



How Feasibility Study Guides An Execution Of Project Development

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ABSTRACT

The author intends to show that a feasibility study is not the only indicator of an investment or project because a feasibility study is developed based on assumptions and collected data. The more complete and more relevant the collected data, the better qualified the study for management decision-making. On the other hand, if the data is insufficient or irrelevant, the Feasibility study could be misleading information for management decision making. The type of study is usually treated as a Pre-Feasibility Study ("Pre-FS"); therefore, it still needs further development to become a feasibility study. The feasibility study needs certain criteria to be met as guidance for project development. This paper is based on the author's independent research, which still lacks criteria to be classified as a feasibility study, therefore from another perspective, a reader could treat this study only as a Pre-FS. This article intends to present an example of an initiation project prepared with the approach of a study of an investment plan and is accompanied by a follow-up. It does not matter whether the project plan is feasible; what is important here is the benefits of preparing an FS to be input in making further decisions. The author takes a purposive sample of the government's plans to build a Kulon Progo airport in the administrative area of the Special Region of Yogyakarta. Transportation from and to the planned airport is served by various modes, including passenger transportation by train. Moreover, this study specifically discusses the pre-feasibility of investment in passenger transportation by rail based on various assumptions and data obtained at the beginning of planning. Discounted cash flow method (DCF) is used to determine the project's financial feasibility. Based on the simulation, the project is considered not financially feasible. The government can improve the project feasibility by giving some injection (e.g., Passenger Service Obligation, viability gap funding, etc.), but due to research limitations, a further study should be conducted to measure the project's economic benefits. Through the sample project plans analyzed, this article only provides an example of how a feasibility study can guide decision-making on the implementation of a planned project. Maybe the data used is no longer appropriate, but the purpose mentioned above is more for the academic interest of the discipline of knowledge about feasibility studies.

Keywords: the uses of feasibility study, investment criteria, discounted cash flow, EBITDA, free cash flow, improve feasibility study.

1. Introduction

Investment is utilizing resources of a certain amount of money into a business to get adequate returns. Business plans, especially those that require large amounts of funds, require a review first, whether the business to be carried out is profitable or not. The tool to assess whether the business plan was profitable or not is called a business feasibility study. If the definition of investment is sharpened by the opinion of Francis, (1991) which stated that an investment is a commitment of money that is expected to generate additional money, then we can argue that for an investment that in the end does not provide additional money, the investment is called not a real investment. Therefore, it is necessary to be careful in making investments. Several rational attitudes are needed to plan investment in a project for the construction of physical facilities and infrastructure.

a) Ideas to develop a business must be supported by data on the business environment that has the opportunity to be entered.

b) Markets and industries to be entered should be properly assessed so that comprehensive information on potential demand is properly projected.

c) Financing needs for business infrastructure development must be calculated carefully to provide certainty of the amount of investment in the project development plan.

d) An investigation of the technology's ability to operate within the timeframe according to the investment objectives is carried out due to its economic benefits.

e) The investment plan is written into a feasibility study based on the adequacy of data and information, then compiled according to the usual stages. If necessary, a preliminary study (pre-FS) is carried out at the initial stage. Research should cover all relevant business aspects be scientifically reviewed and integrated by considering the need for time, cost, and other resources to produce a feasibility assessment based on correct principles and with accountable conclusions.



2. Identify the problem

In many cases, there is still neglect of the study process that should be done before deciding to invest in developing a business. Even if it is done often only with observations that are not in-depth, it creates problems of uncertainty or validity of research results when the decision is about to be taken. Not infrequently, there is coercion of the will of certain authorities according to various interests. As far as they can be harmonized, these interests do not have the potential to cause conflict and can avoid being unproductive. In general, problems in the preparation of a feasibility study can be identified, including the following:

a) The design of infrastructure development does not fully accommodate the intended business development concept. Infrastructure development whose design is not accurate creates uncertainty in the implementation method of development. It can cause swelling of the project value and ultimately require a revision of the plan. As the investment grows in value, achieving the expected returns will be more difficult and make the project unfeasible. The implication is that it is necessary to review the results of previous studies. Therefore, to maintain the certainty of the need for financing (CAPEX), the cost of developing infrastructure and investment facilities must be ascertained. Then to be able to maintain the amount of the CAPEX value, it is necessary to control efforts in the implementation of its development. About controlling construction costs, Olawale and Sun (2010) conducted quantitative and qualitative research on the Construction Industry in the UK. The top five factors inhibiting time and cost control in construction practice in the UK were revealed as design changes, risks, and uncertainties; inaccurate evaluation of project time/duration; the complexity of works and; non-performance of subcontractors. The design change is the single most important factor considered by practitioners as hindering the ability to control not only the time of construction projects but also cost. Cunningham (2017), successful projects are those that are delivered safely to the required quality standards, on time, and within budget. The effective management of costs is a vital element in achieving these objectives. Clients rightly expect that the final cost of their projects should not exceed the approved budget, and indeed for some, cost certainty may be their main priority. The primary aim of cost control is to prevent cost overruns. Husen (2011), if the results of the information system indicate that there are cost deviations from the predetermined standard, the next action is to make corrections, such as changing the implementation method, incurring costs for additional labor, equipment, and materials as well as scheduling improvements, improving the quality of work that is

adjusted with actual standards and needs. Discussing the arrangement of the feasibility study, an indication of the swelling of construction costs also occurs in the ongoing Jakarta Bandung (KCJB) high-speed rail project. During the Commission VI Hearing Meeting (RDP) of the House of Representatives, September 1, 2021, it was explained that the initial cost of building KCJB was 6.07 billion US dollars or around Rp86.5 trillion. With the estimated budget swelling reaching 8 billion US dollars, it means that there is an increase of around 1.9 billion US dollars, or equivalent to Rp27.09 trillion. There was an increase of approximately 1.9 billion US dollars with the composition of Engineering, Procurement and Construction (EPC) and Non-EPC, 80 percent to 20 percent. As a plan to save the Indonesia-China cooperation project, President Joko Widodo (Jokowi) then signed Presidential Regulation (Perpres) Number 93 of 2021, which is an amendment to Presidential Regulation Number 107 of 2015, concerning the Acceleration of the Implementation of Infrastructure and Facilities for the Jakarta-Bandung high-speed train⁴.

