manager, blue collar, and supervisor, illegal street blackmailing into the site, late revision from Engineer team, no mitra database, no manpower grading, no work standard regulation, no risk management.
Procurement	Different approach from procurement team, they like to prioritize not only price but billing time and shipping time based on the project urgency,
Sales & Engineering	No closing project report to learn, no evaluation with cross-department, no constrain standard in handling the end-user and developer.
Engineering	Sudden change in design from end-user request with no constrain standard in handling.
Site Team and SHE	Less power comes from site team that did not have authorized to support to negotiate with the customer, led



Finance	to acceptance to any additional circumstances that disadvantageous for the company.
Stakeholder	There's an uncontrollable factor that happen during the project.
Trading	it connects with the government, the company must rush for getting all the permit between the half year term and start the calculation, procurement until the installment.
	Misscommunication and unintegrated follow-up while several project were running together.

Table 4. Question 3

Department	Q3. What cost does the department and the company loss?
Project	
Procurement	Delay, capital loss, margin decrease, penalty, water leak from the site, and conducting 2 years guarantee.
Sales & Engineering	
Engineering	
Site Team and SHE	Capital loss and delay.
Finance	Overbudget and delay
Stakeholder	Delay, capital loss, margin decrease, penalty, water leak from the site, and conducting 2 years guarantee.
Trading	Delay, capital loss, and end-user conflict.

Table 5. Question 4

Department	Q4. What will be the right action to close the gaps?
Project	Make: guideline reports, SOP PR, SOP Closing Project, Manpower Grading, SOP work method, assessment blue collar mitra (contract, socialization, summary project). Track project cost, document control, cross department knowledge and communication, and risk management regarding the instalment.
Procurement	Cross department knowledge.
Sales & Engineering	Evaluation after every projects, updated standard of budgeting.
Engineering	Cross department knowledge, updated information.
Site Team and SHE	Responsibility person in charge that have big influence in the project
Finance	Cross department update.
Stakeholder	Cross department update and evaluation after every projects.
Trading	Cross department update.

Based on the interview, the problem related to project in departments are perceived differently. Each of the problem will then be sort of into problem tree based on Figure 3.1. into causes and its consequences to clear the bias for the solution tree.



