

CAPITAL LEASING STRATEGY AND CAPITAL BUDGETING IMPLEMENTATION OF MODULAR BUILDING CONSTRUCTION TECHNOLOGY: A CASE STUDY FOR PT WIKA GEDUNG (WEGE)

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ABSTRACT

All the business activities have been shut down, not to immune, a construction sector as one of a significant growth driver of the economy. The unprecedented pandemic crisis is prompting many businesses to be in a state of urgency for innovation, to quickly deploy innovative solutions to survive. In 2019, PT Wika Gedung introduced Modular Building Construction Technology as its most recent innovation to survive in Covid-19 pandemic. This study aims to investigate the feasibility rate of innovative product from PT Wika Gedung; Modular Building Construction Technology and propose strategic way to enhance the product through qualitative analysis. This study used a mixed methodology that included strategic, capital budgeting, sensitivity, and non-monetary analysis, all of which should be carefully taken into account by management when making capital investment plans. The study's findings demonstrated that the 20-year modular instalment payment plan derived from the qualitative analysis is seen to be feasible, with an IRR of 29.5%, a payback period of 10 years, and a ROI of 52%. This study is expected to encourage PT Wika Gedung management to move forward with the project.

Keywords: Capital Budgeting, Mixed Method, Construction, Innovation, Covid-19 Pandemic.

INTRODUCTION

The sudden appearance of Coronavirus pandemic in 2019 was firstly reported in Wuhan city in China, which is caused by severe acute respiratory syndrome (Hui et al., 2020). The economy, in general, faces a direct impact amid the COVID 19 outbreak. All the business activities have been shut down due to lockdowns, restricted the movement of people, and companies have shifted to the Work-From-Home (WFH) concept to accommodate and run the business and service (Nachit, H., & Belhcn, L., 2020).

Seen from one of the sectors that considered as a significant growth driver of the economy: construction industry, with no exception, has also been completely shut down. The industry, like the construction industry, which typically requires on-site involvement of all the project members (Financial times, 2020), has been tested by the COVID-19 for its resilience. Growth in construction, which makes up one-tenth of gross value added (GVA)—slowed to just under 3% (yoy) in the first quarter of 2020, down from 5.8% in the fourth quarter of 2019 and 6.1% in 2018 (Badan Pusat Statistik, 2021).

This severe condition has impacted almost all companies in Indonesian construction sectors, not to be excluded, PT Wijaya Karya Bangunan Gedung Tbk (WEGE). The following Figure 1.1 summarizes insights on WEGE's revenue. Due to the pandemic, the revenue in fiscal year 2019 has dropped significantly at 27% from IDR 5822,5 billion in 2018 to IDR 4567.5 billion. Likewise in year of 2020, the revenue continued to fall at IDR 2810.1 billion. Nevertheless, in the year of 2021, WEGE managed to increase its revenue by prompting growth strategies and innovations in their product and services. It can be seen by an upward tendency in their revenue composing IDR 3168.2 billion, or increase at 11% from the previous year.

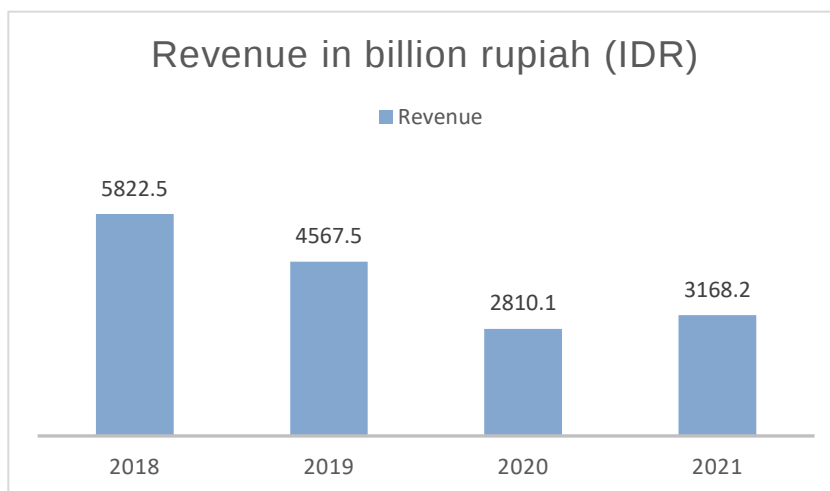


Figure 1.1 PT Wijaya Karya Bangunan Gedung Tbk (WEGE)'s Revenue
(PT Wijaya Karya Bangunan Gedung Tbk financial statement, 2018-2021)

