

SELECTION OF ALTERNATIVE SCENARIOS FOR THE DEVELOPMENT OF INDONESIA'S SEA CABLE COMMUNICATION SYSTEM (SCCS) IN THE METAVERSE ERA (PT XYZ CASE STUDY)

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ABSTRACT

PT XYZ is a State-Owned Enterprise (BUMN) engaged in information and communication technology (ICT) services and telecommunications networks in Indonesia. The projection of increasing internet needs makes internet bandwidth even greater. The sea cable communication system (SKKL) available today is predicted to no longer be able to accommodate bandwidth needs, especially the internet, for the next few years. In addition, PT XYZ must also be able to anticipate serving the Metaverse. This study aims to determine alternative scenarios and the feasibility of building Indonesia's sea cable communication system (SKKL) in the metaverse era. This study discusses the selection of the best scenario from 4 scenarios with the discounted cash flow method and considers the EUAC of each scenario. The aspects to be studied are market, technical, and financial aspects. Market aspect data is obtained from the company's historical data, and demand forecasting is carried out using the linear regression method. The technical aspect is carried out by determining the business process, the scenario to be used, labor, and the details of investment costs. The financial aspect is done by calculating estimated revenue, income statement, and cash flow. Based on the results of the feasibility calculation, the NPV value was Rp.32,337,102,145,226, PBP of 3.2 years, and IRR of 44.43% with MARR of 14.8%. This research shows that the selected scenario is feasible to run.



Introduction

The internet is a medium that can be used to find the information needed. Everyone can use the internet easily and quickly (Wardani, 2021). In this day and age, the internet has become a daily necessity that cannot be abandoned. The need for the Internet increases yearly (Amalia & Nazar, 2015).

Statista 2019 data shows that internet users in Indonesia in 2018 were 95.2 million, growing 13.3% from 2017, which was 84 million (Amalia & Nazar, 2015). The following year, internet users in Indonesia will increase, with an average growth of 10.2% in 2018-2023. In 2019, the number of internet users in Indonesia is projected to grow by 12.6% compared to 2018, namely 107.2 million users. In 2023, Indonesia's internet users are projected to reach 150 million, as shown in Figure 1.

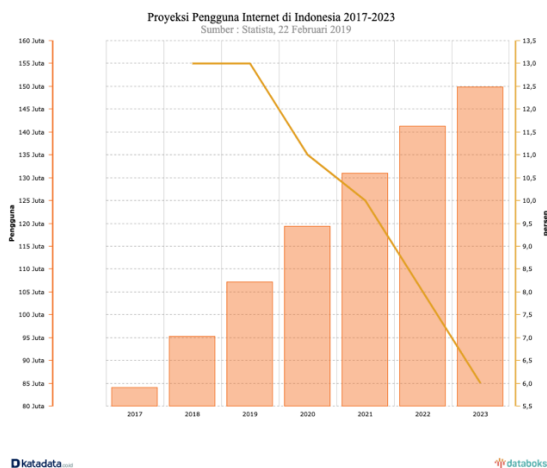


Figure 1
(Indonesian Internet User Projection)

Bandwidth measures the amount of information or data (bits) that can be sent from one place to another in one second (Priambodo, 2017). Bandwidth is related to internet usage. The wider the bandwidth, the faster internet access can be done. The projection of increasing internet needs makes internet bandwidth even greater. Therefore, media infrastructure with a larger capacity is needed. This is also what PT XYZ considers for building and developing Sea Cable Communication System (SCCS) infrastructure in Indonesia (Febriyanti & Mujiyati, 2021). The infrastructure that has been deployed is projected to be insufficient to accommodate the increasingly large bandwidth, especially the need for bandwidth between large islands in Indonesia, which can be solved with a Sea Cable Communication System (SCCS).

The Sea Cable Communication System (SCCS) available today is predicted to no longer be able to accommodate traffic needs, especially the internet, for the next few years. Indonesia's SCCS infrastructure is around 25.6 Tbps (Rhomyah, 2020). Meanwhile, according to the Minister of Communication and Information, the projected bandwidth capacity needed in 2025 will reach 55 Tbps, jumping three times greater than the existing bandwidth capacity 2020 of 18.1 Tbps (Ravyanda et al., 2014).

PT XYZ has a new SCCS program plan to answer bandwidth needs for the next 10 years. This program is a continuation of the previous SCCS development. The PT XYZ program also intends to support the Indonesian government (PALAPA RING) in building fiber optic cable infrastructure throughout Indonesia. In addition, PT XYZ must also be able to anticipate serving the Metaverse (Setiadamayanthi & Wirakusuma, 2016). One of the most well-known social media platforms in the internet universe, Facebook, has rebranded to signal and embrace futuristic ideas by lifting the term metaverse.