b) Market research results do not provide a comprehensive picture of potential demand. Demand projections that deviate significantly from plans create problems in income streaming. The amount of income that is not sufficient to cover costs causes the availability of free cash flow to decrease and can even be in deficit. The implication is that the feasibility study must be reviewed by including stakeholder actions that can reduce costs or provide subsidies to meet operating income. Atwell, P. (2022), in a business feasibility study, a market assessment is done to determine whether the market is ready for your business idea. In a cultural feasibility study, it would be wise to study the "cultural market" or the group of people in the existing or planned cultural pool to determine whether they are ready for a cultural shift. If they are not ready, the study can move to what actions you need to take to prepare them. To make cultural changes, your target market has to be willing to accept them,

c) One reason for doing a feasibility study is to get an expert opinion on whether or not it makes sense to move forward with a project. The idea is to reduce risk and identify potential problems, threats (and opportunities) that may only become clear after deeper research and analysis. The project cannot start until the feasibility study is completed. So time is a factor. But if the feasibility study is done too quickly, the odds of missing, or underestimating, one or more important factors is high. Yet many clients want to rush through the feasibility process so they can get on with their project. This usually leads to failure (Clarke, A. and



Kelleher, R., 2022). In avoiding Pitfalls in Feasibility Studies, Hikcs (2012) discussed in a symposium some common mistakes made in the preparation of feasibility studies in the phosphate industry. Two relevant topics discussed among other topics are inadequate prospect data and unrealistic project schedules. Inadequate prospect data give conclusions that lead to poor economic decisions. Problems of unrealistic project schedule, there is often a fear of the commitment of funds until the last possible moment, as well as the ever-present environmental issues, which threaten to cancel the project. These forces lead the owner to delay the start of the project until the last possible moment, which causes the project to concurrently perform activities that should be sequential. When you hear the words “Fast Track”, you can be sure that elements of the project will not be performed in the proper sequence. This often leads to extensive rework. In a properly sequenced project, the feasibility may be determined earlier and for less cost than for a fast track project, thus avoiding needless expenditure on accelerated activities for a project that ultimately proves not to be feasible.

d) A feasibility study is part of the initial design stage of any project/plan. It is conducted to objectively uncover the strengths and weaknesses of a proposed project or an existing business. It can help to identify and assess the opportunities and threats present in the natural environment, the resources required for the project, and the prospects for success. It is conducted to find answers to the following questions: 1) Does the company possess the required resources and technology? 2) Will the company receive a sufficiently high return on its investment? (CFI Education Inc., 2022). Mistakes in choosing the technology of production facilities. The operating system of infrastructure and production/operational facilities that are not by customer service will be detrimental due to decreased organizational performance. This will result in the non-fulfillment of investment returns. The implication is that it is necessary to re-plan and modify the financing scheme to minimize losses and maintain or increase the project's feasibility, so it is possible to update the feasibility study using value engineering (VE) analysis. Levinson (2012), high capital costs and passengers' demand play a significant role to attract business entities, high-speed train business projects. VE generates value by proposing more benefits over cost. Meredith and Mantel JR (2006), can be used in any project where the relevant cost trade-offs can be estimated. Berawi, M.A (2018) through his research proposed a change in the feasibility study of the High-Speed Train HST Jakarta Surabaya Project using the VE approach. His study aims to improve the feasibility

of the project by producing a conceptual design of the Jakarta-Surabaya high-speed train in Indonesia. Value engineering was used to evaluate both the technical and financial aspects of the project. Value engineering implementation in the HST project development has transformed a single function project from transporting people into a multifunction project. Additional functions that have been identified are transit-oriented development (TOD), fiber optic, tourism, and solar cell. Added value from the innovative function enables the project to reach an expected value of feasibility through a significant internal rate of return (IRR) and positive net present value Figure 8. Institutional framework for HST project development in Indonesia. Improving Feasibility of High-Speed Train Project: Creating Added Value

<http://dx.doi.org/10.5772/intechopen.74288> 199 (NPV). Before the value engineering method, the single-function project only reaches 5.20% of IRR. Meanwhile, the additional function has been successfully improving the IRR value by 12.30%. Furthermore, the public-private partnership scheme elaborates the division of responsibility between government and business entities about financing the project. The result increases the IRR value to 16.1%. Thus, a collaboration between value engineering and the public-private partnership is a package to improve project feasibility, particularly railway development to reach its expected outcome from stakeholders' perspective.

e) Natural factors that can undermine planning. Natural disasters, monetary crises, and pandemic disease outbreaks on a global scale can significantly change project plans and even stop them. The implication is that the feasibility study must be remade from scratch. Apart from the case of project cost overruns due to correction of design changes and so on, the Covid-19 pandemic is also accused of being the main factor causing delays in project development, which ultimately impacts KCJB's costs to swell.

The issues that can be considered in the preparation of the study may refer to the following state of the problem:

1. Investment value (CAPEX) is not accurate.
2. The assumptions used cannot guide which way the research is carried out according to the objectives.
3. Conclusions have been formulated in the sponsor's wish to be stated in the study results.
4. Research is not in-depth and comprehensive to dig up information.
5. Feasibility studies were prepared in a hurry to meet the project development implementation schedule.