Seen from the competitive landscape of construction sector, the Indonesian construction market is considered as less competitive (Markplus Research, 2021), or dominated with the presence of major local players, especially state-owned enterprises (SOEs).

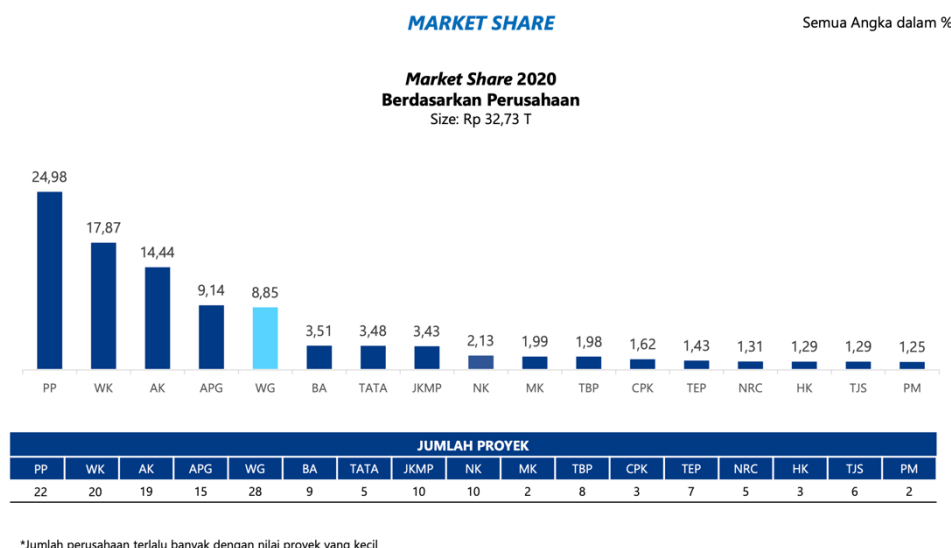


Figure 1.2 Competitive Landscape of Construction Sector (Markplus Research, 2021)

Based on Figure 1.2, PT Wika Gedung (WEGE) has received the biggest five, compositing the fifth rank (has reached 8.85% of the total market share) from the overall Indonesian construction sector in 2020. Seen from the number of ongoing projects, WEGE has obtained the greatest number of projects among all the construction companies. This shows the competitiveness level of WEGE and its prospect that quite satisfactory and thus WEGE must strive for sustainability of its business through several appropriate strategies, continuous innovation, and quality of the work programs to remain competitive.

The unprecedented pandemic crisis is prompting many businesses to be in a state of urgency for innovation, e.g., re-purposing businesses, products, materials, etc. to quickly deploy innovative solutions to survive (Lee, S. M., & Trimi, S., 2021). Similarly, in his research, Ali (2021) emphasizes the importance of innovation, as he found out firm that possess high level of innovativeness could aid firms to reduce the detrimental financial effects due to Covid-19, increasing their likelihood of survival.

Recent Innovation: Modular Building Construction Technology

In 2019, WEGE introduces the most recent innovation; Modular, as a symbol of dedication to provide better living solutions. The adoption of modular technology is suitable for a variety of sectors, such as construction, mining, healthcare, hospitality, education, commercial, and residential.

Prefabricated Prefinished Volumetric Construction (PPVC) is incorporated through modular design. This type of building is constructed (prefabricated) in a factory away from the project site and then transported to be put together. The term "modular," signifies the construction was built using one module (or unit) in a time before being installed in a specific place. Thus, modular only requires installation on the foundation and combined with various other devices on the project site.

