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Analysis of Development Planning for Infrastructure with Land Consolidation Concept in the Mandalika Special Economic Zone (SEZ)

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ABSTRACT

Mandalika Special Economic Zone (SEZ) a national priority super tourism destination. The plan for holding an international MotoGP event requires the preparation of supporting infrastructure development. One of the pressing issues needing resolution is land conditions for permanent relocation. From a technical point of view, the land is still in the form of terracing, road access to the location is heavily damaged and some of the roads are unpaved. In addition, the relocation settlement area does not yet have public infrastructure. In this study sought to determine a strategy of funding sources for infrastructure development as well as priority factors for planning the development of infrastructure with the concept of land consolidation. The analysis in this study was carried out using Analytical Hierarchy Process (AHP) technique, showing that environmental factors had the highest weight of 0.414, followed by infrastructural with 0.295, economy with 0.157 and social factors with 0.133. For alternative factors, accessibility had a weight of 0.167, price had a weight of 0.148, quality had a weight of 0.161, location had a weight of 0.201, infrastructure had a weight of 0.176 and tradition had a weight of 0.144.



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1. Introduction

Current development flagship programs of the Government of Central Lombok Regency are focused on 3 (three) priority sectors based on superior potential zoning, namely agriculture, tourism, and marine or known as ATM (Agriculture, Tourism, Marine). The end goals of these development programs are the eradication of poverty, provision of employment, increased business opportunities, and other welfare-related benefits. For the tourism sector in particular, it is expected to be able to drive the economy of the local community and its surroundings owing to its multiplier effect which significantly affects the frequency of movement of goods and people and the economic cycle in it. Based on the data from the Tourism Office of Central Lombok Regency, the number of tourists entering Central Lombok in the last 5 (five) years on average was around 10699 people per month. Therefore, infrastructure development to support the tourism sector is constantly promoted by preparing adequate financial and technical planning [1].

Central Lombok Regency which has been designated as a priority national super tourism destination due to the existence of the Mandalika Special Economic Zone (SEZ) has boosted the economic growth in Eastern Indonesia (EI) in general and West Nusa Tenggara Province in particular. Infrastructure support, both within the region and outside the region, demands the acceleration of preparation for the development of supporting infrastructure. A number of infrastructure developments include construction of the BIL-Mandalika bypass road (17.3 km) connecting Lombok International Airport and the Mandalika SEZ, increasing the capacity of provincial roads to the Mandalika SEZ, development of Drinking Water Supply System (DWSS) in Mandalika, and increasing landfill capacity [2].

Apart from the accelerations that have been done, there are still many pressing issues that require immediate remedy, namely the land for permanent relocation initiated by the Government of Central Lombok Regency and Indonesia Tourism Development Center (ITDC) not meeting the requirements for build-ready land. From a technical point of view, the land is still in the form of terracing by dumping or excavation, thereby not meeting slope stability standards. The 2.5 km asphalt roads to the relocation location are heavily damaged and part of them is still a dirt road. In addition, existing settlements around the relocation area do not yet have general infrastructures and facilities such as electricity networks, water sources and sanitation.

Considering the need urgency in the relocation area and existing problems, Analysis of Development Planning for Housing and Utility Infrastructure with Land Consolidation Concept for Community Affected by Construction of Road and Other Public Facilities in Mandalika Special Economic Sone (SEZ) is needed. It functions as an evaluation and to determine a strategy for development planning of housing, infrastructure, facilities and utilities the concept of land consolidation. In addition, the establishment of the relocation housing along with its supporting general infrastructures and facilities, it is hoped that Ngolang Village can become a new tourist destination that already has complete and quality accessibility, amenities, and attractions. Ultimately, this condition will lead to relatively intensive activities that directly affects the standard of living of the people affected by the development of the Mandalika SEZ.

Based on the above elaboration, the following research problems were formulated the strategy for financing the development of infrastructure facilities that support the tourism sector and the priority factors for planning the development of housing and facilities, utility infrastructure with the concept of land consolidation. Referring to the research problems mentioned before, the objectives to be achieved in this research are identification of funding source strategy for the development of infrastructure and facilities and identification of priority factors for planning the Development of Infrastructure with Land Consolidation Concept in Mandalika Special Economic Zone (SEZ).

