

A Value-Driven Approach to Software Project Prioritization: Integrating AHP and Value-Focused Thinking in a Messaging Service Firm

Fauziah Firlita Ningsih¹, Meditya Wasesa²

^{1,2}School of Business and Management, Institut Teknologi Bandung, Jl. Ganesa No. 10, Bandung 40132, Indonesia

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ABSTRACT

As requests for development projects grow, a real-life messaging service firm faces increasing challenges in objectively prioritizing initiatives due to limited developer capacity and a high number of concurrent projects. These issues have resulted in inefficient resource allocation, delayed timelines, and declining customer satisfaction, exacerbated by unclear and unstructured project selection methods. This study proposes an integrated decision-making framework that combines the Analytical Hierarchy Process (AHP), stakeholder analysis, and Value-Focused Thinking (VFT) to address the firm's prioritization challenges. AHP structures the decision criteria and evaluates project alternatives based on their relative importance, stakeholder analysis identifies key decision-makers and their influence, and VFT ensures alignment with organizational values and strategic goals. To uncover underlying issues and stakeholder expectations, the study employs Problem Tree Analysis, structured interviews, and questionnaires. Four typical sub-project alternatives—Custom Projects, New Features, Bug Fixing, and Optimization—are assessed against four criteria: Cost, Quality, Functionality, and Client Satisfaction. The study concludes with an implementation roadmap and actionable recommendations to improve the firm's project selection and prioritization process.

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Corresponding Author:

Fauziah Firlita Ningsih,

Master of Business Administration,

School of Business and Management, Institut Teknologi Bandung, Indonesia

Email: fauziahfzhfn@gmail.com

1. INTRODUCTION

In today's digital landscape, providers of business messaging solutions play a pivotal role as key enablers of customer communication. These platforms support a range of use cases—from transactional alerts and customer service to marketing outreach—enabling businesses to maintain strong, real-time engagement with their clients. This critical role has intensified competition within the industry, where the ability to offer compelling, high-performing products is essential for sustaining market relevance and success.

From a software engineering standpoint, one of the most pressing challenges faced by messaging service providers is determining which product features should take development priority. Companies must strategically allocate their time and resources to initiatives that deliver the highest value to their users. Effective development requires not only adherence to project timelines but also a strong emphasis on functionality, performance, and resource efficiency. A well-structured prioritization approach fosters team alignment, enhances productivity, and ultimately improves client satisfaction.

This study focuses on a real-world business messaging provider facing significant priority management challenges. The company must balance rapid integration of third-party features to

remain competitive, respond to client-specific customization requests, resolve bugs, and implement service optimizations. As the organization scales, managing these diverse priorities becomes increasingly complex, requiring more sophisticated resource planning and decision-making frameworks. A failure to effectively manage development priorities can lead to misaligned efforts, delayed deliveries, and reduced client satisfaction.

This issue is evident in the company's recent performance data (see Figure 1). The completion rate for projects declined from 92.31% in 2023 to 89.33% in 2024. Simultaneously, the proportion of delayed and on-hold projects rose to 5.33% each. These trends underscore the operational strain caused by insufficient prioritization mechanisms and highlight the urgent need for improved strategies to optimize development workflows.

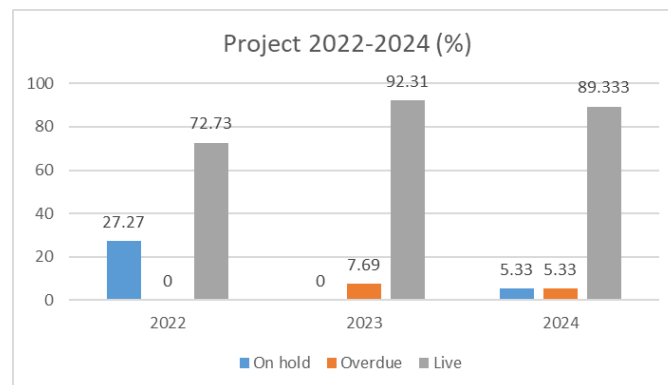


Figure 1. Project Completion Overview

Furthermore, customer satisfaction metrics—specifically Net Promoter Score (NPS) indicators—reveal declining ratings in critical service dimensions such as Service Quality and Customer Support Responsiveness (see Figure 2). These shortcomings suggest that the challenges in priority management are not only affecting internal operations but also undermining the customer experience. This reinforces the urgency for a more systematic and data-driven approach to project prioritization, enabling the company to make more objective decisions, allocate resources effectively, and address high-impact areas that directly influence client satisfaction.

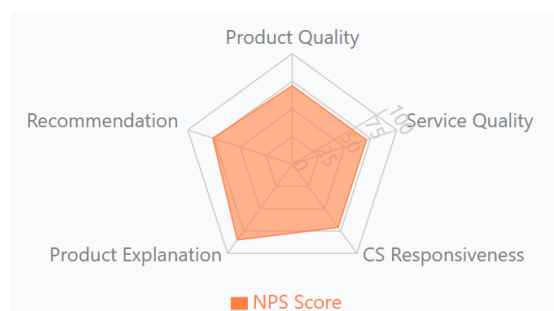


Figure 2. Net Promoter Score for Client Satisfaction

- RQ1: What are the views and expectations of key stakeholders regarding the prioritization of project development initiatives?
- RQ2: What alternative project development initiatives that warrant prioritization?
- RQ3: Which project development alternatives should be prioritized to best align with stakeholder expectations and organizational objectives?

By addressing these research questions through a structured decision-making framework, this study aims to tackle critical challenges such as improving operational efficiency, enhancing client satisfaction, and improving the company's competitive advantage.

2. LITERATURE REVIEW

Prior studies have examined decision-making practices in software development projects, particularly within agile environments and using structured prioritization methods such as the Analytic Hierarchy Process (AHP) and its extensions. [4], conducted a study employing the AHP method to prioritize agile practices and improvement goals in the software development process. The decision-making involved both IT and management teams, utilizing 20 agile practices from the Agile Practice Guide and 12 improvement objectives derived from the ISO/IEC 33014 standard as evaluation criteria. The study concluded that client involvement and timely decision-making were the most critical practices for improving the development process.

Similarly, [1] applied the Fuzzy AHP technique to identify factors contributing to cost overruns in agile-based software projects. The study categorized these factors into four key dimensions: people, process, project, and technology. Results showed that the "people" aspect carried the greatest influence (44.94%), with technical complexity and developer knowledge levels identified as dominant cost drivers. This finding highlights the significant role of human resources in determining the cost efficiency of agile initiatives.

An empirical investigation by [22], surveyed agile practitioners across various software development firms to identify commonly adopted requirements prioritization techniques. The study found that Cost-Value Ranking and Value-Oriented Prioritization were the most widely used approaches. Moreover, it emphasized that Product Owners and Project Managers typically serve as the primary decision-makers in the prioritization process.