The following advantages of using modular technology as a substitute material for building construction are listed in the Table below.

Table 1.1 Advantages of Using Modular Technology as a Alternative to Traditional

MODULAR	TRADITIONAL
The constructing procedure takes place off-site (off the project site), with the modules being pre-assembled at the manufacturer before being used on the project site (On-Site)	On-site labor is used exclusively for the whole building process.x
Off-site and on-site construction is done in a coordinated manner, which can reduce the time required by 30% to 40%.	The linear construction used requires coherent steps
When the modular unit arrives at the project site, construction is 95% complete.	Weather risks and unreliable labor both have the potential to cause damage

Consistency in maintaining product quality and facilities	Weather conditions have a significant impact on on-site construction
Construction can be disassembled, allowing for several uses	Construction is permanent and cannot be altered

(Modular Profile Wika file and Construction Leadership Council, 2019)

COVID-19 Modular Hospital

Like many nations around the globe, at the beginning of the pandemic, Indonesia had an unprecedented rise in COVID-19 cases that exceeded the number of available hospital beds. The Indonesian government began planning the construction of 14 new hospitals to alleviate this gap.

In 2020, the Covid-19 Hospital project—which was built using modular construction technology, was implemented by Wika Gedung. Wika Gedung's scope of work includes structure, architecture, landscape, and finishing. The hospital worth USD 4 million is a one-story building with a capacity of 300 beds, 35 intensive care unit rooms, and 10 emergency rooms. Each hospital has isolation rooms that are built to use negative pressure and are isolated from other patients to prevent the transmission of COVID 19 infection.

Given the critical pandemic situation, WEGA completed design and construction works, as well as have the hospital fully operating, in less than a month. While for the conventional building construction without modular technology takes 1-2 years. Delivery also needed to be cost-effective and environmentally sustainable. The project was completed in May 2020. Because of this, WEGA was awarded with two MURI records; the actualization of the State-owned Enterprises (SOEs) Hospital's role being transferred to the quickest Covid-19 Hospital and deployment of the quickest inpatient room at a Covid referral hospital (Rahayu A.C, Sept 2021).

LITERATURE REVIEW

Capital Budgeting Practices

The importance and complexity of capital budgeting decisions have drawn numerous academics to this area of study. Capital budgeting, according to Clayman et al., (2012), is the process of choosing investment projects that maximize shareholder value. The majority of capital budgeting concerns substantial investments in long-term assets. Buildings, plants, and equipment are examples of tangible assets. Intangible assets include trademarks, new technologies, and patents. The preparation of a capital budget typically takes place a year in advance and can be extended to five, ten, or even fifteen years in the future (Anthony et al., 2011). According to Wegandt et al. (2016), capital budgeting is the process of evaluating and choosing investment opportunities in long-term assets where the rewards persist for longer than a year.

Capital budgeting is employed as a vital tool for planning, managing, and allocating scarce resources among competing demands. The ability to use capital budgeting techniques to make better decisions and be able to defend the choice of certain capital investments among competing options makes capital budgeting an essential component of financial planning and decision-making (Anthony et al., 2011). Top management makes the crucial decision to select the best investment project from among competing initiatives, hence it is important to pay close attention to how these projects are evaluated and chosen (Brickley, 2006).

Many studies have been conducted about capital budgeting practices. Daryanto, W.M., and Putra R. A. (2020) studied capital budgeting practice in an aerial inspection services's project in Indonesia. The research revealed that the project had a payback period of around a year, a positive NPV and IRR larger than WACC, and a profitability index over one. Daryanto, W. M., and Primadona, A. (2018) surveyed capital budgeting practices in oil industry investment. Gafli, G. F., and Daryanto, W. M. (2019) carried out a capital budgeting analysis of a 20 MegaWatt Photovoltaic Power Plant for one of Indonesia's Independent Power Providers in the eastern area. In 2018, Mentari, D., and W. M. Daryanto (2018) & Agitarini, D., and Daryanto, W. M. (2018) investigated the capital budgeting model in SEO's gas-based company.