With the problems identified above, the result is that the study results become unreliable. The results of the study were not as expected. A further implication of this incident is the necessity of correcting the study results. A feasibility study



review should be carried out to meet the original objectives. The expectation from the improvement of this feasibility study is that everything that is projected can be seen as more realistic and acceptable. Because of that, we often see several projects being reviewed for their feasibility studies.

3. Research Objectives

Based on the above thinking, the objectives of this research are:

1. A trusted feasibility study will guide the implementation of the investment in the direction it should be based on the previously stated planning assumptions.
2. Provide an understanding that the feasibility study prepared properly is a consideration tool that should be used in making investment decisions.
3. Finding the conclusion that the feasibility study, which is not carried out in-depth and does not accommodate comprehensive data, will result in inaccurate and unreliable study results so that improvements need to be made.
4. A good feasibility study provides benefits for various interests, especially for large-scale investments.

For this reason, the author intends to describe a feasibility study in the initial process of preparation whose results are based on the assumptions used, showing unfavorable calculations, so for certain reasons at the end, and it is recommended to include several actions that have the potential to encourage investment plans to be feasible. The idea for a change in responding to this phenomenon is not merely forcing investments. The study becomes feasible but proposes proportionally for stakeholders to take roles according to their positions and authorities according to the norm. By using several references to the improvement of the feasibility study, and based on the purpose of writing, in the next section, as stated above, the author presents an example of Pre-FS that the author has compiled, namely a study of the "Kulon Progo Airport Train" development project in Yogyakarta, Indonesia.

4. The Project

The Government of Indonesia plans to relocate the current Yogyakarta Airport named Adi Sucipto International Airport to a new location in Kulon Progo. The distance of the proposed airport will be about 45 km from Yogyakarta city. The Government plans to build an airport train that connects Tugu station to the airport. Yogyakarta is one of the autonomous Special Regions in Indonesia, with 3.7 million or 1.4% of Indonesia's total population (2015). The regional economy has enjoyed stable economic growth and in 2015 booked GDP growth of 5.2%. Yogyakarta is also known as one of the country's main travel destinations, as it is a focal point for education and tourism. Key tourism sites include the Borobudur Temple, Prambanan Temple, and Malioboro Street. As such, Adisutjipto Airport attracts 13.6 thousand air travelers per day, of which $\pm 95\%$ are estimated to be domestic

by origin (Indonesian). The center of Yogyakarta is already highly congested and cannot sustain further business growth without improved public transportation infrastructures.

The current capacity of Adisutjipto Airport (designed for 1.2 million people per year) is not sufficient to accommodate the number of passengers that has grown to approximately 6.2 million people per annum in 2014. Thus, this has created the need to relocate to a new location. The new airport location (in Kulon Progo) is farther from Yogyakarta city, estimated to be ± 45 km away, which will create demand for a new mode of transport from and to Yogyakarta city.

In this case, the train could be the new alternative mode of land transport for airport users. The train is the fastest and safest mode of transportation commonly used by airport users. Train service is generally considered beneficial for major tourist destination airports. Many passengers do not have their vehicles (compared with mainly origin airports, where passengers are traveling from dispersed homes) and are all traveling to the city center. For such high-volume surface routes, the train is considered the most efficient mode of mass transport.

This research study will examine the financial feasibility of the proposed Yogyakarta airport train service, measured by project Net Present Value ("NPV"). This research only measures the project feasibility from a financial perspective and does not measure other factors like economic impact, technical feasibility, etc. Data used in this research was gathered from BPS Statistics Indonesia, Angkasa Pura I as the airport operator, and PT KAI as the rail operator appointed by the Government.

5. Limitations

1. The research sample is only for one project, namely the Yogyakarta International Airport Train Project in Kulon Progo.
2. The research has not compared the facts after all airport infrastructure has been built and the airport train has operated.

6. Literature review

6.1 Definition and benefits

The feasibility study is the initial design stage of any project, which brings together the elements of knowledge that indicate if a project is possible or not. A feasibility study includes an estimate of the level of expertise required for a project and who can provide it, quantitative and qualitative assessments of other essential resources, identification of critical points, a general timetable, and a general cost estimate. (My Accounting Course.com, 2022). A feasibility study is designed to discover if a business or project is "feasible" or if it is not: (In short, does the business or project warrant further investment of time, money, and further study or is it a non-starter). A feasibility study is a relatively inexpensive way to safeguard any wastage of further investment (will it work or won't it). If a project is seen to be feasible from the results of the study, the next logical step is to commission a full business



plan. (Thomson, 2003). In the context of project management, a feasibility study is a study that is done to determine options and whether the preferred or optimum option for a particular project is can achieve the desired objectives and sustainable given the likely resources available. The feasibility study can also be defined as an analysis of the viability of an idea. The feasibility study focuses on helping answer the essential question of “should we proceed with the proposed project idea. A project is any planned, temporary endeavor undertaken to create a unique product, service, or other complete and definite outcomes (deliverable) within a limited resource time scale and budget and normally requires mobilization of resources from different disciplines. Project management is the planning, organizing, directing, and controlling of resources for a relatively short-term objective that has been established to complete specific goals and objectives. Project management therefore can be described as the means, techniques, and concepts used to run a project and achieve its objectives. (Siddharth, 2020). What is meant by a business project feasibility study is research on whether or not a business project can be implemented successfully. In general, a business project feasibility study provides three benefits, namely: 1) the economic benefits of the business project itself, meaning whether the project is profitable when compared to the project risks, 2) the project benefits for the country where the project is implemented, and 3) the project's social benefits for the surrounding community (Husnan and Muhammad, 2014). One of the important issues in a business feasibility study includes conducting an analysis of risk anticipation with the aim of mapping risks and mitigating future losses. At the same time, the benefits of implementation include convenience in planning and controlling the implementation of the planned investment. Finally, with the construction of a project, the study also analyzes how much it contributes to the environment. The feasibility study results are in the form of a report stating whether the project or investment plan is feasible or not to be implemented. This feasibility is obtained from a thorough analysis of the project investment plan. Hofstrand and Wright (2020), conducting a feasibility study is always beneficial to the project, as it gives a clearer picture of the proposed project. For instance, some of the key benefits from conducting a feasibility study are: improves project team focus, identifies new opportunities, provides valuable information for the “go/no go” decision, narrows the business alternatives, identifies the valid reason(s) to undertake the project, enhances the success rate through evaluating multiple parameters, aids decision-making on the project, identifies reasons to not proceed. Regarding the study results, Umar (2015) stated that various interested parties need the report on the results of the business feasibility study: **1) Investors.** If the feasibility study results that have been made turn out to be feasible, the fulfillment of funding needs can be started. For this reason, the owner of the capital will explore the feasibility study report whether the project is profitable and there is a