In the realm of IT service management, [3], combined the AHP method with the Wisdom of Crowds approach to support decision-making in selecting between on-premises systems and Software-as-a-Service (SaaS) solutions. Conducted at a Brazilian higher education institution, the study formed a committee comprising IT and management representatives. Using preference aggregation and AHP, the findings indicated a preference for SaaS, particularly due to its advantages in security, cost-effectiveness, and operational efficiency.

In the financial sector, [5] applied AHP to identify critical success factors in information systems development projects. This study evaluated factors across three dimensions: organizational, technical, and project management. It concluded that project scope clarity and requirements management were the most decisive contributors to project success. Lastly, [2] proposed a hybrid prioritization model combining Cumulative Voting, AHP, and the MoSCoW method for Scrum-based projects. The model aimed to enhance product quality and reduce time-to-market by considering multiple criteria, including cost, value, risk, and delivery speed. Importantly, the approach also incorporated client input in the evaluation process. The study demonstrated that integrating multiple prioritization techniques can lead to more precise and balanced decision-making in requirement selection.

This research focuses on the prioritization process of business messaging service development projects, especially in the WhatsApp Business service provider company. Although practical problems were observed in the company, this study addresses wider issues commonly to IT service providers operating in dynamic environments with overlapping project demands and diverse stakeholder expectations. Instead of offering a solution with interrelated contexts, this study contributes a transferable decision-making framework, by integrating Value-Focused Thinking (VFT), AHP, Stakeholder Analysis, and Problem Tree Analysis. This hybrid framework serves as a novel methodological contribution by showing how stakeholder values can be systematically transformed into project selection criteria, extending the theoretical application of AHP from fixed factor prioritization to value-based decision modeling. The integration of these approaches is more than technical, but rather integration at a conceptual level as well that offers an organized yet flexible model and can help other service-based digital platforms beyond the scope of this research. This research, as part of several studies considering prioritization in the context of messaging services, looks at the gap by putting in place a tool to guide decisions in the context of the emerging digital communications industry. The framework can be supported by AHP softwares allowing replication in other organizations with the same or similar prioritization challenges adding to the theoretical importance and practical usefulness of this research.

Table 1. Related Literature Overview

Study	Year	Method	Context	Key Contribution	Multi-method	Software Implementation	Corporate/Company Level	Cross-Context Applicability
[4]	2024	Analytical Hierarchy Process (AHP)	Agile software development	Prioritized agile practices and improvement objectives	No	Yes	Yes	Yes
[1]	2023	Fuzzy AHP (Analytical Hierarchy Process)	Agile software development	Identified cost overhead factors using 4Ps framework	No	Yes	No	Yes
[22]	2020	Empirical Survey (Quantitative)	Agile software development	Guidelines for requirement prioritization techniques	No	No	Yes	Yes
[3]	2015	Consensus-based AHP, crowds theory	IT management committees in telecommunications	Group decision-making in IT committees	No	No	Yes	No
[5]	2021	Analytical Hierarchy Process (AHP)	IT projects in financial sector	Criteria Success Factors for financial sector IT projects	No	No	Yes	Partial
[2]	2016	Cumulative Voting, MoSCoW, Analytical Hierarchy Process (AHP)	Agile (Scrum) software development	Quality optimization through requirement prioritization	Yes	Yes	No	Yes
This study	2025	Value-Focused Thinking (VFT), Analytical Hierarchy Process (AHP), Stakeholder Analysis, Problem Tree Analysis	Project development in Messaging Service Firm	Structured prioritization framework integrating value identification, problem analysis, and decision hierarchy	Yes	Yes	Yes	Yes

This study differs from previous research by combining three methods: VFT, AHP, Stakeholder Analysis and Problem Tree Analysis specifically for business messaging service projects. While other studies focus on general IT or software development, this research applies VFT-AHP to WhatsApp Business providers using data from literature review, stakeholder interviews, and questionnaire surveys. The VFT approach identifies stakeholder values and converts them into objectives, AHP provides systematic weighting for cost, quality, functionality, and client satisfaction criteria, while Problem Tree Analysis maps decision-making bottlenecks. Super Decision software supports calculations and scenario testing to enhance practical implementation. This research contributes three main outcomes: a prioritization framework for messaging service projects, validation of VFT-AHP integration in Indonesian companies, and practical guidelines for structured decision-making in technology services. The study fills an important gap by being the first to examine project prioritization specifically in business messaging services, with applications for similar companies worldwide.

3. RESEARCH METHOD

The initial stage of this research focuses on exploring and understanding the core business issue faced by the company. Through preliminary observations and analysis of current business conditions, early symptoms of the problem are identified to support the formulation of specific and relevant research questions. This stage highlights the urgent need to address the company’s difficulties in balancing the quick implementation of new features, handling client customization requests, responding to bugs from customer complaints, and optimizing systems, if left unaddressed, may disrupt operational efficiency and harm client relationships. The research then

proceeds to define the core problem in a specific and measurable way, aiming to uncover the root causes that significantly affect the company's strategy and performance. Data is collected through semi-structured interviews, direct observations, and secondary sources. Observations focus on the operational activities of the engineering team, while interviews with key stakeholders gather insights into decision-making processes and stakeholder influence. Secondary data from literature and technical documents further support the findings. All data is then analyzed to develop prioritization criteria, which are applied in AHP to ensure strategic alignment with business needs.