Internal and External Analysis

SWOT Analysis

Numerous practitioners, marketing researchers, and corporate marketing and strategy students have all utilized SWOT. It is also a common and well-liked instrument. The tool is used to examine alternatives and difficult decision circumstances (Helms, M. M., & Nixon, J., 2010). SWOT analysis is a useful framework for examining an organization's Strengths, Weaknesses, Opportunities, and Threats (or a project's), which aids in addressing the efficiency of project planning and execution (GURL, E., 2017). Kim (2005) defines SWOT analysis as a tool used to evaluate a company's factors in terms of their respective strengths, weaknesses, opportunities, and threats.

The SWOT analysis considers both internal and external elements that are essential to accomplishing a company's goals. The external opportunities and threats; consumers, rivals, market trends, partners and suppliers, societal changes and new technology, as well as economic, political, and regulatory challenges, are included in the bottom row of the SWOT grid. Internal resources i.e., expertise, drive, technology, finances, business model, etc. aids in meeting expectations and beating off threats is referred to as a strength (Lee & Ko, 2000).

Based on a mix of strengths, weaknesses, opportunities, and threats analyses, the SWOT analysis can be used effectively to produce alternative options for a business (Wang, 2007). Such tactics may make it clear how strengths and weaknesses matched up with opportunities and threats. Based on the internal and external factors, managers can develop four strategies, these are SO (strengths-opportunities), ST (strengths-threats), WO (weakness-opportunities) and WT (weakness-threats).

The SWOT matrix can be summarized as follows:

- SO strategies (strengths-opportunities) : taking advantage of opportunities.
- ST strategies (strengths-threats) : avoiding threats.
- WO strategies (weakness-opportunities) : introducing new opportunities by reduction of weaknesses.
- WT strategies (weakness-threats) : avoid threats by minimizing weaknesses

Porter Five Forces

Porter's Five Forces model is a powerful management tool for analysing the current industry profitability and attractiveness by using the outside-in perspective (Porter, M. E., 2008). Having sufficient understanding of an industry—in which the organization works is crucial for developing a strategy. A company's industry-specific influences might range greatly in terms of variety. Therefore, it is wiser to take into account only those variables that are crucial for all involved businesses in an industry. Porter's Five Forces model identifies four forces that characterize the intensity of competition within industry: rivalry inside an industry in addition to the competition between the current competitors: Bargaining power of Supplier, Bargaining power of Buyer, Threat of Substitutes and Threat of new Entrants (Porter, M. E., 1979).

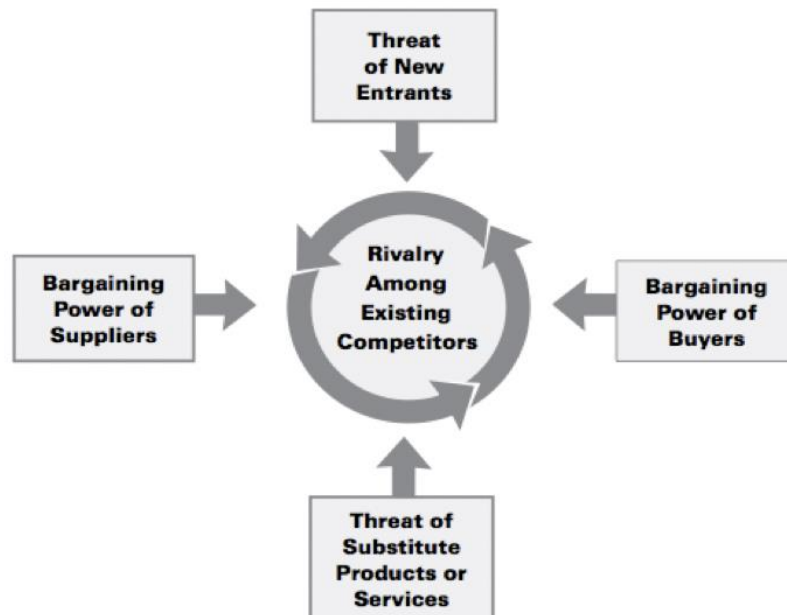


Figure 2.1 Five Forces Framework (Porter, M. E., 1979)

