Volume 4, No. 2 February 2025 - (312-320)
p-ISSN 2980-4868 | e-ISSN 2980-4841
https://ajesh.ph/index.php/gp

Application of Value Engineering to the Construction Project of An ASN Flat Building in Seram Bagian Barat Regency

Eko Pramono[1*], Budi Witjaksana[2], Jaka Purnama[3]
Universitas 17 Agustus 1945 Surabaya, Indonesia
Emails: ekopramono140@gmail.com[1], budiwitjaksana@untag-sby.ac.id[2], jakapurnama@untag-sby.ac.id[3]

ABSTRACT
The ASN apartment building project in West Seram Regency faced significant challenges, especially customary land disputes that caused location changes and design revisions. Initially designed as a three-story linear building, the project was adapted into an L-shaped two-story building to suit the conditions of the new location. This research aims to optimize cost and time efficiency without compromising quality standards through the application of Value Engineering (VE). The methods used include Work Breakdown Structure (WBS) and Function Analysis System Technique (FAST) to analyze the main elements of construction, such as floor slabs, walls, stairs, and formwork. The results show that the use of the knock-down formwork method significantly reduces material costs, speeds up completion time, and minimizes construction waste. In addition, the use of local materials and innovative approaches have been proven to increase project efficiency and sustainability. This research also emphasizes the importance of collaboration between stakeholders and community involvement in overcoming social and cultural challenges. By proving the benefits of VE implementation, this research provides valuable reference for the optimization of construction projects in Indonesia's complex and limited environment.

Keywords: ASN Flats, Cost Optimization, Infrastructure Development, Time Efficiency, Value Engineering.

INTRODUCTION

The construction of the ASN Flat Building in Seram Bagian Barat Regency aims to provide decent housing for the State Civil Apparatus (ASN, *Aparatur Sipil Negara*), which aligns with the government's vision of improving the welfare of civil servants. However, the implementation of this project faces significant challenges, one of which is related to customary land conflicts. The original location, considered sacred by the local community, forced the developer to find a new location. This process took over two months, significantly affecting the project schedule and budget (Bertolini & Zacoeb, 2017).

The change in location also impacted the building design. The initial design of a three-story linear prototype was changed to two L-shaped floors to suit the new land conditions (Tseng et al., 2024). This resulted in an effective implementation time of only four months from the

planned six months. Time and cost constraints are challenges that must be overcome immediately so that the project does not experience further delays (Santoso et al., 2017).

One relevant approach to overcome these challenges is the application of Value Engineering (VE). VE is a systematic method that identifies and reduces unnecessary costs without sacrificing quality (Colla et al., 2017). This method analyzes function and cost efficiency while maintaining the project's main objectives (Miles, 2015). In the ASN Flat Building construction project, the application of VE is focused on several major work items, such as foundations, structures, and architectural elements, to ensure cost and time efficiency (Ferdian et al., 2015).

The VE method has been proven effective in various previous studies. In a research conducted (Abma, 2015), the application of VE in a building foundation structure project showed significant cost savings without reducing the quality of the structure. Another research by (Mendonca, 2015) showed that using VE on roof structures can save up to 41.37% of the initial cost. These results confirm that VE is an effective tool for overcoming construction project cost and time challenges.

The VE approach not only focuses on technical aspects but also involves the participation of various related parties, including project owners, contractors, and communities. This approach encourages collaboration and innovation to find the best solution (Diptera et al., 2018). Given the sensitivity of the customary land issue, local community participation is crucial in the context of the ASN Flat Building.

Furthermore, this research also aims to show how the application of VE can overcome resource limitations and logistical constraints in remote areas such as the West Seram Regency. According to (Govindan et al., 2015), VE helps identify more efficient alternative materials and work methods. In this case, local materials and work methods that suit local conditions are key to the successful implementation of VE.

For example, in formwork work for capping beam and pile cap structures, knock-down formwork systems can significantly reduce time and costs. This system is easy to install and reusable, making it more environmentally friendly. In addition, function analysis with the Work Breakdown Structure (WBS) and Function Analysis System Technique (FAST) approach allows the identification of the most critical work to be improved in efficiency (Riantini et al., 2020).