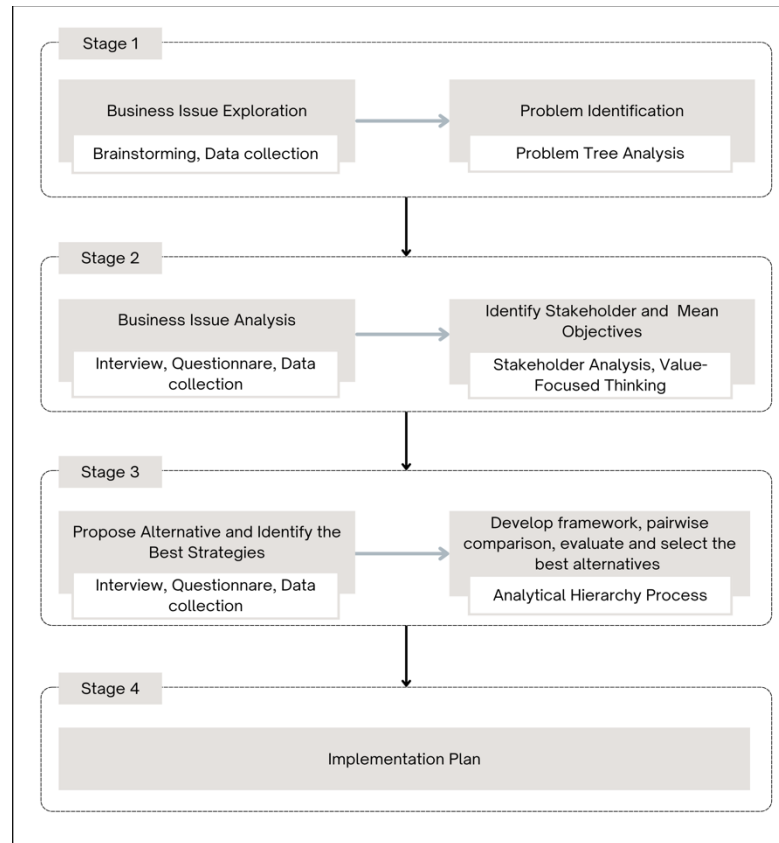


Figure 1. Research framework

3.1. Stakeholder Analysis

The quantitative method in stakeholder analysis focuses on objectively evaluating each stakeholder's influence and interest levels. This approach uses numerical data collected through discussions, observations, surveys, or available records to rate stakeholders on a scale from 1 to 4 (refer to Table 2). The scoring system measures two critical aspects: the stakeholder's capacity to impact project outcomes (power) and their degree of the project's achievements (interest).

Table 2. Power and Interest Rating

Scale	Level of power	Level of interest
1	Low	Low
2	Moderate	Moderate
3	High	High
4	Very High	Very High

The combined scores for each stakeholder's interest level and power level are added together and then averaged using equation (1). This calculation produces the final values $\bar{Y}$ and $\bar{X}$ for each stakeholder. Equation (1) is applied because multiple key participants assess both the interest and power levels. The next step involves summing the results from equation (1) and then averaging them using equation (2), produce the values $\bar{\bar{Y}}$ and $\bar{\bar{X}}$. The results obtained from equation

(2) give the values $\bar{Y}$ and $\bar{X}$, which act as the boundary markers for different zones in Cartesian diagrams.

$$\bar{X} = \frac{\sum X_i}{n}; \bar{Y} = \frac{\sum Y_i}{n} \quad (1)$$

$$\bar{\bar{X}} = \frac{\sum \bar{X}_i}{k}; \bar{\bar{Y}} = \frac{\sum \bar{Y}_i}{n} \quad (2)$$

Where X_i represents the numerical measurement of the i -th interest level; Y_i shows the numerical measurement of the i -th power level; $\bar{X}$ indicates the mean value of interest; $\bar{Y}$ represents the mean value of power; $\bar{\bar{X}}$ is described as the average of the mean value of interest; $\bar{\bar{Y}}$ is described as the average of the mean value of power; n shows the total number of key respondents; and k shows the total number of stakeholders involved (see Table 3).

Table 3. Power and Interest Rating Aggregation

Stakeholder	Level of Interest			Level of Power				
	X_1	X_2	X_i	$\bar{X}$	Y_1	Y_2	Y_i	$\bar{Y}$
1	...	...	...	...	...	...	...	...
2	...	...	...	...	...	...	...	...
k				$\bar{\bar{X}}$				$\bar{\bar{Y}}$

After calculating boundary values $\bar{\bar{X}}$ and $\bar{\bar{Y}}$, each stakeholder is plotted on a power-interest grid using their power level (Y_i) and interest level (X_i) value. The matrix (see Figure 4) divides stakeholders into four groups: Minimal Effort (bottom-left), Keep Informed (top-left), Keep Satisfied (bottom-right), and Key Players (top-right), where horizontal = interest and vertical = power.

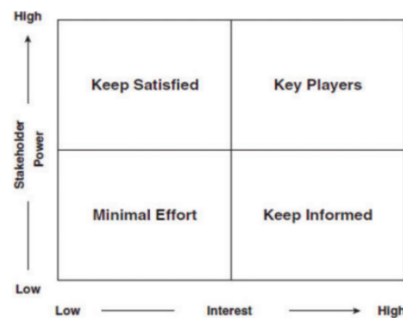


Figure 2 Power Interest Matrix

This conduct enables the company to incorporate appropriate management strategies accomodatinh different stakeholder groups. These strategies may include providing adequate information, maintaining high satisfaction levels, or involving stakeholders directly in decision-making processes.

3.2. Analytical Hierarchy Process

The AHP method employs a structured pairwise comparison technique to evaluate and rank various criteria or alternatives. In this approach, criteria identified through qualitative research are organized for AHP analysis and each criterion is compared against others based on its relevance to research objectives. Numerical values are assigned using a standardized importance scale (see Table 4).

Table 4. AHP Pairwise Rating

Importance Score	Definition	Meaning
1	Equal importance	Both elements contribute equally
2	Slightly favored	One element is marginally preferred
3	Moderately favored	Clear but not overwhelming preference
5	Strongly favored	One element is significantly preferred
7	Very strongly favored	Clear dominance of one element
9	Extremely favored	Maximum preference difference between elements
Intermediate values (4,6,8) represent gradations between these levels		

Note: Source: Saaty (2008)

Following data collection from questionnaires, the information needs to be organized into pairwise comparison matrix. This involves first compiling each respondent's numerical ratings at both criteria and alternative levels before generating the final comparison tables.

Each respondent column's numerical value is entered as follows:

- In column R1, rows C1-2 are completed based on the numerical value (round number) of respondent 1's selection if respondent 1 (R1) selects Criteria 1 (C1), which is superior than Criteria 2 (C2);
- In column R2, rows C1-2 are completed with formula: 1 divided by the numerical value of respondent's choice 2 (formula: $1/[\text{numerical value R2}]$) if Respondent 2 (R2) selects Criteria 2 (C2) over Criteria 1 (C1).

The geometric column means the geometric mean using equation (3):

$$\bar{R} = \sqrt[n]{R_1 \times R_2 \times R_3 \times \dots \times R_n} \quad (3)$$

Where $\bar{R}$ represents the geometric mean; R_n shows pairwise comparison results per criterion; n shows the total number of key respondents; and k shows the total number of criteria. The pairwise comparison outcomes are then examined to build comparison tables and establish priority weights for each criterion. This AHP methodology provides a systematic, quantifiable structure for decision analysis that maintains objectivity and clarity.

4. RESULTS AND DISCUSSION

4.1. Problem Identification

With the non-optimal project prioritization process, problems started to develop and based on discussion sessions with Subject Matter Experts and a review of the existing research, it can be concluded that several factors contribute to the non-optimal project prioritization, such as:

Technical Factors

This factor plays a key role in project prioritization. A major challenge is the mismatch between project complexity and developers' technical skills. Most developers spend their time fixing errors and handling custom requests from clients, which causes new feature development—whether from third-party sources or internal optimization—to be overlooked. The product development roadmap depends heavily on external vendors since in-house developers are mainly focused on client-related work. This creates both dependency and quality risks. Consequently, key elements such as scalability and system performance are often underprioritized, slowing down the technical advancement of the product.