guarantee for the safety of the invested capital. **2) Creditors.** Projects can be financed with Bank loan funds. The Bank will decide to provide the credit needed to review the study made. **3) Company Management.** Regardless of which party the study is made from, the results in the form of profit are needed by the company and the need for project funding arrangements from own funds (investors) or loan funds. **4) Government and Society.** The preparation of feasibility study needs to pay attention to government policies because, after all, the government can, directly or indirectly, influence company policies. **5) For Economic Development Goals.** The costs and benefits of the project on the national economy need to be analyzed concerning the national development plan, including the distribution of added value to the community, social effects and benefits, and others.

6.2 Aspects covered in the study

Several aspects are generally contained in the feasibility study, namely internal and external aspects of the organization. Internal aspects include marketing management, technology, production issues, HR organization and management, and financial management. Meanwhile, the most important external aspect is the market aspect (demand & supply of products and market structure), in addition to political, economic, social, legal, and environmental factors that need to be considered for their significant influence on internal business. Proportionately and according to their relevance, all aspects are ideally evaluated to determine their viability. However, at the initial stage (pre-FS), the main and first aspect of being analyzed is the market potential and the project's ability to sell the results. This marketing performance is very important because it is the main determinant of the project's income stream. Therefore, market and marketing research is generally carried out in the early stages of the study being developed. The next important factor is the capability of technology and the pattern of operations that are expected to support the marketing performance. In addition to supporting marketing, financial data is needed to calculate the initial investment or capital expenditure (“CAPEX”) and operating costs for project operation or operating expenditure (“opex”).

The first pole of the business environment model is the market aspect. An assessment of market aspects is important because no business project is successful without a demand for the goods/services produced by the project. Market aspect analysis aims, among other things, to find out how big the market is, demand growth, and market share of the product in question. While the feasibility analysis of the main marketing aspects in terms of determining segments, targets, and product positions in the market, studies to find out potential consumers, and determining strategies, policies, and marketing programs that will be carried out (Umar, 2015). The need to discuss aspects of the market, marketing, and operating cost forecasts in the early stages of the analysis is a common pattern of a feasibility study. One example of a study conducted by Arga, Susetyo, and Syafwandi (2021) used the Delphi method in



choosing which aspects were the most dominant to be discussed first in a feasibility study. The conducted research is a Feasibility Study of Railway Construction Project as Intermodal Transportation in Tanjung Perak Port, Indonesia. The results of the Delphi Method show that the financial aspect and market aspect are the dominant parameters in the feasibility study of the railway construction project. Perera et al (2014), the Delphi method is designed to obtain the most reliable consensus from the selection of qualified experts, by a series of intensive questionnaires interspersed with an iterative process (rounds of questioning).

After all of the relevant aspects have been accommodated, it is then finally arrived at the financial aspect analysis to determine the feasibility and sensitivity of the planned project. Thus, the financial analysis will provide an overview of the feasibility of the project. Theoretically, investment feasibility can be stated in several criteria.

6.3 Investment Criteria

Van Horne (1992), the investment decision will be either to accept or to reject the proposal. In this section, we evaluate four methods of capital budgeting:

a) The average rate of return (ARR)

This accounting measure represents the ratio of the average annual profits after taxes to the investment in the project. The higher the ratio and cash achieved is better.

b) Payback

The payback period of an investment project tells us the number of years required to recover our initial cash investment. If the payback calculation is less than some maximum acceptable payback period, the proposal is accepted; if not, it is rejected.

c) Internal rate of return (IRR)

The internal rate of return of an investment proposal is the discount rate that equates the present value of the expected cash outflows with the present value of the expected inflows. It is represented by that rate, r , such that

$$\sum_{t=0}^n \frac{A_t}{(1+r)^t} = 0$$

Where A_t is the cash flow for period t , whether it be a net cash outflow or inflow, and n is the last period in which a cash flow is expected. If the initial cash outlay or cost occurs at time 0.

The acceptance criterion generally employed with the internal rate-of-return method is to compare the internal rate of return with a required rate of return, known also as the cutoff, or hurdle, rate. If the internal rate of return exceeds the required rate, the project is accepted; if not, it is rejected.

d) Net present value (NPV)

Like the internal rate-of-return method, the present value method is a discounted cash flow approach to capital budgeting. With the present-value method, all cash flows are

discounted to present value, using the required rate of return. The net present value of an investment proposal is

$$NPV = \sum_{t=0}^n \frac{A_t}{(1+k)^t} = 0$$

where k is the required rate of return. If the sum of these discounted cash flows is zero or more, the proposal is accepted; if not, it is rejected. Another way to express the accepted criterion is to say that the project will be accepted if the present value of cash flows exceeds the present value of cash outflows.