Experience from previous projects shows that VE can provide better cost and time-efficiency solutions. For example, research by (Meilasari et al., 2023) on the revitalization of Arjosari Terminal in Malang showed cost savings of up to 8% through architectural design changes. Applying a similar approach is expected to produce positive results in the ASN Flat Building project.

However, a key challenge in implementing VE is ensuring that all parties involved fully understand the purpose and benefits of the method. According to (Mendes et al., 2018), the success of VE relies heavily on a decision-making process that transparently involves all

stakeholders. This is important to create consensus and ensure the implementation of the agreed solution. This research contributes by providing a comprehensive analysis of how Value Engineering (VE) can be applied specifically in the context of government housing projects facing customary land conflicts. Unlike previous studies that primarily focused on cost savings and efficiency, this research highlights the integration of VE with community participation and local resource optimization to enhance project adaptability in constrained environments. Additionally, this research explores innovative implementation techniques such as the adaptation of modular construction and eco-friendly materials, which have not been widely studied in similar infrastructure projects.

Based on the above background, the purpose of this research is to analyze the application of Value Engineering (VE) in the construction project of ASN Flats in West Seram Regency to improve cost and time efficiency and to take into account the involvement of the local community in the planning and implementation process of the project. The benefit of this research is to contribute to the development of a strategy for the application of VE in government infrastructure projects that face social and geographical constraints, as well as to provide recommendations for stakeholders regarding the use of more adaptive and sustainable VE methods in construction projects in remote areas.

RESEARCH METHOD

Approach

This research uses a qualitative descriptive approach that aims to understand the application of Value Engineering (VE) in the context of construction projects. This approach allows researchers to analyze data in depth to evaluate the effect of VE on cost efficiency and project implementation time. This method allows researchers to explore detailed empirical data from various sources, resulting in relevant and accurate findings. The descriptive qualitative approach was chosen for its flexibility in understanding the complex interactions between various aspects that influence the implementation of VE. Through the qualitative approach, this research focuses on identifying key issues that arise in implementing construction projects. The descriptive analysis allowed the researcher to examine the implementation of EE from the perspectives of various stakeholders, including contractors, consultants, and local communities. This provided a comprehensive picture of how VE was applied and the extent of its impact on project success. This approach also provides scope to explore innovative solutions generated through the application of VE. By thematically analyzing the data, the researcher could identify relevant patterns and trends, resulting in applicable recommendations for similar construction projects in the future. This approach is particularly relevant in the context of the ASN Flat Building development in Seram Bagian Barat Regency, which faced unique challenges such as customary land constraints and design changes.

Location and Subjects

This research was conducted in Seram Bagian Barat Regency, the ASN Flat Building construction site. This location was selected based on specific characteristics that posed major challenges in project implementation. One of the biggest challenges was customary land conflicts that necessitated project location and design changes. In addition, the geographical conditions and accessibility of the project site were also important considerations in this research.

Figure 1. Research Area

Source: Google Maps. Friday, November 1, 2024. at. 15.35

The research subjects involved key stakeholders, including contractors, project consultants, and local government representatives. Contractors and consultants provided technical insights on project implementation, while local government representatives provided information on relevant policies and regulations. The data obtained from these subjects helped the researcher understand the application of VE from various perspectives. Through interviews and observations, researchers also involved local communities as part of the research subjects. Community involvement is important to glean information about the social dynamics that influence the project. This approach provides a holistic understanding of how VE can be applied in complex social and cultural contexts.