Metaverse itself is challenging to explain because it will not necessarily exist. However, considering that there are almost three billion people who use Facebook every month, it is necessary to anticipate if, in time, the metaverse will become a global digital product (Setiadamayanthi & Wirakusuma, 2016). A simple picture of the metaverse is a

set of virtual spaces where a person can create and browse with other internet users who are not in the same physical space as that person. Based on the existing conditions regarding SCCS, it is necessary to select alternative scenarios from Indonesia's SCCS development program in the metaverse era (Napitupulu & Latrini, 2022).

Business Feasibility Study

A business feasibility study is an activity that studies in depth a business or business to be run in order to determine whether or not the business is feasible to run (Mandolang, 2020). Feasibility analysis is an effort to determine an investment's feasibility level from various aspects with systematic and measurable stages. The objectives of the business feasibility study are:

- a. Avoid the risk of loss
- b. Make planning easy
- c. Facilitate the execution of work
- d. Facilitate supervision
- e. Easy control

Market and Marketing Aspects

The market aspect is an effort to determine the amount of market demand that will be received from the community and to place a favorable position for the project to be carried out. Marketing aspects are the main factors that need to be considered in analyzing the feasibility of a business, namely to ensure that the products or services to be offered later can be accepted by consumers.

Technical and Operational Aspects

Engineering and operation aspects are technical specifications of the overall facilities, infrastructure, and equipment required from the product or service to be offered. This aspect of engineering and operation begins with selecting product designs that suit the needs (Kadim, 2017). Analysis from the technical aspect is to assess the company's readiness to run its business by assessing the location determination, production area, layout, and readiness of the machines.

Research Methods

Systematics of problem-solving contains stages carried out to identify and solve existing problems. Figure 2 is a systematics of problem-solving in this study.

Selection Of Alternative Scenarios For The Development Of Indonesia's Sea Cable Communication System (SCCS) In The Metaverse Era (PT Xyz Case Study)



Figure 2
(Problem Solving Systematics)

The preliminary stage is the initial stage in the development research of SCCS Indonesia, where there is a background problem in this research. The preliminary stage contains problem identification, problem formulation, research objectives, limitations, and assumptions (Handayani, 2020). Furthermore, the data collection stage is carried out by collecting the data needed in this study. In this study, there are 2 types of data, namely primary data and secondary data.

The data processing stage is based on market, technical, operational, discounted cash flow, and financial aspects. Market aspect data is processed by calculating sales forecasting using demand forecasting that has been obtained. Data processing of technical and operational aspects is carried out by calculating material costs, investment costs, depreciation costs, maintenance costs, necessary equipment and facility costs. Discounted cash flow is processed by calculating the costs required from each scenario. Each year's costs are discounted to see a picture of the future value. Financial aspect data processing

is done by calculating production and operational costs obtained from processing data on the market and technical and operational aspects used to obtain revenue estimates.

After processing the data, the next stage is the analysis. Market aspects are analyzed by determining the results of the selected forecasting method. The analysis aims to estimate the market demand for SCCS Indonesia's development. Analysis of technical and operational aspects is carried out to produce information in the form of a technical picture, along with operational and maintenance costs. Discounted cash flow is carried out after an analysis of technical and operational aspects is obtained. This analysis determined the best scenario for developing Indonesia's SCCS. Financial feasibility analysis is carried out by calculating NPV, IRR and PBP. The results of the calculations will show whether or not the development of SCCS Indonesia is feasible.

After conducting the following analysis, conclusions and suggestions are reached. This stage contains overall conclusions about the best alternative scenario and whether or not the development of SCCS Indonesia is feasible after conducting the analysis stage. Furthermore, provide advice to the company based on the research that has been done.

Results and Discussion

a. Market Aspect

The market aspect is obtained from the company's historical data in the form of historical revenue data in the previous few years. The market aspect is carried out to estimate the amount of market demand. The method used to calculate demand estimation is linear regression. Figure 3 represents an estimated 10 Gbps link request.



Figure 3
(Demand Estimation)

b. Technical and Operational Aspects

Technical and operational aspects include the length of the cable built, product costs, labor requirements, and investment costs that will be used in calculating financial aspects.

The required workforce is determined from PT XYZ, located in 80 locations, 7 regional and central. In addition, there is an additional workforce of PT XYZ, which aims

to assist the activities needed to develop SCCS in the metaverse era. There are 118 core employees and 1881 indirect employees.