Land consolidation is one of development models in the land sector that includes urban areas and agricultural areas, and intended to optimize the use of land in its relation to utilization,

productivity improvement, and conservation for environmental sustainability. Things to consider in the process of land consolidation is active participation of the community as the owner of the land to be consolidated. It is a key to the success of the program since it pertains to the area/percentage of development land which will be donated in the next process. Land consolidation strives for improved environmental quality and efficiency through mapping and rearrangement of scattered and irregular land, and then redistributing it to the owners in an organized form and equipped with infrastructure. The aim of land consolidation is to develop cities/suburbs/villages in a more controlled manner and improve ways to develop cities more justly and with social value [3], [4], [5], [6], [7]. Land consolidation has been widely implemented in many countries for many research. The research showed that the concept of land consolidation is very effective in solving land relocation problems in both urban and rural areas, because it involves the role of the surrounding community [8], [9], [10], [11], [12], [13], [14], [15], [16], [17], [18].

2. Research Method

2.1. Location

The study was conducted in Ngolang Village located on the south coast of Central Lombok and adjacent to the Mandalika Special Economic Zone showed on Figure 1. Ngolang Village is located in a strategic area in the highlands of the Ngolang hills with an average height of 100 meters above sea level. Therefore, sea views can still be enjoyed from that location. The relocation location of Ngolang Hamlet from the gate of the Mandalika circuit ± 2.5 km north was connected by access roads with a width of ± 6 meters (Figure 2). The relocation was not too far from the initial area of Ngolang Village in order to provide convenience in terms of social aspect and access to the location of the original job or livelihood. The new settlement conditions in these hills will take time to adapt to and interact. Currently, the position of the settlement is at an altitude of 60 meters above sea level from the relocation.

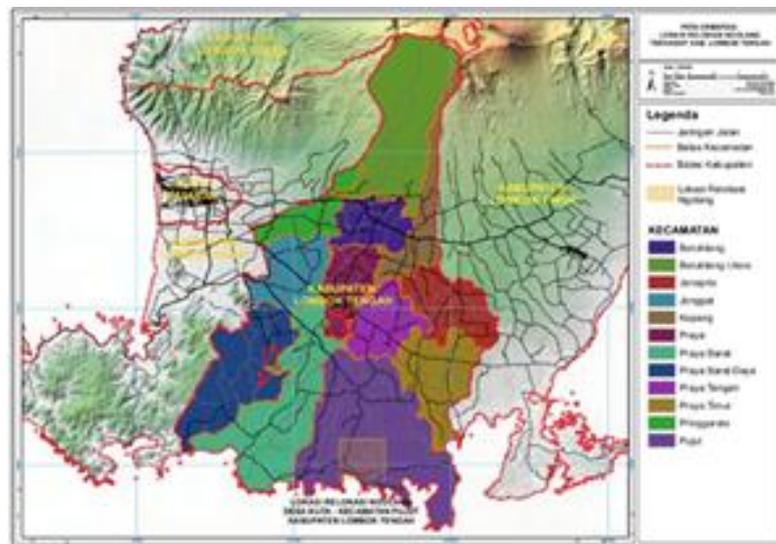


Figure 1. Map of Ngolang Village
(Source : maps interpretation)



Figure 2. Site Plan of the Relocation of Ngolang Village
(Source : maps interpretation)

2.2. Analytical Hierarchy Process (AHP)

Analytical Hierarchy Process (AHP) is a decision support model developed by Thomas L. Saaty [20]. This decision support model will describe a complex multi-factor or multi-criteria problem into a hierarchy. According, hierarchy is defined as a representation of a complex problem in a multi-level structure where the first level consists of goal, followed by factor level, criteria, sub-criteria, and so on down to the last level of the alternatives. With hierarchy, a complex problem can be broken down into groups which are then arranged into a hierarchical form so that the problem will appear more structured and systematic. Four types of measurement scales that are usually used sequentially are nominal, ordinal, interval and ratio scales. A higher scale can be categorized into a lower scale, but not vice versa. Income per month on a ratio scale can be categorized into income levels on an ordinal scale or categories (high, medium, low) on a nominal scale. On the other hand, if at the time of measurement, the data obtained were categorical or ordinal, data with a higher scale could not be obtained.