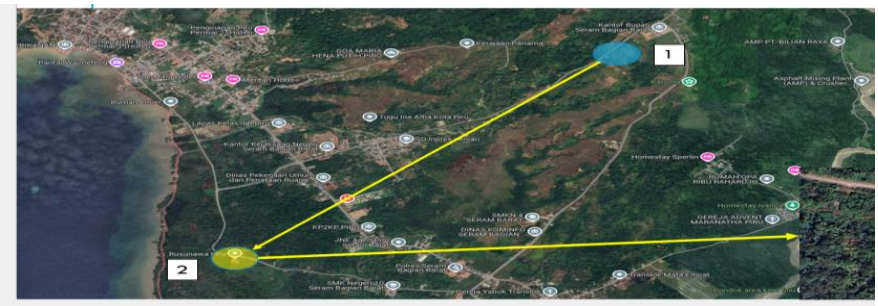

Figure 2. Location of Piru ASN Flat Development in West Seram Regency

Source: Google Maps. Friday, November 1, 2024. at. 15.35

Source

The data used in this research consisted of primary and secondary data. Primary data was obtained through in-depth interviews with various project stakeholders. These interviews were designed to explore their experiences, views, and recommendations regarding applying VE. Focus

group discussions were also conducted to get a collective and in-depth view of the key issues in the project. Secondary data included project documents, such as cost budget plans, design drawings, and progress reports. These documents provided a more precise context and supported the analysis. Reviewing these documents helped the researcher identify potential areas for cost and time efficiency through applying VE. Using a combination of primary and secondary data ensured the validity and reliability of the research findings. By analyzing both data types, the researcher gained a more comprehensive picture of the application of VE and its impact on the project.

Collection Technique

Data collection was conducted through semi-structured interviews designed to explore information in depth. This technique allows for flexibility in exploring topics that arise during the interview. Respondents were free to express their views, often resulting in unexpected new insights. In addition to interviews, direct observations were made at the project site to observe the implementation of VE. These observations provided empirical data that helped the researcher understand how the VE method was applied in practice. Direct observation also provided insights into the work dynamics in the field and the challenges faced during project implementation. Focus group discussions involved various stakeholders to discuss preliminary findings and evaluate potential solutions. This technique was used to identify common ground and explore innovative alternatives. These discussions also helped ensure the research findings reflected all parties' views.

Analysis Technique

The collected data was analyzed using the thematic analysis method, which involved identifying the main themes relevant to the research. The initial stages of analysis included organizing the data to ensure that all relevant information was well structured. Next, coding was conducted to identify patterns and relationships between the data. The analysis process was iterative to ensure the validity of the findings. Data from various sources were compared to identify similarities and differences, resulting in a comprehensive conclusion. Validation of findings was done through data triangulation, which involved comparing primary and secondary data. The thematic analysis allowed the researcher to explore in-depth insights into implementing VE. By identifying key themes, the research generated relevant and applicable findings to improve construction project efficiency.

Table 1. Order of work from highest to lowest cost

Building A	Work Items	Fees (Rp)	Bobot (%)
1	Standard Architectural Work	2,894,831,443	20.91%
2	Standard Structural Work	2,349,712,767	16.97%
3	Mechanical And Electrical Work	1,644,543,260	11.88%
4	Non-Standard Structural Work	942,321,233	6.81%

Building A	Work Items	Fees (Rp)	Bobot (%)
5	Standard Preparation Work	522,449,302	3.77%
6	Non-Standard Architectural Work	516,930,655	3.73%
Building B			
1	Standard Architectural Work	1,774,817,965	12.82%
2	Standard Structural Work	1,125,730,060	8.13%
3	Mechanical And Electrical Work	850,591,338	6.14%
4	Non-Standard Structural Work	796,854,030	5.76%
5	Non-Standard Architectural Work	297,288,385	2.15%
6	Mechanical And Electrical Work	36,035,000	0.26%
	Total	13,843,390,437	100%

Source: Processed by the Author, 2024

RESULT AND DISCUSSION

Identification of Problems in Implementation

In the early stages, implementing the ASN Flat Building in Seram Bagian Barat Regency faced significant challenges. The local community identified the initial project site as customary land considered sacred. This condition forced the project team to find an alternative location, which caused a delay of more than two months. The relocation also required a change in design from a linear 3-storey building to a 2-storey L-shaped building. The change in location and design directly impacted the project schedule and budget. The practical implementation time was reduced from six months to four months. In addition, the revised design required adjustments to the new land conditions, such as soil stability and logistics accessibility, which also affected cost efficiency.

