

# Decision Making on Options for Development of Rest Area Facilities According to Highest And Best Use Using the Analytic Network Process Method (Case Study: Rest Area on Trans Sumatera Toll Road Tebing Tinggi–Parapat Section)

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## Abstract

The paper establishes and analyzes research regarding community needs for the concept of rest areas on the Trans Sumatra Toll Road Section of Tebing Tinggi - Parapat. The background of the research is due to the fact that the current planning of rest areas is still not effective yet in concept and does not pay much attention to the commercial aspect. Even though with the optimal commercial side of the rest area, the cost of maintaining the rest area can be funded from the income earned. Thus, the Company does not need to incur additional costs for maintenance, considering the Company's financial burden due to the construction of JTTS which is not financially feasible. The analysis used in this study is the Analytic Network Process (ANP) Model which will later be divided into 3 clusters namely the destination cluster, the criteria cluster, and the alternative cluster. The objective cluster is the final goal to be achieved in this study. Cluster criteria is the assessment criteria used in this study based on analysis of existing benchmark rest areas, literature studies, and expert validation. Alternative cluster is development options obtained from the results of the highest and best use analysis.

*Keywords:* The Concept of Rest Area; Analytic Network Process; Trans Sumatera Toll Road.

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## 1. Introduction

Sumatra Island is an island that has great potential, based on its natural wealth such as rubber, palm oil, coffee, coal and natural gas (Zebua, 2016), with contribution to the Indonesian economy by 22.09% in 2022 or the second largest after the island of Java. The potential of the island of Sumatra can be further optimized by developing toll road accessibility, where through Presidential Regulation no. 100 of 2014 which was later updated through Presidential Regulation no. 117 of 2015, the Government assigned PT Hutama Karya (Persero) to build, develop, and operate 24 (twenty four) sections of the Trans Sumatra Toll Road. Construction has started since 2014, and the construction of phase 1 JTTS is targeted to be completed in 2024.

The construction of the Trans Sumatra Toll Road (JTTS) is included in the category of government strategic projects that are not financially feasible but economically feasible, so that the Assignment of the Trans Sumatra Toll Road (JTTS) is projected to burden the company's financial projections, where PT Hutama Karya (Persero) will experience benefits from the assignment of JTTS start in 2030. This is happen due to the income obtained from traffic or daily traffic is still not enough, so there is a need for creative development in order to increase traffic generation and generate other income for the company apart from traffic (Value Capture). One of the value capture opportunities that can be realized soon is by carrying out developments with a not too large investment value, namely optimizing rest areas as destinations for toll road users and the surrounding community.

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A rest area is a place designated as a temporary resting place on the toll road with complete facilities and infrastructure for toll road users who experience fatigue due to long trips (Setyabudi, 2011). Rest areas are not just refueling and commercial area but relaxation facilities due (Laskara, 2021). Rest area facilities must meet technical aspects and planning criteria that function to create a compact public area as a toll road support function, a mixed function of rest, commercial, and vehicle maintenance that ensures the visual quality of the area and has an impact on the local economy (Al-Kaisy, Veneziano, Kirkemo, & Dorrington, 2012). Currently, the rest area that has been built in JTTS does not yet have optimal commercial value. One of the reasons is the planning of the rest area which has minimal concept and does not pay much attention to the commercial aspect. Even though with the optimal commercial side of the rest area, the cost of maintaining the rest area can be funded from the income earned. Thus, the Company does not need to incur additional costs for maintenance, considering the Company's financial burden due to the construction of JTTS which is not financially feasible. Lesson learned from the construction of the rest area, becomes a lesson for future rest area planning that must be carefully conceptualized from a commercial perspective, also taking into account the needs and wishes of potential users of the rest area, namely the community.

The concept of a commercial rest area is prepared based on the HBU (Highest and best use) analysis. Furthermore, from the results of the HBU analysis, the options for developing rest areas are validated against potential toll road users, surrounding communities, and business actors in rest areas as well as the general public. So that the concept of the rest area to be built has appeal and reflects the needs of the community and business actors, which will also have an impact on increasing toll road traffic and can even bring up the desire of the public to want to pass the toll road because there are rest areas that have attractiveness.