Data processing with the AHP method was performed by giving weight to each respondent. This weighting was based on the knowledge or experience of the respondents in carrying out regional development planning and was considered to have sufficient detailed knowledge of the problems faced in carrying out development. This data processing would be carried out using free software Super Decisions Version 2.10 Software. The Super Decisions software is a simple easy to use package for constructing decision models with dependence and feedback and computing results using the supermatrices of the Analytic Network Process. The Super Decisions software have successfully used for analysis in engineering analysis [21], [22], [23], [24]

3. Results

3.1. Respondent Characteristic Analysis

Based on the data obtained from the survey results in Central Lombok Regency Government Agencies using questionnaires, the characteristics of the respondents in general shown in Figure 4. There were more male respondents than female respondents, namely 13 men (65%) and 7 women (35%), 10 respondents' latest education were senior high school (17%), 6 were bachelor (52%), and 4 were postgraduate (31%), 10 people were civil servants (50%), 2 were ITDC staffs (40%), and 8 were residents (10%).

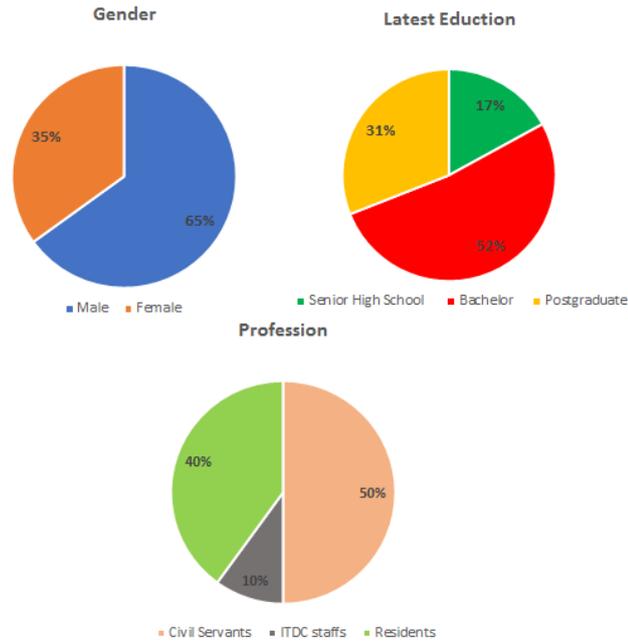


Figure 3. Characteristics of the respondents
(Source : data analysis)

3.2. Decision Making Based on the Analytical Hierarchy Process (AHP) Analysis

The data source used was direct interview data using questionnaires, where the data would be used to calculate the weight value or eigenvector with the resulting CR value of less than 0.1 or CR < 10%. In the process, the Super Decisions Version 2.10 Software was used as shown in Figure 5 below:

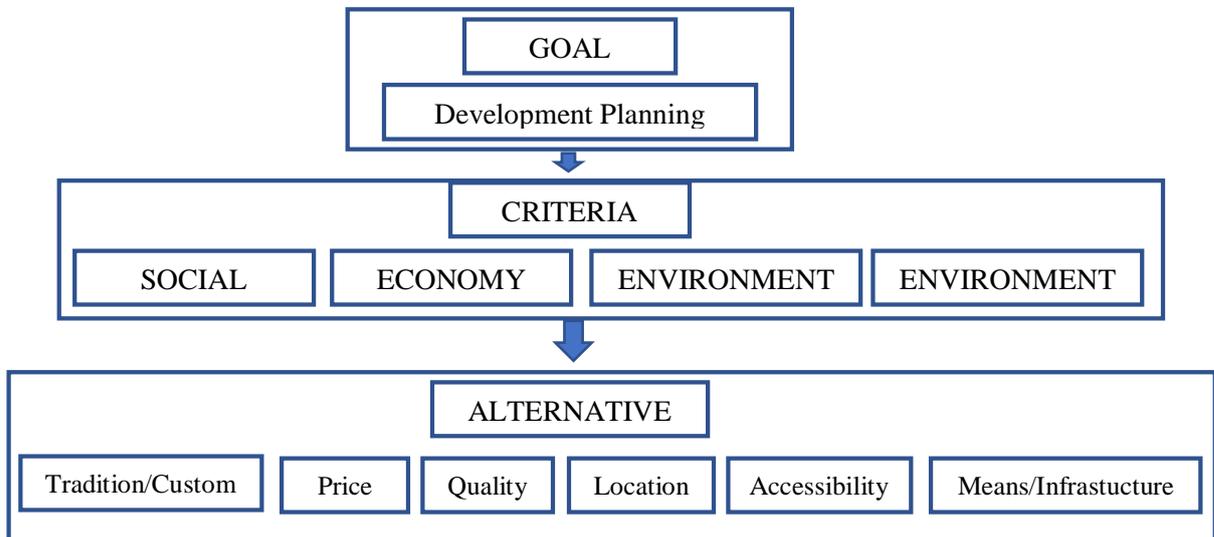


Figure 4. Hierarchy of the AHP Method on the Super Decisions V.2.10 Software
(Source : data analysis)

Figure 5 above is the hierarchal structure of the AHP method using Super Decisions V.2.10 as an assist tool, so that the goal can be defined which is to determine the factors influencing the Development Planning for Housing and Utility Infrastructure with Land Consolidation Concept for Community Affected by Construction of Road and Other Public Facilities in Mandalika Special Economic Zone (SEZ), and the criteria were Social, Economy, Environment and Infrastructure. While the alternatives are Tradition/Custom, Price, Quality,

Location, Accessibility and Infrastructure/Facility. Thus, the next step is the processing of the data obtained from respondent’s assessment.

The value form of each criterion is expressed in the form of weight value or eigenvector with the resulting CR of less than 0.1 or $CR < 10\%$. Thus, we can say that the respondent’s opinion is accepted or satisfactory. Using Super Decisions V.2.10, we obtained the results of the weight values from the comparison of the criteria for tradition/custom, price, quality, location, accessibility and facilities/infrastructure to the factors influencing the Development Planning for Housing and Utility Infrastructure for Community Affected by the Construction of the Mandalika Circuit with Land Consolidation Concept, as shown in Table 3 below.

Table 1. Super Decisions V.2.10 Eigenvector Criteria Weight Value

Criteria Weight Value	
Inconsistency: 0.08062	
Economy	0.15714
Infrastructure	0.29466
Environment	0.41362
Social	0.13458

(Source : data analysis)

The Consistency Ratio (CR) of the respondent data in Table 3 above is 0.08465 or 8.5%. it shows that the respondent data is acceptable since the resulting CR was below 0.1 or $CR < 10\%$, where Environment has the highest weight with 0.41362. Infrastructure had a weight value of 0.29466, Economy had a weight value of 0.15714, and Social had the lowest weight value with 0.13458. The weight values of the criteria can be presented in a Comparison of Criteria Factor in Figure 6 below:

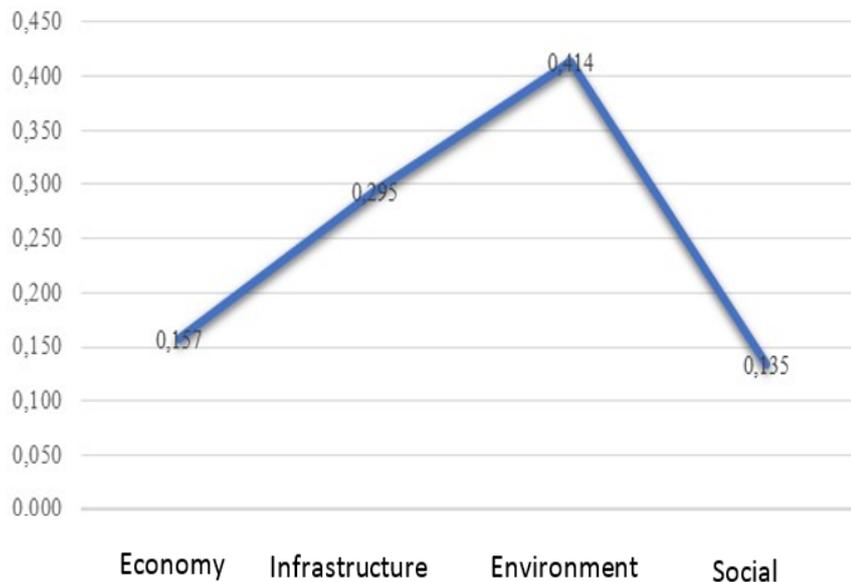


Figure 5. Comparison of Criteria Factor

(Source : data analysis)

Figure 6 above shows that each service criteria for factors affecting the Development Planning for Housing and Utility Infrastructure for Community Affected by the Construction of the Mandalika Circuit with Land Consolidation Concept, where Environment had the highest weight value with 0.414, Infrastructure with 0.295, Economy with 0.157, with Social being the

lowest weight value with 0.135. Then, we can proceed to the next stage, which is comparison of each alternative factor.