Financial Factors

Financial considerations also impact project prioritization, as the company currently focuses on numerous short-term revenue-generating projects. Several respondents observed that projects are frequently prioritized based on potential revenue, leading to a tendency to overlook long-term core product investments. This revenue-driven selection can result in budget overruns due to frequent revisions caused by misaligned expectations with technical capabilities. Additionally, some projects had to be terminated because key team members resigned, or clients canceled custom project requests. These conditions led to financial losses and inefficient resource allocation, especially among developers.

Management Factors

Project management created barriers to building successful cooperation between technical and management teams. The lack of clear project ranking standards resulted in decisions that were short-term and difficult to measure. Poor communication structures and insufficient stakeholder oversight raised the chances of project failure. There was also an uneven relationship between the product team and business team, as evaluation standards favored external stakeholders like clients, who received more attention than product requirements. The business division often accepted client demands, making commitments that exceeded their technical abilities.

Strategic Factors

Short-term and immediate decisions that ignore future consequences are strategic elements that limit growth. The product lost market competitiveness because creating new features was delayed focusing on client projects that promised quick profits. Strategic choices frequently put

aside the product development plan to satisfy client needs, even when the long-term investment benefits were minimal, as seen with customization projects. One client was thought to bring a significant income contribution. Ignoring projects with long-term strategic benefits causes the company to fall behind in innovation and ongoing system development.

4.2. Stakeholder Analysis

Based on the stakeholder analysis, a mapping of the various parties involved or affected in the prioritization process of development projects in the company is obtained. Stakeholders are mapped based on two main dimensions, namely the level of interest and the level of influence on the decision-making process. From the mapping results (see Figure 5), stakeholders who are in the high interest - high power quadrant are Product, Engineering, Meta (WhatsApp), Project Management and Business Development teams, which have an important role in conveying needs and setting the direction of project priorities.

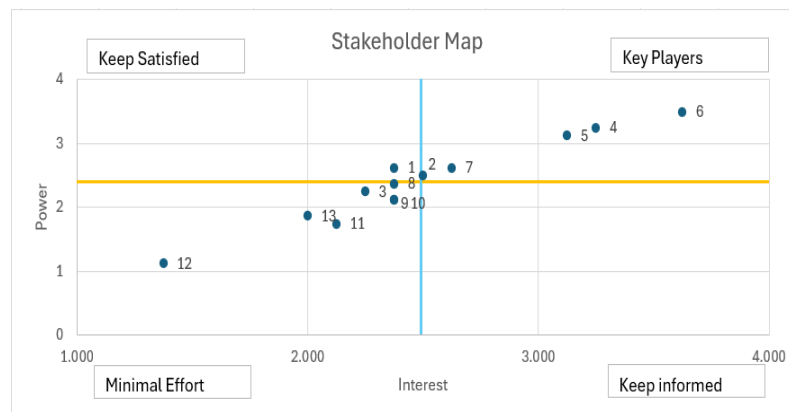


Figure 3. Stakeholder Mapping (Interest and Power Matrix)

Table 5. The Calculation of Stakeholders' Level of Interest and Power

No	Stakeholder	Level of Interest $\bar{X}$	Level of Power $\bar{Y}$	Category
1	Client	2.375	2.625	Keep Satisfied
2	Meta / Whatsapp	2.500	2.5	Key Players
3	Telco / Operator	2.250	2.25	Minimal Effort
4	Engineering / Developer	3.250	3.25	Key Players
5	Product	3.125	3.125	Key Players
6	Project Management	3.625	3.5	Key Players
7	Business Dev	2.625	2.625	Key Players
8	Vendor	2.375	2.375	Minimal Effort
9	Tester	2.375	2.125	Minimal Effort
10	System	2.375	2.125	Minimal Effort
11	NOC	2.125	1.75	Minimal Effort
12	Customer Service	1.375	1.125	Minimal Effort
13	Support	2.000	1.875	Minimal Effort
		$\bar{X} = 2.49$	$\bar{Y} = 2.40$	

Table 6. Stakeholders' Level of Interest and Power

No	Stakeholder	Expectation for the Projects
1	Client	Project finished on schedule; Product meets quality standards; Project expenses remain within budget; Transparent communication throughout the project.
2	Meta / Whatsapp	Compliance with platform standards; proper prioritization of key features; Seamless integration.
3	Telco / Operator	Scalable and optimized systems; No service disruptions; Minimized delays.
4	Engineering / Developer	Well-organized development approach; Clear feature priorities; Sufficient time given for fixing errors and creating new features; Maintaining balance between complexity and team abilities; Clear design specifications and requirements.
5	Product	Product development plan followed regularly; Strategic features receive priority; Product stays competitive in the market; Ongoing innovation receives strong support from effective processes.
6	Project Management	Balance between client demands and product goals; Cost efficiency; Fewer planning errors; On-time delivery; Effective team coordination; Reduced reliance on vendor.
7	Business Development	Competitive product offerings; Active client involvement; Reduction of vendor dependency.
8	Vendor	Clear alignment between expectations and technical capabilities; Minimal scope changes; Smooth collaboration with the project team.
9	Tester	Prevention of design and planning errors; Effective team coordination and communication.
10	System	Seamless system integration; Enhanced system efficiency and expandability.
11	Network Operation Center	System reliability and enhancement; Reduced service interruptions.
12	Customer Service	Clear client communication; Reduced service delays.
13	Support	Clear client communication; Reduced service delays.

By identifying where each stakeholder stands, organizations can develop suitable involvement methods to ensure the prioritization process becomes more transparent and effective.

4.3. Value-Focused Thinking

This study serves as a crucial foundation for creating a more comprehensive communication and decision-making method. Mean-objectives hierarchy is recognized as a helpful tool in identifying the fundamental goals of this research. At the highest level, the core objectives include are “Selection the Best Alternatives of Project Management Prioritization” and at the second level, the mean objectives are including:

- Optimizing Project Cost,
- Maximizing Project Quality,
- Maximizing Functionality of the Product,
- Maximizing Client Satisfaction

The AHP structure hierarchy model will be created using the criteria that are determined from these mean objectives. Table 7 shows the outcomes of converting the mean objectives to AHP criteria.

