

# Development of Sea Transportation Development for the Islands of the Makassar Municipality

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**Abstract:** The population growth of Makassar Municipality every year is 1.27%, including the Islands Region, and influence on the number of passengers or users of inter-island transportation services in Makassar. This study identifies the movement characteristic of community, analysis of traffic generation between islands, and formulates a strategy for developing sea transportation in Makassar. Data sourced from direct observations in the field, the physical condition of transportation facilities, namely traditional ship at the Harbor Base Life at the Bangkoa Wooden, Paotere Harbor, and port infrastructure facilities with documentation that completes the analysis for description. The results of the analysis show that the movement of people from the island to Makassar Municipality occurs on the largest Barrang Caddi Island route 91%, from Kodingareng Lompo Island to Makassar 95%. The strategy for developing inter-island transportation networks in Makassar Municipality using SWOT analysis is transportation facilities and infrastructure to support movement from and between islands is to be able to add traditional boats to connect islands that have not been served by regular transportation. Increasing the island's tourist attraction through maritime planning and promotion by the Makassar Municipality government and the community encourages the demand for inter-island transportation services and movement to Makassar Municipality.

**Keywords:** Islands Region, Transportation Demand, Shipping and Infrastructure

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## I. INTRODUCTION

South Sulawesi Province has an area of the Spermonde archipelago located on the west side which stretches from the Pangkajene Islands Regency on the north side to Selayar Regency on the south side. There are approximately 120 island groups within the Spermonde Archipelago. In addition, there are 12 islands which are administrative areas of Makassar Municipality, consisting of small islands, namely Kayangan Island, Small Lae-Lae Island, Lae-Lae Island, and Samalona Island. Furthermore, there are several islands that are larger in the Kodingareng sub-district area, namely Kodingareng Keke Island and Kodingareng Lompo, Barrang Lompo Island in the Barrang Lompo Village area. Barrang Caddi Island, Bonetambung Island, Lumu-Lumu Island, Langkai Island, to the farthest, namely Lanjukg Island, are included in the Barrang Caddi Village area [1].

The connecting access node pier in Makassar City serves as a crossing route between Makassar City and several islands that are included in the Makassar Municipality administrative zone as nodes. Connecting access such as Barombong dock, Shipyard dock, Paotere Terminal, Popsa dock, and Bangkoa Wood dock. Connecting access that provides regular transportation services to small islands in the Makassar archipelago is only served by Paotere Terminal and Bangkoa Wood dock [2].

To support the development of economic activities and the sustainability of people's lives in the archipelago in Makassar Municipality, the development of sea transportation should be optimized towards a balance between demand and the provision of transportation services [3,4]. The availability of transportation means that is greater than the need or demand for transportation services will create a problem of unfair competition between companies or providers of transportation services, causing one of them to suffer losses. Vice versa, if the demand for transportation services is more than the availability of transportation means, it can cause resistance to the smooth flow of goods, resulting in unstable prices in the market [5,6].

Therefore, it can be hypothesized that population growth is related to the increase in the number of passengers or users of transportation services. In addition to the increase in population, the number of locations in the Makassar Municipality archipelago which have become tourism objects makes the enthusiasm of passengers or users of transportation services also increase [7,8,9]. The purpose of this study is to identify the pattern of movement characteristics of sea transportation users in the Makassar Municipality archipelago,

analyze the magnitude of the generation and formulate a strategy for developing inter-island sea transportation in the Makassar Municipality archipelago.

## II. METHODOLOGY

This study uses a descriptive method with qualitative and quantitative approaches. The location of the research was Bangkoa Wood dock, Paotere Harbor, Barang Lompo Island, Barrang Caddi Island, Kudingareng Lompo Island. Descriptive analysis is carried out to describe and explain and analyze existing relationships or symptoms, dig up information about the research objectives and describe quantitatively the phenomena or data collected, to obtain a model for the development of island transportation in the city of Makassar. Comparative studies to compare the similarities and differences of certain symptoms, quantitative studies, namely measuring and presenting facts through survey techniques, questionnaires, interviews, and others as well as correlational studies of one element with other elements.