1. Alternative Scenarios

a. Scenario 1

Scenario 1 is to build all links on SCCS. The company will rebuild all links on SCCS spread across Indonesia to prepare for metaverse traffic needs. The calculation of investment costs will be carried out in 2024. The length of the cable to be built in scenario 1 is 77,496 kilometers. The calculation of investment costs obtained for scenario 1 is Rp.34,861,185,000,000.

b. Scenario 2

Scenario 2 is to build some links on SCCS. The company will build some links on SKKL, where the links to be built are those estimated to have insufficient capacity for metaverse traffic. The calculation of investment costs will be carried out in two years, namely 2024 and 2030. The total length of cables to be built from 2024 to 2030 is 39,696 kilometers, while the length of cables from 2031 to 2040 is 20,385 kilometers. So, the investment cost in 2024 is Rp.17,863,008,750,000, and the investment cost in 2030 is Rp.9,173,468,700,000.

c. Scenario 3

Scenario 3 is to build part of the link on SCCS and use CDN (Content et al.). The company will build some links on SCCS, where the links to be built are those estimated to have insufficient capacity for Metaverse traffic. In addition, companies use CDNs that aim to reduce bandwidth usage. In scenario 3, the number of locations that will use the CDN is based on historical data on the use of the CDN in the previous project. The CDN used is placed in 40 locations spread throughout Indonesia. The calculation of investment costs will be carried out in two years, namely 2024 and 2030. The total length of cables to be built from 2024 to 2030 is 36,926 kilometers, while the length of cables from 2031 to 2040 is 23,155 kilometers. So, the investment cost in 2024 is Rp.16,616,646,000,000, and the investment cost in 2030 is Rp.10,419,831,450,000.

d. Scenario 4

Scenario 4 is building links on SCCS and using CDN (Content et al.). The company will build some links on SCCS, where the links to be built are those estimated to have insufficient capacity for Metaverse traffic. In addition, companies use CDNs that aim to reduce bandwidth usage. In scenario 4, the number of locations using the CDN is based on the total SCCS transport link locations. The CDN used is placed in 80 locations spread throughout Indonesia. The calculation of investment costs will be carried out in two years, namely 2024 and 2030. The total length of cables to be built from 2024 to 2030 is 34,949 kilometers, while from 2031 to 2040 is 25,132 kilometers. So, the investment cost in 2024 is Rp.15,727,269,150,000, and the investment cost 2030 is Rp.11,309,208,300,000.

2. Discounted Cash Flow

The discounted cash flow method is used to determine the choice of an alternative by considering the time value of money. The selection of alternative scenarios is done

by calculating the present value of the costs incurred for each scenario. Furthermore, EUAC (Equivalent et al. Cost) calculations are carried out to determine annual costs. After knowing the EUAC value of each scenario, a comparison of EUAC values is made. Table 1 is an EUAC comparison of each scenario.

Table 1
(EUAC Comparison)

EUAC Comparison	
Scenario	MUSIC
Scenario 1	Rp8,95
Scenario 2	Rp6,683
Scenario 3	Rp6,590
Scenario 4	Rp6,511

Based on Table 1, the scenario with the smallest EUAC value is scenario 4, IDR 6,510,543,651,025.

a. Financial Aspect

Financial aspect analysis includes revenue estimates, income statements, and cash flow analysis. The estimated income from constructing SKKL links in the metaverse era is obtained from the multiplication between metaverse demand and SKKL link rental prices. The SKKL link rental price used is Rp.693,600,000. The link rental price used has a discount of 40%. Figure 4 estimates SKKL link development revenue in the metaverse era.

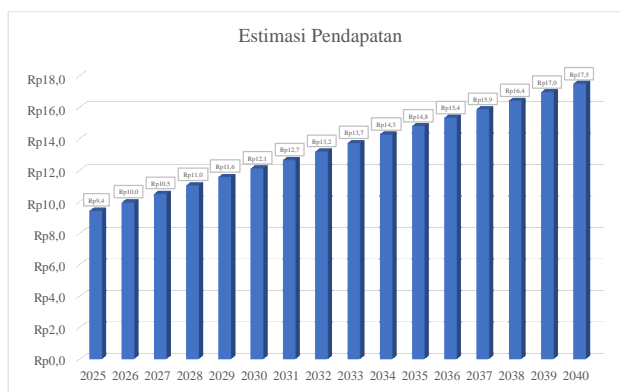


Figure 4
(Estimated Revenue)

Profit and loss is a financial statement to determine the company's financial condition. In the income statement, EAT (Earning After Tax) is obtained from the development of SCCS Indonesia in the metaverse era. Figure 5 is the EAT (earning after tax) of the development of SCCS Indonesia in the Metaverse era for each year.