Table 7. Mean-objectives and Criteria

No	VFT (Mean Objective)	AHP Criterion	Details
1	Optimizing Project Cost	Cost	Focuses on managing project expenses by reducing poor cost management, cutting unexpected cost increases, maintaining balance between immediate and future investments, and improving financial resource distribution.
2	Maximizing Project Quality	Quality	Focuses on reducing design and planning mistakes, enhancing system reliability and enhancement, and improving time management for error corrections and new feature creation.
3	Maximizing Functionality	Functionality	Focuses on speeding up the creation of strategic features, improving product market competitiveness, and building capacity for ongoing innovation.
4	Maximizing Client Satisfaction	Client Satisfaction	Focuses on better stakeholder management, maintaining balance between client requirements and product plans, reducing delivery delays, and enhancing communication clarity with clients.

While the four objectives were developed to reflect the values of key stakeholders, there can also be trade-offs between them in practical implementation. Table 7 outlines how each objective translates into evaluation criteria that can compete. For example, optimizing project costs requires reducing unnecessary spending and avoiding unexpected budget increases. However, this effort may also conflict with the goal of maximizing functionality, which often involves adding complex or strategic features that may involve additional resources or longer development time. Similarly, efforts to maximize project quality such as reducing design errors and improving system reliability can result in increased costs or delays and can also affect client satisfaction, especially when clients expect often updates.

In addition, a focus on client satisfaction, which includes timely delivery and clear communication, may limit opportunities for process innovation if too much pressure is placed on short-term response rather than long-term improvement. The examples show that all four objectives must be balanced by decision-makers depending on the project context. This study helps to make this trade-off more explicit by determining the degree of importance of each objective, so that stakeholders can understand how different priorities influence the final decision.

4.4. Generate Alternatives

The VFT study mentioned before seeks to help decision-makers concentrate on the primary goals and key purposes that affect the decision-making process. After finding the issue and choosing the standards that matter for the assessment, a value-based approach is specifically used to create different options that match these standards. Following individual discussions with Subject Matter Experts, research was done to examine possible different approaches regarding project ranking to achieve basic goals (referred to as "Selection the Best Alternatives of Project Management Prioritization "). The study revealed that there are four different project alternatives that could be implemented, namely:

1. Custom Projects from the client,
2. Developing New Features from Third parties (e.g. Meta and Operator)
3. Bug Fixing,
4. System Optimization

With the help of VFT analysis, it is also possible to reframe the meaning and purpose of each alternative. For example, bug fixing is considered a strategy to improve long-term system quality and client trust, which supports the value of quality and client satisfaction. Optimization encompasses not only technical performance metrics but also achieving functionally relevant cost efficiency. This illustrates that VFT is applied to not only establish the metrics of importance, but also through the application of VFT to derive more thorough insights and enhanced analyses of every alternative makes for improved strategic decision-making.

4.5. Analytical Hierarchy Process

Create Hierarchy Structure

To determine which alternatives issues should be prioritized to optimize so that existing projects can be carried out according to existing needs. The research employs the AHP method, with its hierarchical structure illustrated in Figure 6.

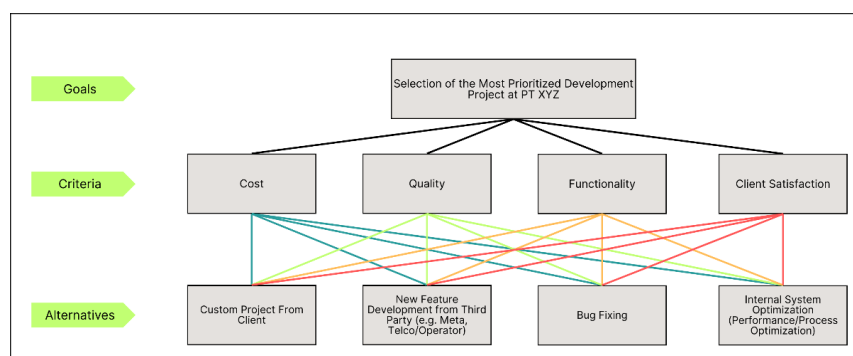


Figure 1. Hierarchy Structure

Create Pairwise Comparison

To create pairwise comparison process involved transferring the previously identified criteria and alternatives into a structured questionnaire, which was then completed by selected respondents who provided their ratings for each comparison table. During interviews with the seven SMEs (Subject Matter Experts), specific values for pairwise comparisons of both criteria and alternative solutions were collected from each expert. Following this data collection, the research team applied the formula in equation (3) to calculate the average values of these pairwise comparisons from each SME. These calculations produced two key sets of results: Table 8, which presents the pairwise comparison of criteria, and Table 9, which shows the alternatives in pairwise comparison.

Table 8. Pairwise comparison for Criteria

No	Criteria	Respondent							Mean
		R1	R2	R3	R4	R5	R6	R7	
1	Cost - Quality	3	1	0.2	3	1	1	1	1.457
2	Cost - Functionality	1	1	0.2	1	3	1	0.125	1.046
3	Cost - Client Satisfaction	0.33	1	0.33	0.33	1	1	0.125	0.589
4	Quality - Functionality	1	1	0.33	1	1	1	1	0.905
5	Quality - Client Satisfaction	1	1	3	1	1	1	1	1.286
6	Functionality - Client Satisfaction	1	1	2	1	0.33	1	7	1.905

Table 9. Pairwise comparison for Alternatives

Criteria	Alternatives	Respondent							Mean
		R1	R2	R3	R4	R5	R6	R7	
Cost	Custom - New Feature	1	1	0.167	0.2	0.5	1	0.143	0.573
	Custom - Bug Fixing	1	0.25	0.167	0.33	0.33	0.5	0.143	0.389
	Custom - Optimize	0.33	0.25	0.167	0.25	0.33	1	0.125	0.351
	New Feature - Bug Fixing	1	0.25	0.25	3	0.33	0.5	0.143	0.782
	New Feature - Optimize	1	0.25	1	0.33	0.33	0.5	1	0.631
	Optimize - Bug Fixing	1	0.25	1	1	0.25	0.5	1	0.714
Quality	Custom - New Feature	1	1	0.125	0.33	1	1	0.111	0.653
	Custom - Bug Fixing	0.20	0.25	0.143	0.25	0.33	0.5	0.111	0.255
	Custom - Optimize	0.20	0.25	0.143	0.25	0.33	0.5	0.125	0.257
	New Feature - Bug Fixing	1	0.25	0.2	3	0.33	0.5	0.111	0.771
	New Feature - Optimize	1	0.25	0.2	0.33	0.33	0.5	0.125	0.392
	Optimize - Bug Fixing	1	0.25	3	2	0.33	0.5	1	1.155
Functionality	Custom - New Feature	1	1	0.2	1	1	1	0.111	0.759
	Custom - Bug Fixing	0.11	0.25	0.2	0.33	0.33	0.5	0.111	0.263
	Custom - Optimize	0.11	0.25	0.2	0.33	0.33	0.5	0.111	0.263
	New Feature - Bug Fixing	1	0.25	0.2	0.25	0.33	0.5	0.111	0.378
	New Feature - Optimize	1	0.25	0.2	3	0.33	0.5	0.111	0.771
	Optimize - Bug Fixing	1	0.25	0.2	3	0.33	0.5	1	0.898
Client Satisfaction	Custom - New Feature	1	1	0.143	4	0.5	1	0.111	1.108
	Custom - Bug Fixing	1	0.25	0.143	0.33	0.33	0.5	0.111	0.382
	Custom - Optimize	1	0.25	0.143	3	0.33	0.5	0.111	0.762
	New Feature - Bug Fixing	1	0.25	0.167	0.25	0.33	0.5	0.111	0.373
	New Feature - Optimize	1	0.25	0.143	3	0.33	0.5	0.111	0.762
	Optimize - Bug Fixing	1	0.25	7	0.33	0.33	0.5	1	1.488