Therefore, researchers feel the need to do research on the community's needs for the concept of rest areas on the Tebing Tinggi-Parapat Trans Sumatra Toll Road so that people are interested in using the Trans Sumatra Toll Road as a means of mobilization and as a tourist destination.

## 2. Literature Review

### 2.1. Rest Area

Rest area (TIP) is the facility available along highways or toll roads, which is designed to make it easier for road users to rest, refuel, eat and carry out other activities. These facilities generally consist of toilets, parking lots, children's play areas, places to eat and drink, as well as several other facilities that can be used by road users.

According to the Federal Highway Administration, rest areas are facilities along highways managed and operated by the government or private sector, which aim to facilitate rest, refueling, and other needs for road users. Rest areas are also known as stopovers or rest stops and have an important role in providing highway and toll road services. A number of studies and journals have revealed the positive impact caused by the existence of rest areas on toll roads. Here are some of them:

- a. Reduce fatigue and improve driving safety. Rest areas can help reduce fatigue and avoid accidents caused by fatigue while driving. Rest areas on toll roads have succeeded in reducing the number of accidents and driver fatigue. In addition, research by (Li et al., 2014) show that rest areas on toll roads can help reduce fatigue and improve driving safety.
- b. Improving toll road efficiency. Rest areas can help improve toll road efficiency by facilitating refueling, facilitating access to and from toll roads, and providing vehicle maintenance services. According to research by (Guo, He, & Chai, 2020), rest areas on toll roads can increase toll road efficiency and provide a positive experience for road users.
- c. Provide a positive experience for road users. Rest areas can also provide a positive experience for road users by providing comfortable and quality facilities. According to research by (Li et al., 2014), rest areas on roads can increase user satisfaction and provide positive experiences for road users.

In order to optimize the use of rest areas from a functional and commercial perspective, a development concept is needed that suits user needs, so that rest areas can provide better service, according to Minister of Public Works and Public Housing Regulation Number 28 of 2021 concerning Rest Areas and Services on Roads Toll Road Article 43, there are several classifications of TIP development, including:

- a. Adding certain product promotion areas and regions as well as MSME promotions. By adding this facility, TIP visitors can find out more about local products around the area. This will provide benefits for both

visitors and local entrepreneurs, because their products can be more easily accessed by TIP visitors by adding certain product promotion areas and areas as well as promotion of MSMEs is one form of TIP development that can be carried out.

- b. TIP can also be developed by adding a transfer location area for people and goods or logistics. By adding this facility, entrepreneurs who need a place to send goods can more easily find the right location, as well as make it easier for people who need access to transportation to travel.
- c. TIP development can also be directed at building tourist destinations or industrial areas around TIP. This will provide added value for TIP visitors, because they can travel while traveling or visit industrial areas around the TIP area.

However, in developing TIP, it should be noted that any changes or developments must pay attention to aspects such as safety, cleanliness and comfort. In addition, TIP development must also pay attention to the needs and desires of toll road users in order to provide optimal service and meet the expectations of TIP visitors.

## 2.2. Market Research

Market research or market research is a process of collecting and analyzing data about markets and customers to help companies understand the preferences, behavior and needs of their customers. The goal is to identify opportunities and challenges in the market, understand competitors' positions, and develop effective business strategies.

The market research process consists of several stages, such as planning research, collecting data, analyzing data, and preparing research reports. Several techniques used in market research include surveys, interviews, secondary data analysis, and field observations.

By conducting market research, companies can understand their markets and customers better, so they can develop products or services that suit customer needs, improve product or service quality, determine the right price, and develop effective marketing strategies.

## 2.3. Analytic Network Process Methods

According to (Saragih, 2013) the Analytical Network Process (ANP) is a decision support model developed by Thomas L. Saaty. ANP is designed to help researchers determine alternative priorities in a complex decision and involves several interrelated criteria/decision support systems. There are 4 basic principles in ANP, namely hierarchy in decision making, interaction between criteria and alternatives, weighting on criteria and alternatives, a mathematical approach. In this study, researchers will follow the basic principles of using ANP, among others, by forming a hierarchical model (objectives, criteria, and alternatives) according to research needs, determining interactions between criteria and alternatives according to the model that has been formed, carrying out weighting and mathematical calculations so that it will produce a final decision of the model that has been formed. The research will also use the help of super decision software in processing the ANP model.