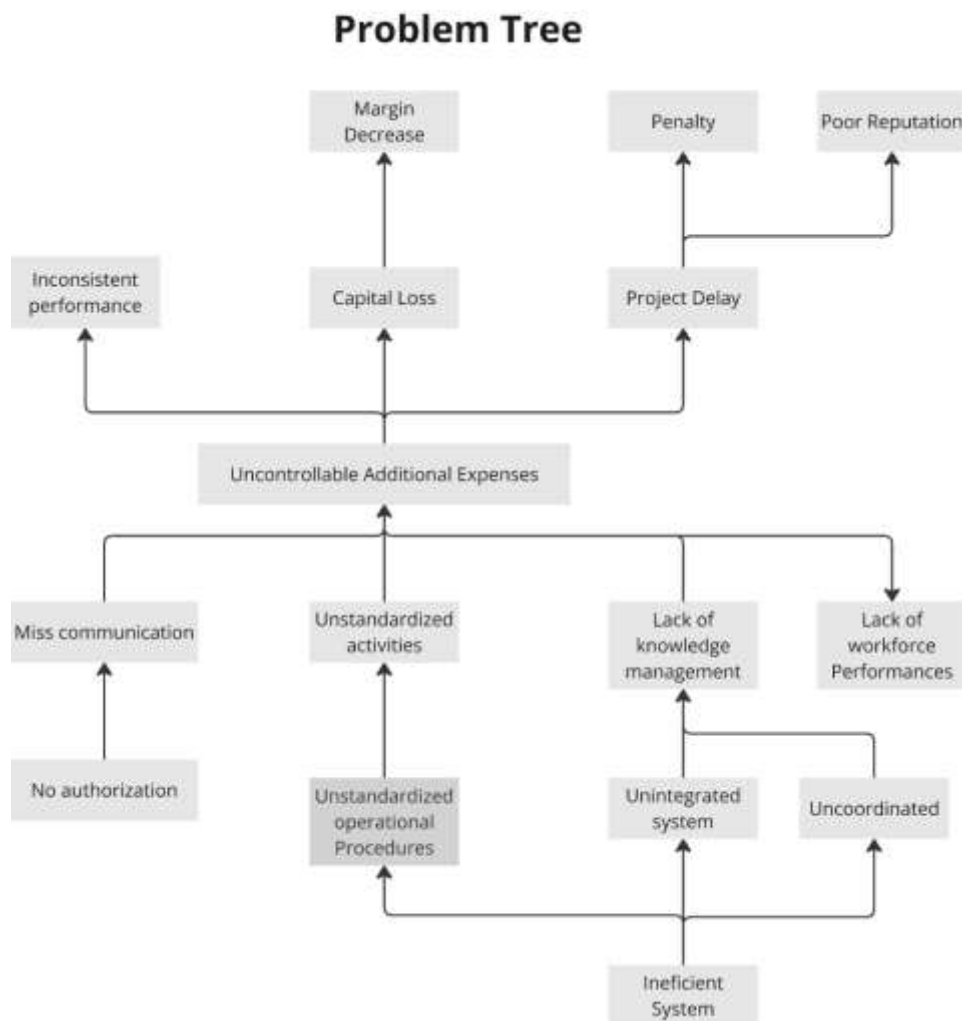


Figure 4. Problem Tree

Based sorting the issues from interview result, the causes of uncontrollable additional expenses are miss-communication that cause from no authorized person, unstandardized activities that cause from unstandardized operational procedure, lack of knowledge management from uncoordinated and unintegrated system, and lack of workforce performance. Then on the upper side of the tree, the consequences of those causes led to capital loss that led to margin decrease, inconsistent performance, and project delay that led to penalty and poor reputation.

The solutions of the causes are to make a better efficient system, by detailing and completing the standard procedure so that the function of the department can be standardize, integrated operation system and coordinated the cross department by conduct training to make sure that the knowledge management are being comprehended, then the last is to develop the workforce performance that being absence before.

The impact or the effects of the solutions to control and monitor the expenses are for the company to be able to calculate the risk management, to have more capital gain, to be able keep the schedule on track. These events can lead the company to gain more excellence services and margin for expanding the company.