Synthesize the Best Alternatives

Next, analyzing the outcomes based on the pairwise comparisons performed across both criteria and alternative levels (refer to Table 8 and Table 9) are synthesized using Super Decision AHP software, as seen in Figure 7.



Figure 2. Best Decision Determination Using Super Decision Software

Priority Ranking

The collected data was processed using Super Decision software to establish priority rankings for both criteria and alternative options, as illustrated in Figure 8.

Clusters	Nodes	1Prioritization project and product development	1Cost	2Quality	3Functionality	4Client Satisfaction
1Goals	1Prioritization project and product development	0.000000	0.000000	0.000000	0.000000	0.000000
2Criteria	1Cost	0.243968	0.000000	0.000000	0.000000	0.000000
	2Quality	0.229726	0.000000	0.000000	0.000000	0.000000
	3Functionality	0.292369	0.000000	0.000000	0.000000	0.000000
	4Client Satisfaction	0.233937	0.000000	0.000000	0.000000	0.000000
3Alternatives	1Custom Projects	0.000000	0.122564	0.098759	0.104675	0.174906
	2New Feature	0.000000	0.222978	0.183227	0.176173	0.165271
	3Bug fixing	0.000000	0.286987	0.343955	0.379141	0.418327
	4Optimize	0.000000	0.367472	0.374059	0.340011	0.241496

Figure 8. Priority Ranking

Consistency Ratio

An important factor in assessing decision quality is verifying whether the decision-maker's judgments remain consistent during the pairwise comparison process. Using Super Decision AHP software, the consistency ratio was calculated. The results (shown in Table 10) indicate values

below 0.1 for both criteria and alternative levels, confirming that the respondents' pairwise comparisons are consistent and acceptable.

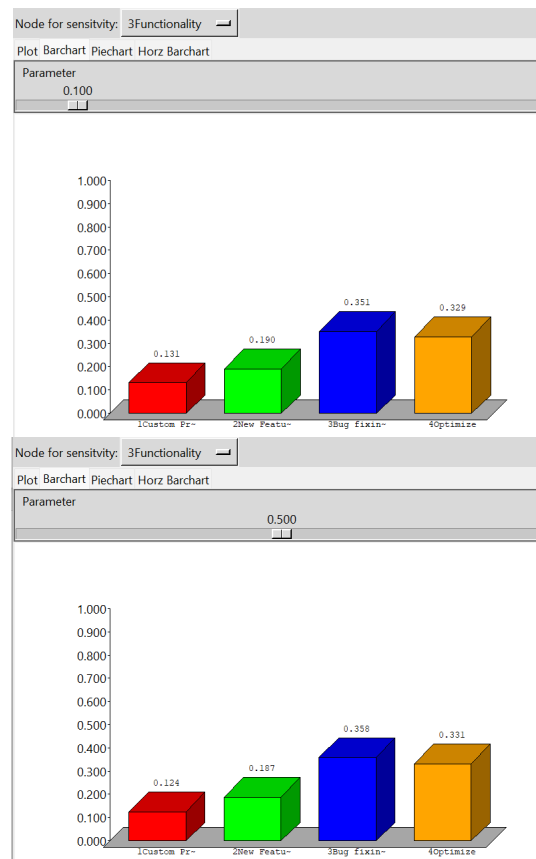
Table 10. Consistency Ratio Calculation

Evaluation Area	Consistency Ratio Value in Super Decision Software	Standard Consistency Ratio Threshold	Results
Level 1 Pairwise Comparison	0.07125	CR < 0.1	Acceptable
Level 2 Pairwise Comparison			
Cost	0.00212	CR < 0.1	Acceptable
Quality	0.02735	CR < 0.1	Acceptable
Functionality	0.03159	CR < 0.1	Acceptable
Client Satisfaction	0.00476	CR < 0.1	Acceptable

Name	Graphic	Ideals	Normals	Raw
1Custom Projects		0.346925	0.124110	0.062055
2New Feature		0.521777	0.186662	0.093331
3Bug fixing		1.000000	0.357742	0.178871
4Optimize		0.926606	0.331486	0.165743

Figure 3. Alternatives synthesize priorities from super decision

To ensure consistency of the decision-making results, a sensitivity analysis was performed using Super Decisions software by adjusting the weight of the Functionality criteria as the most valuable criteria. As shown in Figure 10, the priority scores of the four alternatives are recalculated at different weight values: 0.1, 0.5, and 0.9 for the Functionality criteria. The results show that the priority scores or the overall ranking order of the alternatives have changed slightly. Bug Fixing is still ranked first, followed by Optimize, New Feature, and Custom Projects.