Therefore, the conceptual framework for this study is, as follows:

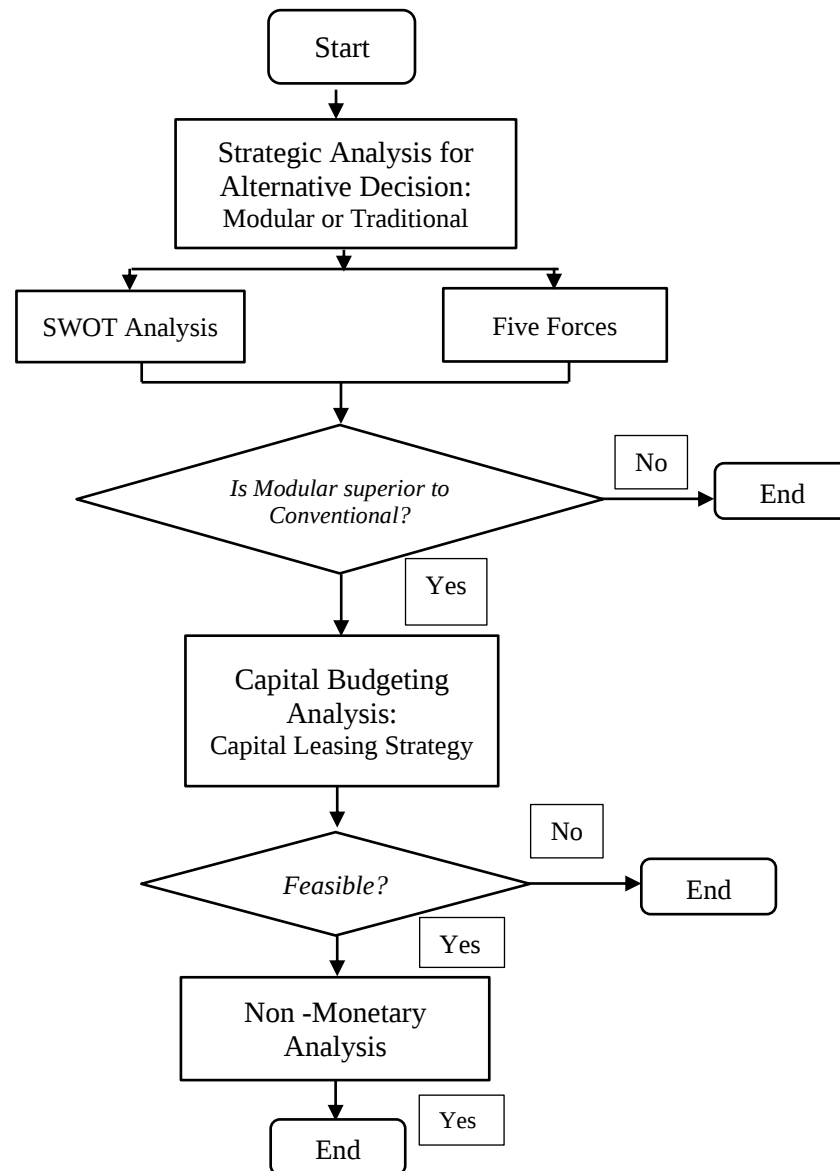


Figure 2.2 Conceptual Framework (Author, 2022)

METHODOLOGY

Capital Budgeting

The process of analyzing and choosing long-term investments while making sure they are in line with business objectives is known as capital budgeting. The questions are: which of the initial investment will generate the biggest return or profit for Wika Gedung? Development of construction projects utilizing modular building technology or in traditional or conventional? Capital budgeting is essential because it promotes accountability and measurability.