Tang (2003). Underlying principles of discounted cash flow (DCF) method, the DCF method is based on the discount of the future cash flows by taking account of the time value of money. The DCF method, like the equivalent annual cost method, also automatically allows the initial investment to depreciate over the life of the project. Since IRR is calculated based on the outstanding balance (or the undepreciated part) of the capital invested, having allowed for net incomes to offset against the investment.

Brealey and Myers (1991). Here then we have two equivalent decision rules for capital investment: 1) *Net present value rules*. Accept investments that have positive net present values. 2) *Rate of return rule*. Accept investments that offer rates of return over their opportunity costs of capital.

6.4 EBITDA and Free cash flow (FCF)

Another important accounting measure that is widely used by managers, analysts, and bank loan officers are EBITDA, which stands for earnings before interest, taxes, depreciation, and amortization. Because neither depreciation nor amortization is paid in cash, EBITDA is a better measure of cash flow than is net income. FCF is the cash flow available for distribution to investors after the company has made all the investments in fixed assets and working capital necessary to sustain ongoing operations (Brigham and Daves, 2002).

7. Research Methodology

This research adopts a combination of quantitative and qualitative approaches. This study uses a field survey method conducted at PT Kereta Api Indonesia (PT KAI) and then obtains secondary data from other sources. The study is equipped with a literature review supported by relevant previous research results. The author takes a purposive sample from the government's plan to build Kulon Progo airport in the administrative area of the Special Region of Yogyakarta. Transportation to and from the planned airport is served by various modes, including passenger transportation by train.

Moreover, this study specifically discusses the pre-feasibility of investment in passenger transportation by rail based on various assumptions and data obtained at the beginning of planning. In conducting the survey, the author also interviewed the Management Team of PT. KAI, as the only railway operator in Indonesia, and other relevant agencies. After the data has been described, financial feasibility is calculated using the discounted cash flow method



(DCF) on the free cash flow projections. Thus this study perspective measures the feasibility of the project from a financial



A feasibility study leads to how successfully a project can be completed, accounting for factors that affect it, such as economic, technological, legal, and scheduling factors. Project managers use feasibility studies to determine potential positive and negative outcomes before investing a considerable amount of time and money into it¹. The feasibility study is the initial design stage of any project, which brings together the elements of knowledge that indicate whether a project is possible or not², an investigation carried out by a company or other organization that examines whether a planned business activity or project is likely to be successful³

A feasibility study tests the viability of an idea, a project, or even a new business. A feasibility study aims to determine potential problems that could occur if a project is

implemented and determine whether the project should be pursued after considering all the significant factors. Furthermore, a feasibility study also assesses the potential obstacles, competition, and funding requirements to implement the business. In addition, a feasibility study also includes the project estimation provided by an expert that captures qualitative and quantitative assessment, as well as identification of critical points, the project timeline, and general cost estimation.

Research about Thinking of the preliminary by Sharkawy (2005) stated that a pre-FS is prepared based on available data in a published form that can be easily collected and worked out. A complete and integrated feasibility study should be conducted if the pre-FS is considered viable and appears to be practical to implement.

Projected Average Passengers/Days in Kulon Progo Airport			
Year	High	Medium	Low
2000A	1,666	1,666	1,666
2005A	7,009	7,009	7,009
2010A	10,111	10,111	10,111
2011A	11,759	11,759	11,759
2012A	13,578	13,578	13,578
2016F	20,734	20,099	17,137
2021F	30,419	26,408	19,688
2026F	39,107	31,567	24,296
2031F	46,948	37,460	29,351
2036F	55,674	44,630	35,134
2041F	65,726	53,195	39,619

Source: GVK

8. Proposed Kulon Progo Airport Location

As depicted in the above picture, compared to the current airport, the distance of Kulon Progo Airport is much further from Yogyakarta city than the current airport (which is about 40 km away from Yogyakarta city). Currently, the main access to Kulon Progo Airport is via JL Nasional III, with at least 3 meters width per lane and a base capacity of around 3,000 passenger car units (PCU)/hour (two directions). Other road access is via JL Daendels Pantai Selatan, with at least a 2.8 m width per lane and a base capacity of around 2,800 PCU/hour (two directions). Given that the capacity of the

existing road is considered narrow, it is most likely that the road could not accommodate the current traffic volume once the project is completed. To overcome the situation, the government planned to improve accessibility to the Kulon Progo area, including the following:

- a) The widening road and the improvement of road class in JL Daendels Pantai Selatan were expected to be performed in 2019.
- b) Development of a 30 km toll road that will connect the city of Yogyakarta and the new airport (expected to be performed in 2025; currently, the government



has assigned Toll Road Regulatory (BPJT) to implement the toll road development.

c) The development of a ±40 km railway link of the Kulon Progo Airport to Yogyakarta (was expected to be performed in 2019. Currently, the government has assigned the “Ditjen” Perkeretaapian or Directorate General of Railways as an implementer of this project).

If the entire plan to improve accessibility to the new airport is realized, the new airport will be accessed by at least four main access routes, consisting of three roads and one railway.

9. Market Projections

9.1 Projection for Kulon Progo Airport Passengers

The main assumption used in this study is the projected number of passengers of Kulon Progo Airport generated by Angkasa Pura I and an Indian airport operator named GVK in 2012. The historical data presented are the number of passengers in Adisutjipto Airport. It is currently assumed that it will serve no commercial flights, the number of passengers will be fully transferred to the Kulon Progo Airport.

The projection for the number of passengers was carried out by GVK (2012) using the econometric regression model based on the historical correlation between air traffic in Adisutjipto International Airport and the Gross Domestic Regional Product (“GDRP”) data for Yogyakarta and its national GDP. Estimates of future growth until 2019 have been developed using an econometric regression model and estimates of the economic growth in Indonesia made by Moody’s.