## Solution Tree

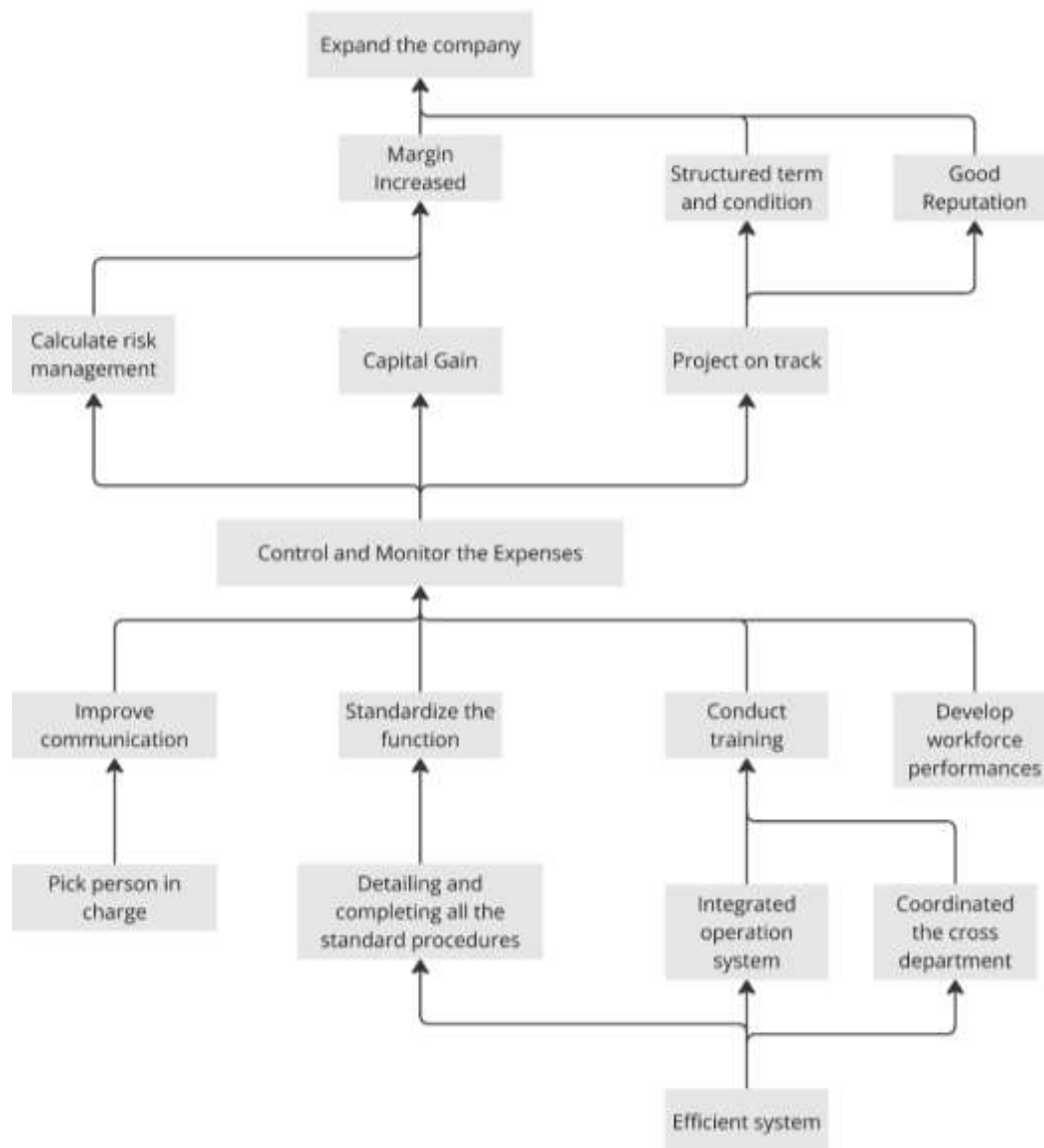


Figure 5. Solution Tree

Practical solution to address and picture the solution tree is for the company to arrange the standard operational procedure that needed and the function of it in the project and to have an integrated system picture. Based on the structure that have been conduct by Olson,T., et al (2024) and combine with the case situation and needs, here's the process model on integration for project .

The business model suggestion in organizational integration start with the goal of controlled and monitored expenses during project especially in installation. There are two main parts, between cross department with cross-project, and the organization with the project. In cross department with cross project, the function propose is to make the

interconnection sustain. Therefore, the function is to control the relations by having evaluation and knowledge management training.