## 3. Research Method and Materials

In this study, the Analytic Network Process Model was used which will later be divided into 3 clusters, namely the objective cluster, the criteria cluster, and the alternative cluster. The objective cluster is the final goal to be achieved in this study. Cluster criteria are the assessment criteria used in this study based on analysis of existing benchmark rest areas, literature studies, and expert validation. Alternative clusters are development options obtained from the results of the highest and best use analysis.

Comparison is made based on the judgment of the decision maker by assessing the level of importance of an element. Relative importance values are determined with a scale of 1 to 9 Saaty which will be shown in Table 1.

The data collection carried out in this study was obtained from two data sources, namely primary and secondary data sources. The following is an explanation of the primary data sources and secondary data used in the research:

- a. Primary Data. There are two types of primary data used in this study. The first primary data is the results of expert interviews aimed at validating the alternatives and criteria that have been determined based on benchmark analysis and literature studies. Furthermore, the second primary data in this study is the result of

collecting data through questionnaires to the community to find out the needs and interests of the community regarding the development of rest areas. This questionnaire was distributed digitally using the Facebook Ads and Instagram Ads platforms, where surveys can be carried out in an appropriate manner according to the social media user's profile.

- b. Secondary Data. The secondary data used in this study is a literature study obtained from adjustments to theory and previous research, books, journals, and information from the internet that are related to the topics in this study.

**Tabel 1.** Relative Importance Values

Value	Definition	Explanation
1	Just as important	Both elements are equally important
3	A little more important	One element is slightly more important than the other
5	More important	One element is more important than the other
7	Much more important	One element is clearly more important than the other elements
9	Mutlak lebih penting	Absolutely more important
2,4,6,8	The values are midway between two adjacent considerations	Values between two adjacent judgment values

The population in the research review are practitioners, experts, and the community around the Tebing Tinggi - Parapat toll road. The selection of the sample in this study was based on the understanding and experience of the subjects related to the rest area on the Trans Sumatra Toll Road (JTTS). The method used in the selection of sampling is purposive sampling method. Purposive sampling is a sampling method that is chosen carefully so that it is relevant to the research structure. Sampling was selected by the author according to specific characteristics and certain characteristics.

#### 4. Results and Discussion

##### 4.1. Analytic Network Process Methods

In this study, the determination of the number of samples/respondents was calculated using the G-Power statistical software which took into account several criteria, namely the Correlation  $\rho$  H1, which is the desired effect size or correlation value,  $\alpha$  error probability, which is the level of significance that is tolerated, and Power ( $1 - \beta$  err prob) which is the expected statistical power.

Based on the results of processing using the G-Power software and according to predetermined criteria values, the minimum number of samples required in this study was obtained, namely 23 samples/respondents, but this study will use 30 samples to reduce the probability of inconsistencies occurring (Figure 1). Respondent data collection was carried out using a survey through the website assisted by Facebook & Instagram ads tools. The following is a website survey display.

The profile of the intended community for this questionnaire survey includes:

- a. Age 25 to 55 years
- b. Domiciled in North Sumatra
- c. Car users and toll road users
- d. Having transit experience in Rest Areas
- e. Preferably having driving experience from the city of origin to Parapat City (the city where Lake Toba is located), according to the location of the research object which is located on the Toll Road to and from Parapat.

With the profiles of the respondents above, it is hoped that the results of this research are relevant and right on target to be realized into real development. Questionnaires were distributed for 28 days to get responses from respondents. During the 28 days of displaying the questionnaire advertisement on the digital platform, 61 respondents were obtained. Of the 61 respondents, a filtering process was carried out to take 30 valid samples/respondents so that they were relevant to this study.