The following indicators from the Capital Budgeting Model were used to assess the data: Payback Period, Discounted Payback Period, Return on Investment (ROI), Net Present Value (NPV), NPV Index, and Internal Rate of Return (IRR).

Strategy Formulation

The goal of conducting an external environmental analysis is to identify the external factors that Wika Gedung is dealing with and how the Wika Gedung responds to threats and potential opportunities that arise. The technique used to evaluate external influences or macro level is PESTEL; Political, Economic, Sociocultural, Ecological, and Legal (PESTEL) with the addition of PORTER's five forces. In order to assess the market attractiveness of the company and identify trend that most likely to have a abundance

impact on altering the competitive landscape in the industry, PORTER's five forces will measure the magnitude level of competition within its industry. SWOT analysis will be used to incorporate the analysis' findings.

Data for the study is gathered in a variety of ways:

1. Stage 1 - In-depth interviews with Wika Gedung's stakeholders (Top Management; Various departments; Supply Chain; Finance; and etc.) for descriptive static.
2. Stage 2 - Technical Analysis
3. Stage 3 - Commercial Analysis

Stage 1 – In-depth interviews with Wika Gedung's stakeholders for descriptive statistic

To enhance the quality of research, an effective data collection is necessary. The objective of this phase is to gather both the mandatory data and any unofficial data on the larger context of the study. A qualitative method interview will be conducted with the expert system to gain a deeper insight of the goals and requirements from decision makers.

1. What is their objective in inventing Modular Building Construction Technology?
2. What is the advantage of doing construction project using Modular Building Construction Technology rather than conventional?
3. What are requirements in terms of expected rate of profitability and productivity of the project using Modular Building Construction Technology?
4. What is the impact of project using Modular Building Construction Technology in terms of environmental, social justice, and governance (ESG)?

Stage 2 – Technical Analysis

In this step, this study collects information from the finance departments of WEGE by requesting for quotation of data regarding initial investments. Information such as a study of strength, weakness, opportunities, and threats of the Modular Building Construction Technology, and the external condition that might influence the competitiveness of the product is also considered. This information is importance since it will have an impact on the conclusion.

Stage 3 – Commercial Analysis using Capital Budgeting Technique

Using the gathered financial data, author proceed to the next phase, which is to determine the feasibility of the sample project using Modular Building Construction Technology. The measurement consists of Payback Period, Net Present Value, Internal Rate of Return, Profitability Index, Weighted Average Cost of Capital. Finally, perform the sensitivity analysis of the project using Monte Carlo with variable of Price.

Stage 4 – Draw Conclusion

After all the steps is being completed, the next crucial stage is to draw an conclusion. Combining the analysis of non-monetary and monetary through capital budgeting analysis and link it with the result analysis from the expert system, the author could derive a conclusion regarding the feasibility and superiority of the project using Modular Building Construction Technology. In addition, it can also result in several competitive strategies for Modular Building Construction Technology in defending its position in the market share.

RESULT AND DISCUSSION

In-depth Interview using Expert System

The author conducted in-depth interview to elaborate the reason behind the invention of Modular Building Construction Technology, understanding the strategy, and getting data for financial assumptions.

Based on the interview, below is the summarization regarding the superiority of Modular Building Construction Technology than conventional.

Greener than conventional construction

The factory-controlled process generates less waste, creates fewer site disturbances, and allows for tighter construction.

Greater Flexibility and Reuse: Modular buildings can be disassembled, and the modules relocated or refurbished for new use, reducing the demand for raw materials, and minimizing the amount of energy expended to create a building to meet the new need.

Less Material Waste: When building in a factory, waste is eliminated by recycling materials, controlling inventory, and protecting building materials.

Improved Air Quality: Because the modular structure is substantially completed in a factory-controlled setting using dry materials, the potential for high levels of moisture being trapped in the new construction is eliminated.

Faster than conventional construction

Construction of modular buildings occurs simultaneously with site work, allowing projects to be completed in half the time of traditional construction.

Reduced Construction Schedule:

Because construction of modular buildings can occur simultaneously with the site and foundation work, projects can be completed 30% to 50% sooner than traditional construction.