Estimated economic growth rates have also been adjusted to reflect the economic growth of Yogyakarta, which is slower compared to the national average. The results of econometric models were then also influenced by factors such as infrastructure development and competition with the airport in Surakarta. The following is the projected average passengers/day of Kulon Progo Airport.

Based on the projected number of passengers per year in Kulon Progo Airport, it can be assumed that the average daily passengers of Kulon Progo Airport would be around

20,000 passengers per day in 2016 (by dividing annual passengers by 365 days) and will continue to increase until reaching approximately 53,000 passengers per day in 2041. The following charts depict the projection conducted by GVK.

9.2 Market Survey

In this research, the writer gathered data from KAI, as KAI has conducted a demand survey to ascertain the current airport passengers' willingness to pay (“WTP”). The total number of respondents obtained from the survey was 370 respondents. The data set collected is likely to have a 6% margin of error with a 95% confidence interval.

The market survey shows that about 52% of the departing passengers came from Yogyakarta City, 18% came from DIY (outside Yogyakarta city), and 30% from outside DIY. While about 56% of the arriving passengers' destinations were within Yogyakarta City and Sleman, the other arriving passengers were going to locations outside Yogyakarta City.

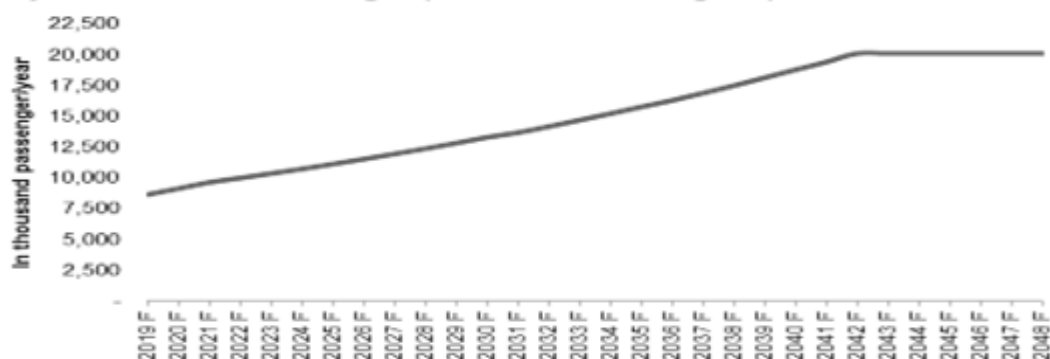
Based on the survey results, 20% of airport passengers are willing to pay IDR 50,000, and only about 75% of them stated that they would use the airport train or tend to use the airport train. Thus, if the Kulon Progo Airport train’s fare is IDR 50,000 for one trip, it is estimated that there will only be about 15% of the number of passengers in Kulon Progo Airport that would use the airport train each day. Thus the 15% is used as the mid-case scenario.

In addition, if it is assumed that the airport passengers who will use the airport train are only passengers bound for or coming from the city of Yogyakarta, Sleman, and Solo, then the number of airport train passengers can only reach about 12% of the total airport passengers. Thus, this figure is used as the low case scenario.

Furthermore, if it is assumed that all the existing airport train passengers will keep using the train as their airport access mode, then the number of airport train passengers could reach about 21% of the total airport passengers. Thus, this figure is used as the high case scenario.

The following figure depicts the projection of Kulon Progo Airport Train Passenger forecasted by combining the WTP level and airport passenger projection data from Angkasa Pura I.

Projected Numbers of Passengers per Year at Kulon Progo Airport



Source: Processed data



9.3 Benchmark with Other Airport Train Services in Asia

To check whether the assumption used in this research is considered rational, the writer compared other airport train services in Asia. Based on the research, it is also known that the market share of airport trains varies from 15% to 36%;

thus, the assumption of 12% - 21% of market share for the proposed Kulon Progo airport rail link is still in between the benchmarks. The following table depicts the comparison of market share and characteristics of airport trains in cities in Asia.

Airport	Rail share (%)	Road travel time (minutes)	Rail travel time (minutes)	Ratio of road travel time to train travel time	Distance from city centre (km)	Dedicated airport service?	Average fare/km in 2015 (IDR/km)	GDP per capita (million IDR)
Narita	36%	90	55	1.6	40	Yes	5,200	586
Hong Kong	28%	35	23	1.5	21	Yes	5,000	452
Suvarnabhumi	26%	34	15	2.3	32	Yes	1,200	142
Indira Gandhi	18%	35	25	1.4	17	Yes	530	47
KLIA	15%	50	30	1.7	57	Yes	3,150	257

Source: Various external sources, researcher analysis

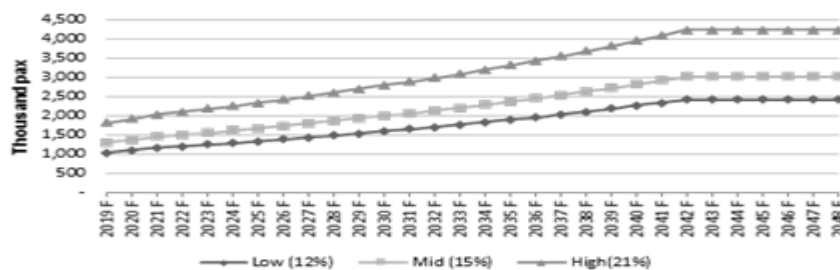
10. Research Assumptions

10.1 Tariff Assumptions

In this research, the tariff used is IDR 50,000, following the current top 20% of passengers' WTP. Tariff

escalation is assumed to occur once every two years, with the escalation rate based on the current inflation rate of 5.5% per year.