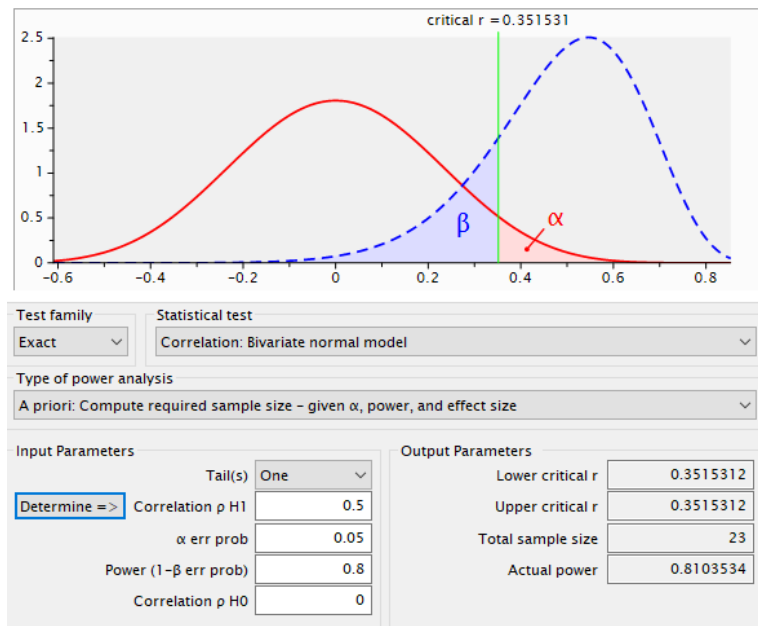


Figure 1. G-Power Statistical Software.

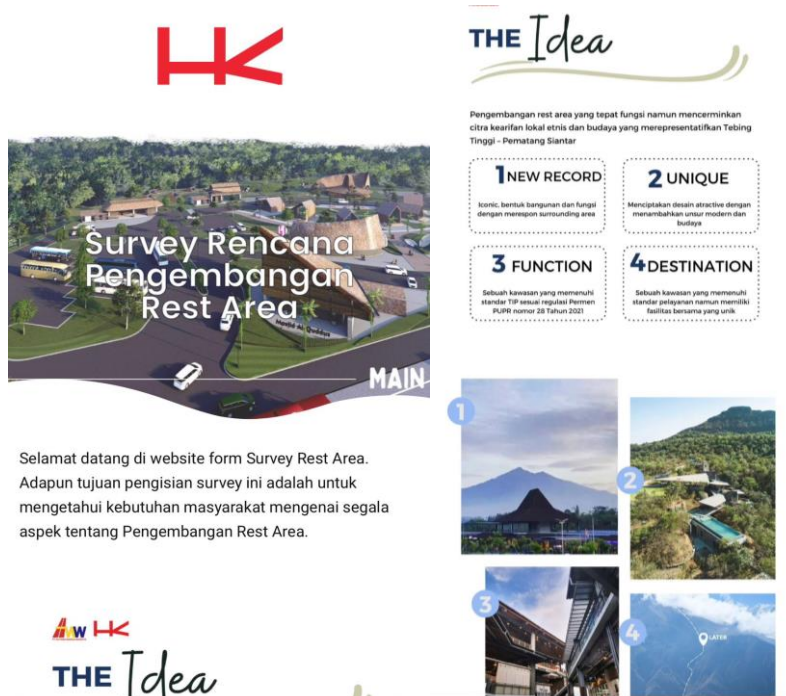
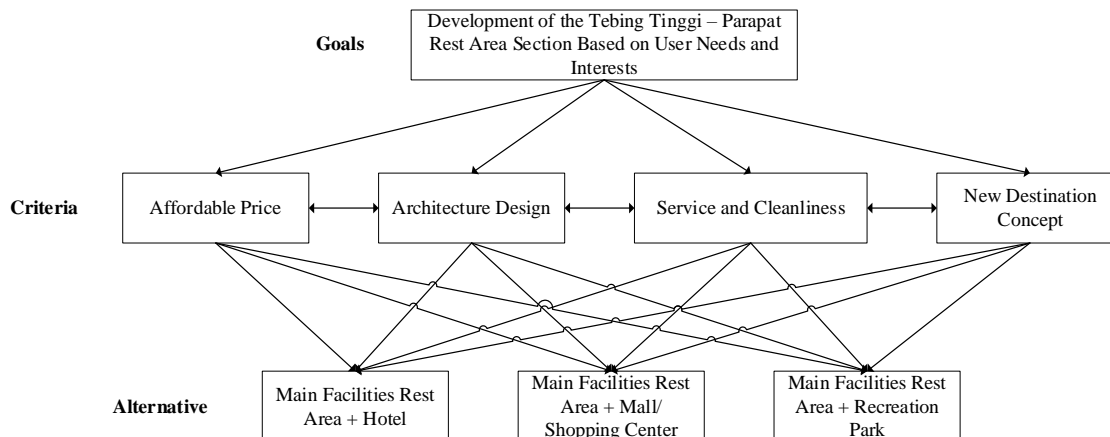