Elimination of Weather Delays:

60 - 90% of the construction is completed inside a factory, which mitigates the risk of weather delays. Buildings are occupied sooner, creating a faster return on investment

Built to Code with Quality Materials:

Modular buildings are built to meet or exceed the same building codes and standards as site-built structures, and the same architect-specified materials used in conventionally constructed buildings are used in modular construction projects – wood, concrete, and steel.

Smarter than conventional construction

Modular buildings are built with the same materials and to the same building codes and architectural specifications as traditional construction. Once assembled, they are virtually indistinguishable from their site-built counterparts.

Safer Construction:

The indoor construction environment reduces the risks of accidents and related liabilities for workers.

Limitless Design Opportunities:

Modular units may be designed to fit in with external aesthetics of any existing building and modular units, once assembled, are virtually indistinguishable from their site-built counterparts.

Only accept cash payment

Modular buildings can only be purchased by cash.

PESTLE AND SWOT ANALYSIS

In order to assess WEGE's modular position in the market both from internal and external contexts, this study employ SWOT analysis and Five Porter Forces analysis. These tools provide a sense of Modular Building Construction Technology posits in Construction industry, including statistics on demand and supply, the level of product competitiveness, and the environment. WEGE SWOT and Five Porter Forces analyses are shown below.

SWOT ANALYSIS

Table 4.1 SWOT Analysis

Strength (S):	Weaknesses (W):
a. Competent Human Resources(S1). b. Pioneer in building modularsystems (S2) c. Superior Brand Image WIKABuilding (S3) d. Construction time speed (S4) e. Have products that are certifiedto national and international standards (S5) f. Have a culture to innovate and research especially for modular systems (S6) g. Passed 4% SNI seismic seismic design cyclic test for modular	a. Product price is higher than conventional construction (W1) b. High shipping costs because thedimensions of the flat pack do not match that of a regular container (W2) c. Limited production facilitiesonly in Java Island (W3) d. Socialization of the Modular system has not been comprehensive to all segments (W4) e. Less Market Penetration (W5) f. Digital Marketing has not been managed properly (W6)

Opportunities (O): a. Development of IKN & 10 NewBali Destinations (O1) b. Shift of 50 million lower class to middle class & housing needs near production facilities (O2) c. One Million Homes Program(O3) d. Implementation of Domestic Component Level Commitments(O4) e. Indonesia's commitment in the NDC to issue low carbon (O5)policies f. Diverse purchasing preference (buying power) of buyer (O6) g. Offer Capital Leasing Payment Strategy (O7)	Threats (T): a. Conventional construction products have competitive prices(T1) b. Emergence of similar modular products from up-and-coming companies (T2) c. Impact of Economic Recession Due to Covid-19 Pandemic Since 2020, European War and Global Economic Uncertainty 2023 (T3)
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Source: Author Analysis from In-dept Interview Result (2022)

FIVE PORTER FORCES

Table 4.2 Five Forces Analysis

1. Threat of New Entrants (Low) a. High capital investment to achieve economies of scale b. Need to have in-depth knowledge/experience & mastery of modular technology	2. Threat of Substitute(High) a. The price and quantity of replacement products are lower than modular b. Buyer's intention to use substitute products or technology (traditional wet process)	3. Bargaining Power of Customers (High) a. Product substitution b. Product quality and implementation process c. There is not much information about modular at the retail customer and foreman level.
4. Bargaining Power of Suppliers (Moderate) a. Input differentiation b. Substitute supplier c. Supplier concentration d. Raw material quality	5. Competitive Competition (Low) a. High switching costs b. Brand identity c. Product differentiation Low concentration of players in the industry	

Source: Author Analysis from In-dept Interview Result (2022)

Capital Budgeting Analysis

The investment viability of Modular Building Construction Technology is determined using capital budgeting analysis. The criteria used in the computation are: Payback Period, Return on Investment, Net Present Value, Profitability Index, and Internal Rate of Return. The forecasting assumptions are shown in Table 4.3.