Selection Of Alternative Scenarios For The Development Of Indonesia's Sea Cable Communication System (SCCS) In The Metaverse Era (PT Xyz Case Study)

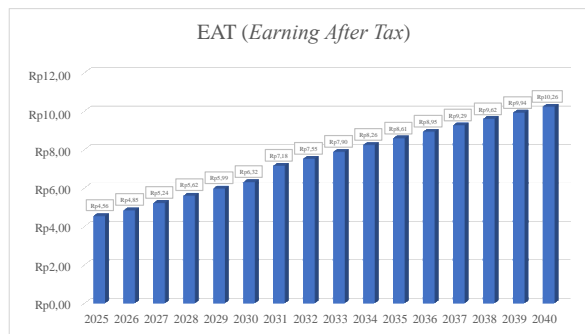


Figure 5
(Earning After Tax)

Based on Figure 5, the EAT value obtained each year increases. At the beginning of the use of SKKL in 2025, the EAT obtained was Rp.4,561,864,181,570. In 2040, the EAT obtained was Rp.10,256,986,707,068.

The cash flow statement is a financial statement that contains information on cash flows in and out of the company. The cash flow statement obtains the final cash balance for each year. Figure 6 represents the final cash balance for each year in units of trillion rupiah.

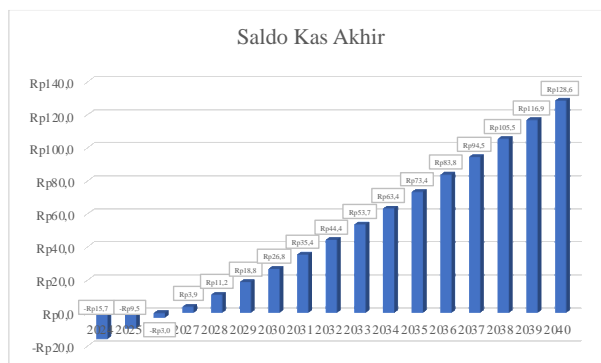


Figure 6
(Final Cash Balance)

Based on Figure 6, the final cash balance obtained each year tends to increase. In 2024, the cash balance reaches a negative number because that year is the initial year of SKKL development, so some costs must be paid. In 2040, the final cash balance obtained is Rp.128,590,977,766,189.

b. Qualification Analysis

The feasibility analysis calculation is carried out using three methods, namely Net Present Value (NPV), Payback Period (PBP), and Internal Rate of Return (IRR). The MARR value based on PT XYZ's provisions is 14.8%. Table 2 represents each scenario's NPV, PBP, and IRR results.

Table 2

(Eligibility Calculation Result)

Scenario	NPV	PBP	IRR
1	Rp12,9	8,82	20,92%
2	Rp30,4	3,69	39,68%
3	Rp31,5	3,40	42,29%
4	Rp32,3	3,20	44,43%

Based on the calculation results, an NPV value of Rp.32,337,102,145,226 was obtained, and the NPV value was >0. So, it can be concluded that the development of SKKL Indonesia in the metaverse era using the NPV method is feasible. An effort is considered feasible if the payback period obtained is shorter than the maximum period calculated. Based on the calculation results, a payback period value of 3.2 years is obtained. So, it can be concluded that the development of SCCS Indonesia in the metaverse era using the payback period method is feasible. Based on the calculation results, the IRR value is 44.43%, then the IRR value is > MARR. So, it can be concluded that the development of SCCS Indonesia in the metaverse era using the payback period method is feasible.

Conclusion

Based on the results and discussion, demand forecasting is carried out from 2024 to 2040 using linear regression. There are 4 alternative scenarios in this study. Based on the EUAC calculation results of each scenario, the scenario that has the smallest EUAC value is scenario 4. So, the selected scenario is scenario 4. The technical and operational scheme of scenario 4 is that development is carried out by building part of the link on SCCS and using CDN (Content et al.). The company will build some links on SCCS, where the links to be built are those estimated to have insufficient capacity for metaverse traffic. In addition, companies use CDNs that aim to reduce bandwidth usage. In scenario 4, the number of locations that will use CDNs is based on the total SKKL link locations, which is 80 CDNs. The calculation of investment costs is carried out in 2 stages, namely in 2024 and 2030. Investment costs 2024 are IDR 15,727,269,150,000, and investment costs in 2030 are IDR 11,309,208,300,000. The calculation of financial feasibility is carried out by 3 methods: NPV, PBP, and IRR. Based on the calculation results, the NPV value was Rp.32,337,102,145,226, PBP of 3.2 years, and IRR of 44.43% with MARR of 14.8%. Based on these results, it can be said that the development of SKKL Indonesia for metaverse needs is feasible to run.

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Auliya Zahra, Endang Chumaidiyah, Meldi Rendra

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