Figure 2. Website Survei Display

#### 4.2. Analytic Network Process Methods

Based on primary and secondary data validation, the results of the analytic network process (ANP) model are as follows:



**Figure 3.** Analytic Network Process (ANP)

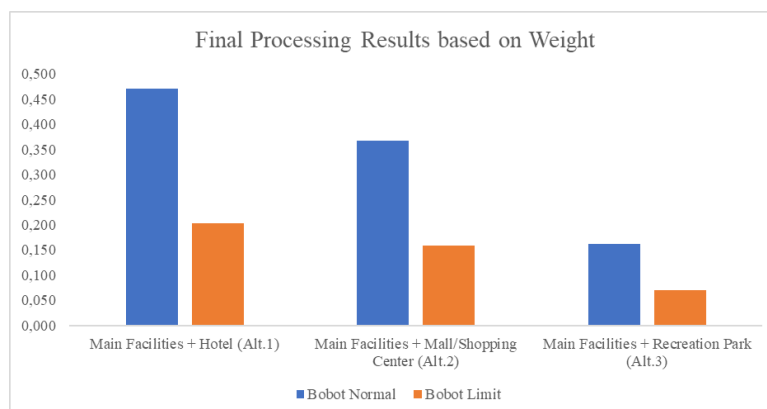
The structure of the ANP network in this study consists of three clusters, namely the objective cluster, the criteria cluster, and the alternative cluster. The assessment criteria used in this study were based on benchmark analysis of existing rest areas, literature studies, and expert validation, namely affordable prices, architectural design, service & cleanliness, new destination concepts. Based on the results of the highest and best use analysis, there are 3 development alternatives used in alternative clusters, including:

- a. Development of rest area with main facilities + hotel/inn.
- b. Development of rest areas with main facilities + malls/shopping centers.
- c. Development of rest areas with main facilities + recreational parks.

Based on the results of processing using super decision software that calculates the value of the limit weight and normal weight, the following results are obtained:

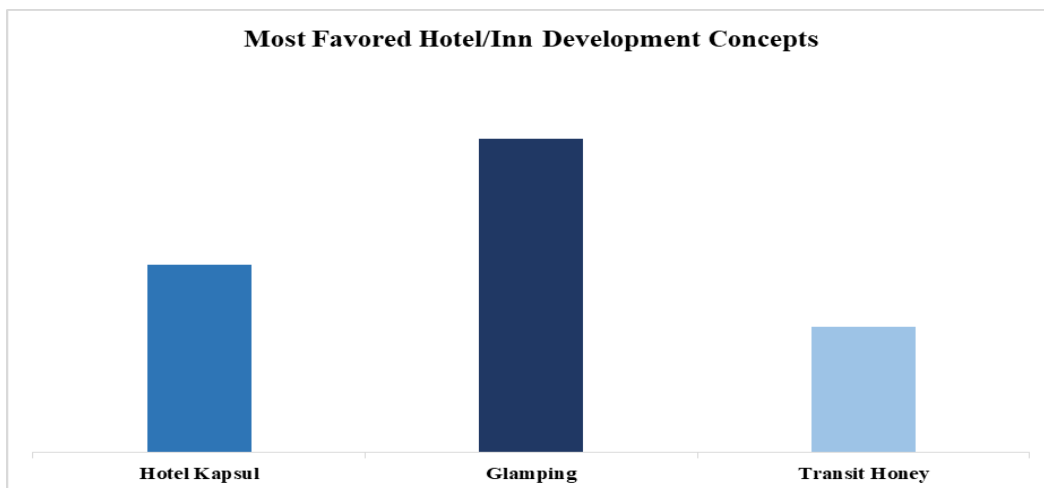
**Table 2.** Final Processing Result

Name	Normal Weight	Limit Weight
Main Facilities + Hotel (Alt.1)	0,471	0,203
Main Facilities + Mall/Shopping Center (Alt.2)	0,367	0,159
Main Facilities + Recreation Park (Alt.3)	0,161	0,070

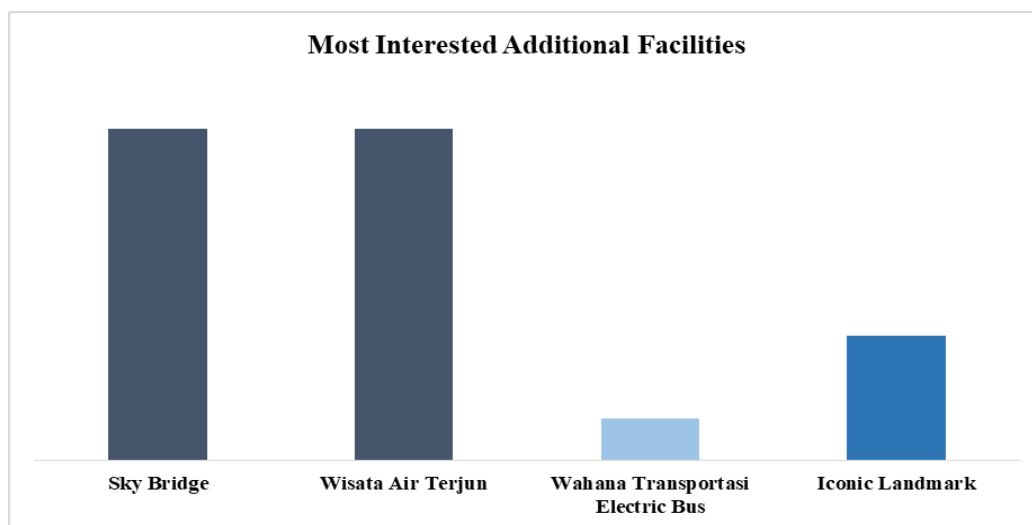


**Figure 4.** Final Processing Result

Based on the results of processing using the analytic network process method, it was found that the development of the rest area of section 49 desired by the community was the development of a rest area with main facilities + hotel/inn. From these results, a follow-up survey was carried out to find out what hotel/inn development concepts are in demand by people who will use the rest area. Apart from developing hotels/inns, researchers also plan to add several additional ride facility options in rest areas such as sky bridges, waterfall tours, electric bus transportation rides, and iconic landmarks, therefore, to determine the best option a survey of additional ride facilities is also carried out. demand by the rest area user community. The following are the results of the survey:



**Figure 5.** Most Favored Hotel/Inn Development Concepts



**Figure 6.** Most Interested Additional Facilities

## 5. Conclusion

Based on the explanation above, the appropriate concept options to be applied to the rest area of the Trans Sumatra Toll Road Section Tebing Tinggi–Parapat KM 49 are as follows: Main facilities include prayer facilities (mosques), restaurants, and other facilities in accordance with the regulations of the Minister of Public Works and Public Housing No. 28 of 2021 as fulfillment of minimum service standards. Additional development options are in accordance with the Highest and Best Use analysis that has been described in CHAPTER IV, including Hotels/Inns/Transit Points, Commercial Areas and Recreation Parks. The criteria tested in the Analytic Network Process (ANP) are affordable prices, attractive architectural designs, service and cleanliness as well as new destination concepts.

Among the options mentioned above that best suit the needs of the community based on market test results and the Analytic Network Process (ANP) are the Main Facilities equipped with Hotels/Lodgings with the main criteria being Service and Cleanliness.

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