Kulon Progo Airport Train Forecast



Source: GVK

10.2 Operational Assumptions

Operational assumptions are based on the demand forecast and the frequency assumption of train services every 30 minutes. In addition, the journey time is assumed to be completed in 50 minutes for each direction with 10 minutes of dwelling time. Therefore, it is estimated that the round trip will be 120 minutes. In reaching that level of service, it is estimated that the project will require an initial purchase of five trainsets comprising four cards with a capacity of 40 passengers per car. The airport train service is assumed to be operated for 18 hours per day; thus, there will be 36 roundtrips per day.

10.3 Capital Expenditure (“CAPEX”) Assumptions

As of the date of this document, KAI as the project owner is still formulating the detailed project CAPEX budget. It is, therefore, important to note that the CAPEX amounts presented are still preliminary estimates based on benchmarking and under discussions with KAI. Although the projected CAPEX is still in discussion, the author used the figure below as the basis for financial calculation. The total Capex is projected to be around IDR 1.27 trillion with three years of completion based on the data. Details of Capex are depicted in the following table.

Projected Capex for Kulon Progo Airport Train Service

IDR In million	FY2016	FY2017	FY2018	Total Capex
A.) Infrastructure				
1.) Track and bridge construction	-	229,990	-	229,990
2.) Overhead electric power line	-	100,031	-	100,031
3.) Telecommunication	-	4,510	-	4,510
4.) Signalling	-	120,270	-	120,270
6.) Land compensation	101,250	106,819	-	208,069
6.) Building compensation	-	-	-	-
7.) Fence /wall	-	11,394	-	11,394
8.) Operational station (renovation)	-	15,825	-	15,825
9.) City air terminal	-	-	244,866	244,866
Total Infrastructure capex	101,260	688,839	244,866	934,866
B.) Rolling Stock				
1.) Initial outlay (first order)	-	-	276,577	276,577
2.) Future additional capacity (Mid case)	-	-	-	-
Total rolling stock capex	-	-	276,577	276,577
Total project capex	101,260	688,839	521,443	1,211,632
Contingency adjustment (5%)	5,063	29,442	26,072	60,577
Total capex after contingency factor	106,313	818,281	547,515	1,272,108

Source: Interview with KAI



10.4 Operating Costs (“Opex”) Assumptions

Maintenance and repair cost: Maintenance for rolling stock is assumed to be performed through a Maintenance Service Agreement (“MSA”) with the vendor. Our analysis has assumed a rolling stock maintenance cost rate similar to the prevailing contractual rate for the Kualanamu service. The cost is projected to be 10% of the purchase value of the rolling stock. On the other hand, we assume that the infrastructure maintenance of the project will be reimbursable to the government.

Fuel and electricity cost is forecasted based on the total train service distance (“KMKA”) and the unit price of electricity for every kilometer traveled. The estimated unit price per KMKA for electricity has been benchmarked to KCJ. It assumes that the Kulon Progo Airport Train will use a DC system similar to the one in place in Jabodetabek. As it is one of the highest variable costs of the operation, it is estimated to increase in proportion to other costs as the project becomes larger.

Salary expense: is divided into two classifications, operational salaries, and general salaries.

Operational salaries are paid to operational staff such as train operators, technicians, and platform supervisors. The number of staff for each position will remain the same throughout the project life, and the increase in these costs is due to a yearly wage increase. Cost related to staff uniforms will also be allocated to operational salaries. The table above

10.5 Fixed Asset and Working Capital Assumptions

Fixed asset	Depreciation method	Useful life	Order/ Construction period
Rolling stock	Straight line	15 years	1 year
Infrastructure	Straight line	30 years	3 years
Facilities	Straight line	30 years	3 years

The above table summarizes the useful life and depreciation method for the project’s fixed assets. The initial rolling stock acquisition will be fully depreciated by 2033, and the depreciation cost for the remaining year will be based on the additional acquisition of rolling stock in 2034. Infrastructure includes double track constructed, city air

10.6 Project Structure and Cost of Capital Assumptions

summarizes the assumption used for the mid-case regarding operational staff.

General salaries are estimated to be approximately the same amount as incurred in the Kualanamu operation. For this analysis, we have assumed that an organization of similar size will back it. The number is assumed to be fixed in nature and will grow by an inflation rate of 5.5%.

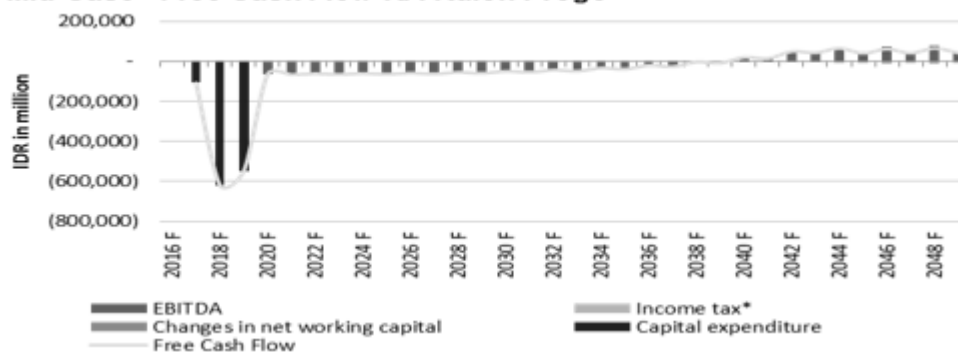
General and Administrative cost: consists of other general expenses, marketing & advertising, and research & development cost. Similarly, benchmarking analysis against the Kualanamu operations has been performed in estimating such costs incurred in the operation of the project (Kualanamu Airport Train, Medan, North Sumatera, and Indonesia).

Infrastructure sharing cost: The results from the usage of the railway infrastructure are owned by the government by the operations. Such infrastructure may include but is not limited to the track, catenary network, and signaling infrastructures. We have assumed an annual sharing cost contribution amounting to 15% of the projected revenue. As a comparison, Commuterline KAI’s infrastructure sharing cost comprises on average 16% of the total revenue in the last three years.