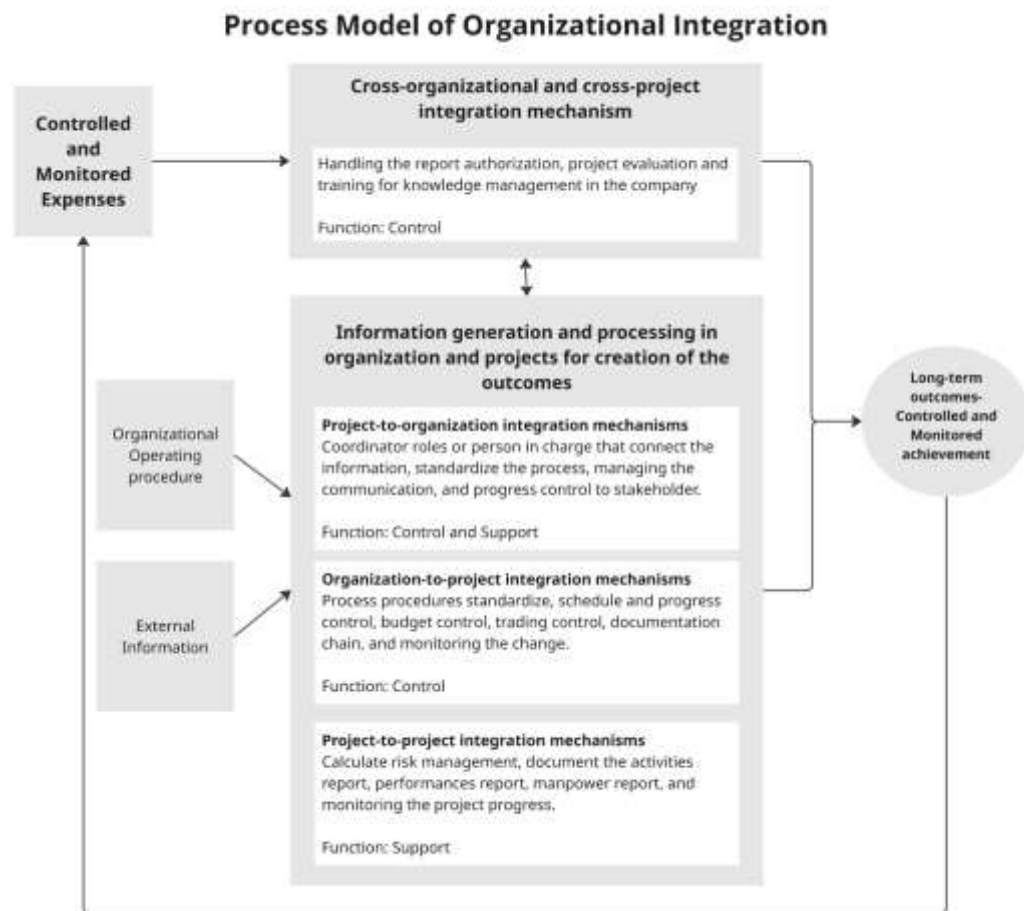


Figure 6. Process Model of Organizational Integration implementation

The second part is an integration between project and organization. The first section is project to organization. In this integration, it manages to strengthen the project department by having control roles yet supporting with the information regarding individual projects to other departments. The second section is cross department to project, the integration is to manage the standardization perception and operational procedure to be connect with the project team, like trading progress, schedule tracking, and budgeting control.

The last is between project to project, the integration are to calculate the risk management, including the standard of installation, how to prevent the leak after the activities, and more documenting manpower's performance, procedure, process and progress. This model will control and monitor the expenses, and this is outcome improvement for the company.

The implementation plan will be started with preparing for FGD with the managers and BOD with the agenda of starting the integration. Then after the approval, the manager will distribute the implementation plan within each department. Then each department will be developing the structure of SOP for standard, person in charge, and knowledge management,

progress, performance, and manpower report, and risk management calculation. After the documentation ready, the company will conduct second FGD with the implementation related to the document and for future communication system. Then each project will have an evaluation in the end for change.

## Conclusion

Answering research question, the primary causes of uncontrollable additional expenses based on Problem and Solution Tree are unintegrated and uncoordinated system, lack of standardize procedure, and miss communication in projects. Meanwhile, the system model is organizational integration where will improve the gaps with integrating the cross department and make it sustain for evaluating the closing project. This research's aim is for the expenses to be controlled and monitored to gain the margin and for the company to expand the business.

The recommendation for the company based on this research are to make sure the data and performances are well documented, the organizational integration is going well, and calculate the risk management. For the long-term recommendation, this research will be the beginning of developing project management office. In developing the PMO, the performance, scope, and flow of the project need to be documented and well structured. This research pointed out the gaps if the company want to conduct the PMO.

For the other researcher that have similar case study, the improvement needed in this research is to structure the literature review while conducting the interview for a holistic perspective.

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