4. Discussions

4.1. Comparison of Alternative Factors

This stage was the continuation of the first questionnaire. The aim was to determine the extent to which the alternative factors affect the development planning, where the alternative factors compared were tradition/custom, price, quality, location, accessibility and infrastructure/facilities. With Super Decisions v.2.10, three types of Super Matrix tables were produced, namely: (1) Unweighted Super Matrix, (2) Weighted Super Matrix and (3) Limit Super Matrix.

Based on the results of data processing, we obtained the weight values for tradition/custom, price, quality, location, accessibility and infrastructure/facilities, presented in a Synthesis Diagram of Super Decisions V.2.10 in Table 4 below:

Table 2. Results of Super Decisions Synthesis V.2.10

Name	Ideals	Normals
Accessibility	0.828842	0.167328
Price	0.735386	0.148461
Quality	0.800047	0.161514
Location	1.000000	0.201881
Infrastructure/Facilities	0.872258	0.176093
Tradition/Custom	0.716875	0.144724

(Source : data analysis)

As seen in Table 4 above, the factor of accessibility had the highest weight value with 0.167328. Price had a weight value of 0.148461, quality had a weight value of 0.161514, location had a weight value of 0.201881, infrastructure/facilities had a weight value of 0.176093 and tradition/custom had a weight value of 0.144724. Overall calculations that have been carried out using Super Decisions Version 2.10 will be displayed in the full report alternative rankings, as shown in the following table:

Table 3. Rangking og alternative factors

Alternative	Total	Normal	Ideal	Ranking
Accessibility	0.0837	0.1673	0.8288	3
Price	0.0742	0.1485	0.7354	5
Quality	0.0808	0.1615	0.8000	4
Location	0.1009	0.2019	1.0000	1
Infrastructure/Facilities	0.0880	0.1761	0.8723	2
Tradition/Custom	0.0724	0.1447	0.7169	6

(Source : Data Analysis)

As seen in Table 5 above, the factor of location is ranked first with a weight value of 0.2019, infrastructure/facilities are ranked 2 with a weight value of 0.1761, accessibility is ranked 3 with a weight value of 0.1673, quality is ranked 4 with a weighted value of 0.1615, the price is ranked 5 with a weight value of 0.1485 and tradition/custom is in rank 6 with a weight value of 0.1447.

5. Conclusion and Suggestion

5.1 Conclusion

From result and discussion above, the priority factors for the development planning for housing and utility infrastructure for community affected by construction of the Mandalika MotoGP Circuit with land consolidation concept, the highest weight value was obtained for the factor of environment with 0.414, followed by infrastructure with 0.285, economy with 0.157 and social factor with 0.133. The alternative factor, the most influential factor is location at the first ranking with a weight value of 0.2019, followed by facilities/infrastructure at rank 2 with a weight value of 0.1761, accessibility at rank 3 with a weight value of 0.1673, quality at rank 4 with a weighted value of 0.1615, price at rank 5 with a weight value of 0, 1485 and tradition/custom is ranked 6th with a weight value of 0.1447. In short, location, facilities and infrastructure as well as accessibility factors are the most important factors in planning residential locations for the relocated community.

5.2 Suggestion

Based on the experience obtained from conducting this study, the researchers would like to provide the following suggestions:

- a. For those executing the relocation, especially the Regional Government which plays the main role in this process, they are expected to carry out careful planning before the development process begins. If the time span of the planning process and development process is sufficient, it is hoped that the preparation of land for relocation can also be better. This will also have an impact on the construction of infrastructure and utilities in new residential locations.
- b. From the social aspect of the community, if the relocation planning is carried out well enough, then the people affected by the development do not have to wait long enough at the temporary relocation location.

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