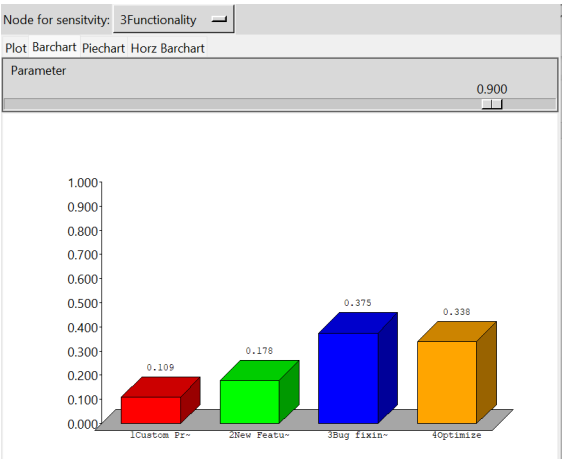


Figure 10. Sensitivity Analysis of Functionality Criteria

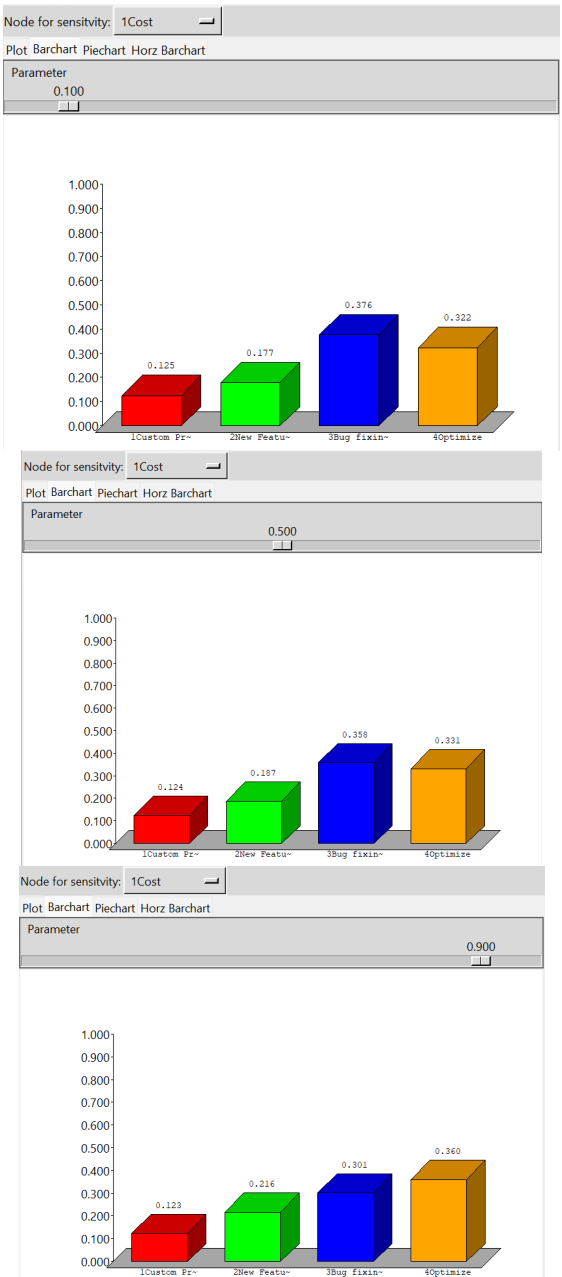


Figure 11. Sensitivity Analysis of Cost Criteria

However, for the Cost criteria when recalculated with different weight values: 0.1, 0.5, and 0.9 the results show that the priority value or overall ranking order of alternatives changes and is different from the results of the Functionality criteria. The Figure 11 shows that when the weight for Cost is 0.9, the order of alternatives changes to Optimize, Bug Fixing, New Feature and Custom Projects.

This indicates that certain criteria have a greater influence on the decision outcome compared to other criteria, even when all Consistency Ratios are below the 0.1 threshold. Therefore, although the CR value confirms an acceptable level of consistency, from the results of this sensitivity analysis it can be seen how small inconsistencies or shifts in importance can affect the decision outcome, especially for certain dominant criteria. This complements the CR assessment and improves understanding of the reliability of the model.

4.6. Discussion

The analysis results from Super Decision's AHP processing reveal that the combined pairwise comparison outcomes (shown in Figure 9) comprise:

1. Bug Fixing : 35.77%
2. Optimization : 33.14%
3. New Feature : 18.66%
4. Custom Projects : 12.41%

The evaluation results demonstrate that Bug Fixing scores highest, establishing it as the primary development priority in accordance with stakeholder needs. The findings on development priorities were then used as the basis for implementing a project prioritization framework, which focuses on bug fixing and system optimization. The results of the implementation of the project prioritization framework that prioritized bug fixing and system optimization showed a significant increase in the 2025 NPS score to 88%, an increase of 13% from the previous year.



Figure 10. Current NPS Score

The highest aspects were found in the assessment of product explanations (98%) and the level of likelihood of recommendations for services (97%), so decisions based on system stability by prioritizing bug fixing and optimization projects have a positive impact on customer assessment of the services provided.

5. CONCLUSION

This study provides a framework for software engineering task prioritization a real-life messaging service firm. This research fills important gaps in IT project priority setting studies by providing practical insights for messaging service companies in competitive digital markets. The study expands AHP method use by including viewpoints from technical teams, management, and client-service departments. It presents a new framework balancing technical problem management (bug fixing and optimizing system) with business growth activities (new features and customization). The findings challenge the common belief that new feature development should always come first, providing evidence that technical stability and system improvement deliver greater long-term value for organizations and clients.

Research results offer practical applications for different management levels. Top-level management should use data-based decision-making by applying AHP results showing Bug Fixing (35.35%) and Optimization (32.14%) as the highest priorities, requiring change toward stability-focused development. IT departments must distribute resources based on priority weights, creating special teams for bug fixing and system improvement. The Project Management Office needs clear escalation processes for priority changes with dashboard monitoring systems. Finance departments should adjust budgeting from project-based to flexible approaches, considering cost factors represent 26.42% of considerations. Development teams should include preventive maintenance through DevOps and automated testing, while business teams must manage client expectations by clearly communicating stability priorities over new features.

This study has several limitations providing future research opportunities. The research focuses on a single case study, limiting findings application to other messaging companies or industries. The AHP method relies on subjective expert opinions that may introduce bias. Future research should develop dynamic models automatically adjusting priority weights based on real-time conditions and development phases. Research is needed to identify measurable connections between priority setting implementation and business improvements like revenue growth, customer retention, and efficiency measures. Exploring combined approaches mixing AHP with methods like TOPSIS or Fuzzy Logic could improve accuracy. Future studies should investigate external factors impact such as regulation changes, technology trends, and market expectations on priority setting dynamics, enabling organizations to develop adaptive strategies for changing business environments.