Other expenses include insurance, on-train cleaning, and security & safety costs. Both on-train cleaning and security & service costs use Kualanamu Airport, Medan, and North Sumatera as benchmarks. Meanwhile, the insurance cost is 1.5% of the yearly revenue.

terminal (Tugu Station), electrical powerhouse, and overhead power lines. All of these assets have 30 years of useful life. Assets considered facilities consist of telecommunication and signaling facilities, Kedundang Station, and some fencing along the tracks.

Mid Case - Free Cash Flow KA Kulon Progo





In preparing the financial projections, it is assumed that the Kulon Progo Airport Train project will construct the infrastructure and then transfer the ownership (Build Operate Transfer scheme) of the 4.5 km rail track to the Government of Indonesia (through the Ministry of Transportation) to obtain the legal concession for +30 years. It is considered a limited life project and not a going concern. The forecast has been prepared until the year 2048.

In terms of cost of capital, in this research, the author used 13% of the cost of capital which is gathered from PT KAI's hurdle rate.

Calculation the feasibility

To measure the project's feasibility, the author used the free cash flow method to calculate the project NPV. If the project NPV is higher or greater than zero, the project can be considered financially viable and vice versa. The formula for free cash flow is shown in the following formula:

The Free Cash Flow of the Project was calculated based on:

EBITDA

+ Change in net working capital

(-) Capital expenditure

(-) Income tax*

Note : * EBT × tax rate(25%)

The change in net working capital was calculated based on:

Decrease/(increase) in accounts receivable balance

+(-) Decrease/(increase) in inventory balance

+(-) Increase/(decrease) in accounts payable

11. Discussion

11.1 Results

Based on the assumptions mentioned above, the project is considered financially feasible by using the free cash flow approach, which is reflected from the negative NPV, both

in using a 13% and 8.8% discount rate. Moreover, the payback period, the simulation shows that the project will not be repaid until the concession period (in all three cases). Details of free cash flow and financial results are depicted in the table below.

Assumption / Indicator	Low Case	Mid Case	High Case
Base tariff	IDR 50,000 (in 2019)		
Market share (% of airport passengers)	12.00%	15.00%	21.00%
Infrastructure capex* (IDR in billion)	981.7		
Rolling stock capex* (IDR in billion)	276.6	276.6	476.9
NPV at WACC 13% (IDR in billion)	-1,435.0	-1,292.9	-1,065.5
NPV at Government cost of borrowing 8.8% (IDR in billion)	-1,715.3	-1,449.7	-1,046.5

11.2 What next?

Based on the assumptions used and the limitations of data, conclusions may be drawn but may not be sufficient to describe the entire project. The result of the financial calculation shows the temporary conclusion that the project is estimated to be not financially viable. There are; therefore, there are several steps that could be taken to improve financial feasibility, such as:

11.2.1 Develop non-ticket revenue

The revenue stream from passenger transportation does not seem to cover all costs, namely operational costs, including maintenance costs for facilities and other costs; it is necessary to develop a non-ticket income. Non-fare box

businesses generally include advertising, retail, telecommunications, and property. So, it is recommended that the project start doing advertising business in train facilities.

11.2.2 Support from Public Service Obligation (PSO)

Public Service Obligation is the Government's obligation to pay the difference in tariffs for the difference in tariff determination by the Government and the tariff calculated by the service provider (Regulation of the Minister of Transportation Indonesia KM. 29, 2010). The project provides benefits to local communities by providing accessible public mass transport. For such purposes, the project may be eligible to receive PSO. Further assessment needs to be performed to measure the economic benefit from the project so



that the public sector can provide support such as PSO or other incentives (e.g., viability gap funding, availability payment).

11.2.3 Support from the Airport

Part of the CAPEX and operational cost of the train service should be borne by the airport, which receives the benefit of the airport train carrying airport passengers directly to the airport.

11.2.4 Longer Concession Period

If the project's default 30-year concession period is not sufficient to capitalize on the cash flow, it should consider requesting a longer concession period.

11.2.5 Provision of Alternative Services

The project should consider other revenue streams. For example, the rental income is from transit-oriented development, service extension to Solo (Central Java), car park, or feeder buses.

This conclusion may still change subject to assumptions, the project funding scheme, and new supporting data.

12. Conclusion and Implications

We finally understand that a feasibility study investigates the viability of a potential business, namely: 1) whether the project is a worthy investment, or 2) whether the project cannot be carried out because it will not be profitable or requires too many resources to constrain it. It is common for

a feasibility study to be prepared early before a full trial is carried out to refine it into a feasibility study that can truly serve as a guide in carrying out correct and profitable investments.

Conducting a feasibility study is a good business practice. From examining successful businesses, we will find that they do not enter into a new business without thoroughly examining all issues and assessing the probability of success. By studying the various opinions and research results above, below are the points of strengthening the reasons why conducting a feasibility study. A good feasibility study should provide guidelines for:

1. focus on the project and describe alternatives,
2. direct the choice of business alternatives,
3. identify new opportunities through the investigative process,
4. identify reasons (if) not to proceed,
5. increase the likelihood of success by addressing and mitigating factors that can affect the project early on,
6. provide quality information for decision making,
7. provide documentation that the business plan has been thoroughly investigated,
8. help secure funding from lending institutions and other sources of financing, and
9. help attract investment capital.

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¹<http://www.bps.go.id/>

²<https://www.investopedia.com/terms/f/feasibility-study.asp#ixzz55dWTMXsR>

³www.kliaexpress.com

⁴<https://money.kompas.com/read/2021/10/10/230600926/biaya-kereta-cepat-jakarta-bandung-membengkak-rp-27-74-triliun?page=all>.

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