The Value Engineering (VE) method is used to identify work items that can be optimized. In this project, some elements analyzed include the foundation structure, formwork, walls, and floors. The analysis aimed to reduce costs without compromising construction quality. The project team utilized the Work Breakdown Structure (WBS) approach to map all work elements (Sharon & Dori, 2014). Based on the analysis results, formwork became the main focus as it has high-efficiency potential. This data was obtained through direct observation and interviews with contractors and project consultants.

Table 2. Order of work from largest to smallest cost

Work Items	Cost (Rp)
Capping Beam Formwork	150,000,000
Foundation Structure	120,000,000
Wall	100,000,000
Floor	80,000,000

Implementation of Value Engineering on

The application of VE in the project focused on formwork with a knock-down method (Palayukan, 2017). This method was chosen for its advantages in time and cost efficiency. Knock-down formwork is easy to install and can be reused, reducing material costs by up to 20%. Knock-down formwork also shortened the capping beam and pile cap working time. Initially estimated to take 10 days, the process was completed in 7 days. This efficiency had a positive impact on the overall project schedule. In addition to formwork, the wall material was changed from red bricks to lightweight bricks. This change resulted in a cost saving of Rp 20 million per unit. With this efficiency, the project could still maintain the expected quality standards. Further analysis was conducted using the Function Analysis System Technique (FAST). This technique helps the project team evaluate the main and supporting functions of each work item. Based on the FAST analysis, the VE method could balance cost, time, and quality.

Impact of Value Implementation

The impact of VE implementation on this project was seen in three main aspects: cost, time, and quality (Kelly et al., 2014). In terms of cost, implementing VE resulted in a total savings of IDR 50 million. These savings were obtained through formwork, wall, and floor efficiency. In terms of time, the VE method enabled accelerated project completion. The planned schedule to be completed in 6 months can be adjusted to 4 months without sacrificing quality. These results prove that VE can overcome time constraints. The quality aspect is also maintained despite the cost savings. Using more efficient materials and innovative work methods ensured that the building structure met safety and comfort standards. This is proof that VE can be applied without reducing functional value. The application of VE also positively impacted the relationship between the project and the local community. The approach involves community participation in the decision-making process, which helps create consensus and supports the smooth running of the project.

Discussion

The application of VE in the ASN Flat Building project in Seram Bagian Barat Regency shows that this method effectively deals with various construction project challenges. Site and design changes that became initial constraints were successfully and systematically overcome. Knock-down formwork, one of the leading solutions, provided significant cost savings and much-needed time efficiency under urgent conditions. This research supports previous findings (Bertolini & Zacoeb, 2017), which showed that VE can improve cost and time efficiency without compromising quality. In the context of this project, similar results were achieved through in-depth analysis of critical work items. The use of local materials and innovative work methods were also key to the successful implementation of VE.

However, challenges in implementing VE remain, such as resistance to change and limited analysis time. This aligns with the findings of (Santoso et al., 2017), who highlighted the importance of education and training for stakeholders to increase acceptance of the VE

approach. In this project, resistance was successfully minimized through effective communication and participation of all parties. VE also provides long-term benefits to construction projects in remote areas. The approach enabled the project team to make maximum use of local resources. This research reinforces the view that VE is relevant for large projects and projects with more minor scales and specific constraints.

The social impact of implementing VE is also worth noting. Involving local communities in the planning and implementation process helps to reduce conflict and increase trust in local government. VE became a tool to bridge technical and social interests in this case. This research shows VE is a practical and flexible approach to addressing construction project challenges. These results are expected to serve as a reference for similar projects in the future, particularly in areas with unique constraints, such as the West Seram Regency.