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REFERENCES

- [1] S. Abusaeed, S. U. R. Khan, and A. Mashkoor, "A Fuzzy AHP-based approach for prioritization of cost overhead factors in agile software development," *Appl. Soft Comput.*, vol. 133, p. 109977, 2023, doi: 10.1016/j.asoc.2022.109977.
- [2] A. Rida, S. Nazir, A. Tabassum, Z. Sultan, and R. Abbas, "Role of Requirements Elicitation & Prioritization to Optimize Quality in Scrum Agile Development," *Int. J. Adv. Comput. Sci. Appl.*, vol. 7, no. 12, pp. 300–306, 2016, doi: 10.14569/ijacsa.2016.071239.
- [3] I. P. Da Silva, A. S. Lima, N. De Souza, F. R. C. Sousa, L. S. Rocha, and T. E. V. Da Silva, "Improving group decision-making in IT service management by the use of a consensus-based MCDM method," *LANOMS 2015 - 8th Lat. Am. Netw. Oper. Manag. Symp.*, no. 978, pp. 103–106, 2015, doi: 10.1109/LANOMS.2015.7332678.
- [4] R. D. Estrada-Esponda, M. López-Benítez, G. Matturro, and J. C. Osorio-Gómez, "Selection of software agile practices using Analytic hierarchy process," *Heliyon*, vol. 10, no. 1, 2024, doi: 10.1016/j.heliyon. 2023.e22948.
- [5] I. Wijastuti, B. Hardian, T. Raharjo, and A. Suhanto, "Identifying Critical Success Factor for IT Project Implementation Using Analytical Hierarchy Process: A Case Study of Clearing and Guarantee Corporation in Indonesia," *7th Int. Conf. Comput. Eng. Des. ICCED 2021*, no. February, pp. 1–6, 2021, doi: 10.1109/ICCED53389.2021.9664844.
- [6] B. Winowoda and M. Wasesa, "VFT and AHP Approach to Selecting the Best Option in Decision-Making at PLN: A Case Study in the Cawang-Gandul Project," *Eur. J. Bus. Manag. Res.*, vol. 9, no. 2, pp. 119–133, 2024, doi: 10.24018/ejbmr.2024.9.2.2103.
- [7] Project Management Institute, *PMBOK® Guide Sixth Edition (PMI, 2017)*, vol. 6. 2017. [Online]. Available: <http://www.citeulike.org/group/14887/article/9008974>
- [8] P. Achimugu, A. Selamat, R. Ibrahim, and M. N. Mahrin, "A systematic literature review of software requirements prioritization research," *Inf. Softw. Technol.*, vol. 56, no. 6, pp. 568–585, Jun. 2014, doi: 10.1016/j.infsof.2014.02.001.
- [9] A. Ahmad, M. Goransson, and A. Shahzad, "Limitations of the analytic hierarchy process technique with respect to geographically distributed stakeholders," *World Acad. Sci. Eng. Technol.*, vol. 70, no. 9, pp. 111–116, 2010.

- [10] M. H. Akmal, "Prioritizing product and services strategic initiatives through analytic hierarchy process (AHP) in Indonesia's IT services sector," Institut Teknologi Bandung, 2024. [Online]. Available: <https://digilib.itb.ac.id/gdl/view/85979>
- [11] E. J. Cooper, R. G., Edgett, S. J., & Kleinschmidt, *Portfolio Management for New Products*. Hachette UK, 2019.
- [12] R. E. E. Freeman and J. McVea, "A Stakeholder Approach to Strategic Management," *SSRN Electron. J.*, 2001, doi: 10.2139/ssrn.263511.
- [13] R. L. Keeney, *Value-Focused Thinking*. Harvard University Press, 1996. doi: 10.2307/j.ctv322v4g7.
- [14] Kepner-Tregoe, *Problem Analysis and Decision Making*, 3rd ed. Kepner-Tregoe, 1979, 1979. [Online]. Available: <https://books.google.co.id/books?id=LYHWAAAAMAAJ>
- [15] Meta, "WhatsApp Business Platform." [Online]. Available: <https://developers.facebook.com/docs/whatsapp/overview>
- [16] O. C. Marketing, "What is Mendelow's matrix and how is it useful?," Oxford College Marketing Blog. [Online]. Available: <https://blog.oxfordcollegeofmarketing.com/2018/04/23/what-is-mendelows-matrix-and-how-is-it-useful/>
- [17] G. S. . Parnell and R. R. Hill, "Value-focused thinking and the challenges of the long war.," *Mil. Oper. Res.*, 2008, [Online]. Available: <http://www.jstor.org/stable/43920753>
- [18] G. S. Parnell and P. D. West, "KR23 Value-Focused Systems Decision Making," *INCOSE Int. Symp.*, vol. 18, no. 1, pp. 1685–1699, Jun. 2008, doi: 10.1002/j.2334-5837.2008.tb00909.x.
- [19] M. R. Y. H. Pratama, "Agile product development: Requirements prioritization using analytical hierarchy process (AHP) decision making within agile way of working in digital banking lending product," Institut Teknologi Bandung, 2021. [Online]. Available: <https://digilib.itb.ac.id/gdl/view/63557>
- [20] R. S. Pressman, *Software engineering: A practitioner's approach*, 7th ed. McGraw-Hill, 2010.
- [21] T. L. Saaty, "Decision making with the analytic hierarchy process," *Int. J. Serv. Sci.*, vol. 1, no. 1, p. 83, 2008, doi: 10.1504/IJSSCI.2008.017590.
- [22] N. Saher*, F. Baharom, and R. Romli, "Guideline for the Selection of Requirement Prioritization Techniques in Agile Software Development: An Empirical Research," *Int. J. Recent Technol. Eng.*, vol. 8, no. 5, pp. 3381–3388, 2020, doi: 10.35940/ijrte.e6634.018520.
- [23] T. Stober and U. Hansmann, *Agile software development: Best practices for large software development projects*. 2010. doi: 10.1007/978-3-540-70832-2.
- [24] O. S. Vaidya and S. Kumar, "Analytic hierarchy process: An overview of applications," *Eur. J. Oper. Res.*, vol. 169, no. 1, pp. 1–29, Feb. 2006, doi: 10.1016/j.ejor.2004.04.028.
- [25] A. Tua and M. Wasesa, "Determining The Contract Service Strategy at Coal Terminal Maintenance to Address Contractor's Inability to Maintain Availability of Fixed Plants in Supporting Shipments Activities at PTKPC a Case Study PTKPC, East Kutai, East Kalimantan, Indonesia," *Int. J. Curr. Sci. Res. Rev.*, vol. 07, no. 02, Feb. 2024, doi: 10.47191/ijcsrr/V7-i2-04.
- [26] I. E. Aditya, A. Wisdianto, and T. Raharjo, "Analysis of Critical Success Factors in Information Technology Projects: A National Shipping Company Case Study," *2022 7th Int. Conf. Informatics Comput. ICIC 2022*, pp. 1–7, 2022, doi: 10.1109/ICIC56845.2022.10006933.
- [27] A. Ali *et al.*, "A data mining technique to improve configuration prioritization framework for component-based systems: An empirical study," *Inf. Technol. Control*, vol. 50, no. 3, pp. 424–442, 2021, doi: 10.5755/j01.itc.50.3.27622.
- [28] Y. Bugayenko *et al.*, *Prioritizing tasks in software development: A systematic literature review*, vol. 18, no. 4 April. 2023. doi: 10.1371/journal.pone.0283838.
- [29] A. Fuggetta, *Software process: A roadmap*. 2000. doi: 10.1145/336512.336521.
- [30] C. D. Foundation, "SuperDecisions Software." Accessed: Apr. 20, 2025. [Online]. Available: https://www.superdecisions.com/tutorials/index.php?section=3_0