Table 4.3 Forecasting Assumption

Net Investment	IDR 100.000.000.000
Margin	20%
Price (By Cash)	IDR 120.000.000.000
Instalment Period	20 yr
Interest/Month	12%
Maintenance Cost	3%
Salvage Value	10%

Source: WIKA Data Calculation (2022)

From the forecasting assumptions above, the capital budgeting flow can be produced to assess whether the capital leasing strategy would yield higher profitability than the cash payment.

The detail of revenue obtained by WEGE per year from capital leasing strategy is presented in the Table below.

Table 4.4 Detail of Revenue

Year	Principal	Interest (15%)	Salvage Value	Total Revenue
1	6.000.000.000	IDR 18.000.000.000	IDR 600.000.000	23.400.000.000
2	6.000.000.000	IDR 17.100.000.000	IDR 600.000.000	22.500.000.000
3	6.000.000.000	IDR 16.200.000.000	IDR 600.000.000	21.600.000.000
4	6.000.000.000	IDR 15.300.000.000	IDR 600.000.000	20.700.000.000
5	6.000.000.000	IDR 14.400.000.000	IDR 600.000.000	19.800.000.000
6	6.000.000.000	IDR 13.500.000.000	IDR 600.000.000	18.900.000.000
7	6.000.000.000	IDR 12.600.000.000	IDR 600.000.000	18.000.000.000
8	6.000.000.000	IDR 11.700.000.000	IDR 600.000.000	17.100.000.000
9	6.000.000.000	IDR 10.800.000.000	IDR 600.000.000	16.200.000.000
10	6.000.000.000	IDR 9.900.000.000	IDR 600.000.000	15.300.000.000
11	6.000.000.000	IDR 9.000.000.000	IDR 600.000.000	14.400.000.000
12	6.000.000.000	IDR 8.100.000.000	IDR 600.000.000	13.500.000.000
13	6.000.000.000	IDR 7.200.000.000	IDR 600.000.000	12.600.000.000
14	6.000.000.000	IDR 6.300.000.000	IDR 600.000.000	11.700.000.000
15	6.000.000.000	IDR 5.400.000.000	IDR 600.000.000	10.800.000.000
16	6.000.000.000	IDR 4.500.000.000	IDR 600.000.000	9.900.000.000
17	6.000.000.000	IDR 3.600.000.000	IDR 600.000.000	9.000.000.000
18	6.000.000.000	IDR 2.700.000.000	IDR 600.000.000	8.100.000.000
19	6.000.000.000	IDR 1.800.000.000	IDR 600.000.000	7.200.000.000
20	6.000.000.000	IDR 900.000.000	IDR 600.000.000	6.300.000.000

From the calculation above, it can be derived the analysis of IRR, NPV, Payback Period, and ROI.

Table 4.5 Summary of Capital Budgeting Analysis

IRR	29.5%
NPV	IDR68,210,772,005.06
Payback Period	10 Year
ROI	52%

CONCLUSION

The first research objective was to identify the superiority or value added of the Modular Building Construction Technology compared to conventional. The outcome suggested that Modular Building Construction Technology is more superior, thus can be considered as competitive advantage of WEGE. This is based on an interview with WEGE's management using expert system and an examination of the product's competitive advantages in relation to external and internal analysis using SWOT analysis and the Five Porter Forces.

The second objective is to propose the capital strategy based on SWOT analysis. The result indicated that due to the **Opportunity No. 6**, WEGE may implement capital leasing strategy for Modular Building Construction Technology, which offer 20x payment instalment with detail payment depicts in Table 4.5. This aim to grasp wider demand of buyer due to different purchasing power of buyer.

The third goal of this research is to determine whether the Capital Leasing Strategy of Modular Building Construction Technology can successfully fulfil the management needs and resulting higher profitability compared to traditional one. Given that capital budgeting criteria were all accepted, WEGE may offer product resulting from Modular Building Construction Technology with leasing scheme or Capital Leasing Strategy.

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