CONCLUSION

This study demonstrates that Value Engineering (VE) effectively addressed the challenges of ASN Flat Building construction in West Seram Regency, particularly in managing time and budget constraints due to relocation and design changes. By optimizing key construction elements—such as formwork, walls, and floors—without compromising quality, VE significantly reduced costs and improved time efficiency. The adoption of knock-down formwork proved to be a crucial innovation, while stakeholder collaboration, including local community involvement, played a key role in project success. For future projects, early implementation of VE is essential to maximize cost and time efficiencies. Providing VE training for stakeholders and involving local communities can enhance acceptance and minimize social conflicts. The integration of technology, such as construction management software, can further improve VE analysis. Future research should explore VE applications across different project scales to strengthen its role in efficient, cost-effective, and sustainable infrastructure development in Indonesia.

REFERENCES

Abma. (2015). *Value Engineering On Building Foundation Structure Works (Case Study Of The Construction Project Of Lecture Building Of Faculty Of Mathematics And Natural Sciences, Islamic University Of Indonesia*. University Of Islam Indonesia.

Bertolini, V., & Zacoeb, A. (2017). Application of Value Engineering Building Project (a Case Study of Hotel Grand Banjarmasin). *International Journal of Transportation and Infrastructure*, *1*(1), 41–56.

Colla, C. H., Mainor, A. J., Hargreaves, C., Sequist, T., & Morden, N. (2017). Interventions aimed at reducing use of low-value health services: a systematic review. *Medical Care Research and Review*, *74*(5), 507–550.

Diputera, I. G., Putera, I., & Dharmayanti, G. (2018). Application of Value Engineering (VE) in the Taman Sari Apartment Development Project. *Udayana University*.

Ferdian, J., Isya, M., & Rani, H. A. (2015). Penerapan Value Engineering Pekerjaan Bangunan Bawah Jembatan Pada Pekerjaan Pondasi Tiang Pancang (Studi Kasus: Penggandaan Jembatan Lamnyong Banda Aceh). *Banda Aceh: Universitas Syiah Kuala*.

Govindan, K., Rajendran, S., Sarkis, J., & Murugesan, P. (2015). Multi criteria decision making approaches for green supplier evaluation and selection: a literature review. *Journal of Cleaner Production*, *98*, 66–83.

Kelly, J., Male, S., & Graham, D. (2014). *Value management of construction projects*. John Wiley & Sons.

Meilasari, S. K., Oetomo, W., & Witjaksana, B. (2023). Value Engineering Analysis On The Architectural Work Of The Arjosari Malang Type A Terminal Revitalization Project. *Jurnal Ekonomi Teknologi Dan Bisnis (JETBIS)*, *2*(8), 556–570.

Mendes, E., Rodriguez, P., Freitas, V., Baker, S., & Atoui, M. A. (2018). Towards improving decision making and estimating the value of decisions in value-based software engineering: the VALUE framework. *Software Quality Journal*, *26*, 607–656.

Mendonca, E. M. D. J. (2015). *Penerapan Value Engineering Pada Pembangunan Gedung Mipa Center Universitas Brawijaya Malang*. ITN Malang.

Miles, L. D. (2015). *Techniques of value analysis and engineering*. Miles Value Foundation.

Palayukan, C. P. (2017). *Cost And Time Study Of Knock Down Formwork*. UAJY.

Riantini, L. S., Wardahni, N. I., Latief, Y., & Machfudiyanto, R. A. (2020). Structural equation model relationship between policy, Work Breakdown Structure (WBS), Guidelines, Information System (IS), and Building Information Modeling (BIM) on maintenance perfomance of high rise building. *International Journal of Engineering Research and Technology*, *13*(10), 2660–2667.

Santoso, A. A., Iskandar, T., & Rizal, M. (2017). Penerapan Value Engineering Untuk Struktur Pondasi Yang Efektif Dan Efisien Pada Pembangunan Gedung Olah Raga Di Kota Pasuruan. *Jurnal Teknik Sipil INFO MANPRO*, *3*(1), 33–42.

Sharon, A., & Dori, D. (2014). A Project–product model–based approach to planning work breakdown structures of complex system projects. *IEEE Systems Journal*, *9*(2), 366–376.

Tseng, C.-C., Huang, L.-S., & Huang, C.-F. (2024). A Study on the Spatial Layout of Newly Built Townhouses in Kaohsiung City. *Applied Sciences*, *14*(18), 8547.