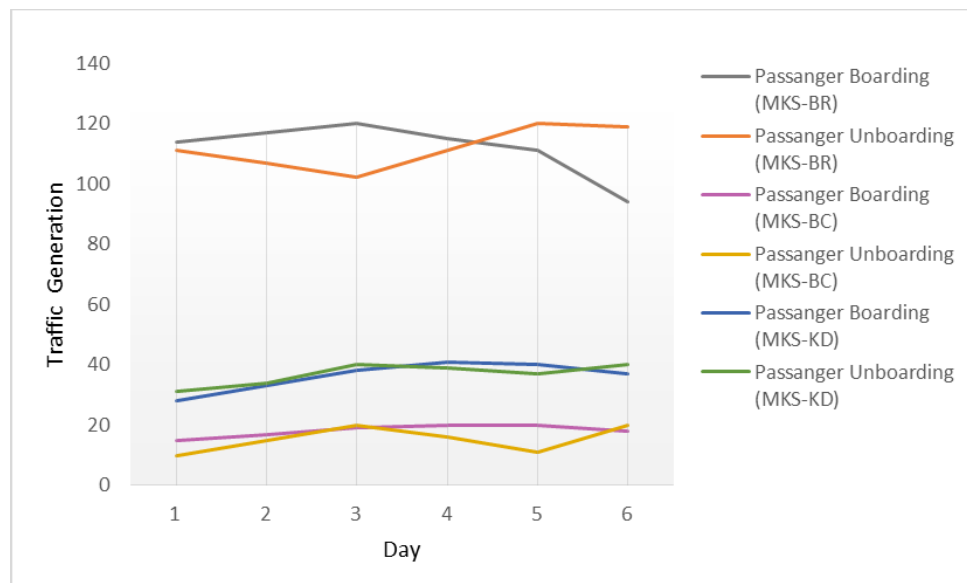
The sample used is based on the character of the region with the criteria of population, area, and area potential. Based on this, three islands were obtained, namely Barang Lompo Island, Barrang Caddi Island, and Kudingareng Lompo Island. The variables and indicators used to consist of shipping lanes such as depth, width, and free of obstacles. Other services are considered safe and secure to be navigable by sea transport ships. The generation of home-based transportation to the activity location and transportation towing are assessed from the activity center. The service network is the arrangement of transportation service routes that form a unit [10,11].

The steps used to analyze the data as in the research objectives were answered using the results of a questionnaire with a total of 100 samples, using the cross-classification analysis method and analyzing external and internal factors as well as considering the results and analysis in the first and second formulations using the SWOT method.

## III. RESULTS AND DISCUSSION

### Characteristics of Community Movement

The potential for movement originating from Makassar Municipality to the Makassar Municipality archipelago with regular ship routes to the three central government islands, namely Barrang Lompo Island, Barrang Caddi Island, and Kodingareng Lompo Island was analyzed based on the results of a survey of passenger movements at the Kayu Bangkoa Makassar traditional dock in October 2020. The survey was conducted for 6 days on passengers getting on and off at the Kayu Bangkoa pier. In addition to counting the number of passengers, interviews were also conducted with passengers and ship owners regarding the purpose of the movement of passengers to and from the islands in the Makassar Municipality area. Potential movement data from Makassar Municipality can be shown in Figure 1.



**Figure 1.** Passenger Movement by Route

**Source:** Analysis Results, 2021

Based on the data in the figure, it can be explained that the potential for movement for the Makassar - Barrang Lompo route every day is 112 people. The purpose of passengers and shipowners who travel to the island is to shop for daily necessities and merchandise in Makassar Municipality as well as family needs or just recreation in Makassar Municipality.

Based on the results of interviews with several passengers from the Barrang Lompo island community, they tend to visit Makassar on holidays for shopping. The largest movement occurred on the Makassar - Barrang Lompo route, then the Makassar - Kodingareng Lompo route and the lowest was the Makassar route, Barrang Caddi Island.

### **Trip Generation**

The potential for inter-island cargo movement in Makassar Municipality using cross-classification analysis and the variables of household income, household size, and ship ownership [12]. These three variables were chosen because the basis used in determining the number of movements is the household basis. For this reason, the relationship between household attributes and the number of movements can be identified with these three variables. The household income variable uses 3 categories, namely the level of low income (1-2 million/month), medium (3-4 million/month), and high (>5 million/month). For the household size variable, 4 categories are used, namely, the level of household structure, namely small (1-2 people), medium (3-4 people), quite a lot (5-6 people), and a lot (> 6 people). Meanwhile, for the variables of ownership of the fleet using 2 categories, namely yes and no, there are 24 categories.

Based on the results of the analysis, the total generation from Barrang Lompo Island to Makassar Municipality with 1,270 families was 184 movements/day. The generation of inter-island movement from Barrang Caddi Island with 1,079 families is 18 movements/day. Movement between islands from Barrang Caddi Island, mostly to Barrang Lompo Island and Kodingareng Lompo Island, the rest to Bone Tambung Island and its surroundings. The total generation from Barrang Caddi Island to Makassar Municipality with 1079 families is 45 movements/day. The inter-island movement from Kodingareng Lompo Island with 1,081 families is 36 movements/day. Movement between islands from Kodingareng Lompo Island, the majority to Barrang Lompo Island and Barrang Caddi Island, the rest to the tourist island of Kodingareng keke. Meanwhile, the generation that occurs from Kodingareng Lompo to Makassar Municipality with 1081 families is 121 movements/day. People in the area move to Makassar Municipality to shop for daily needs and trade needs as well as tourism and family visits.

### **Development of Sea Transportation for Islands Region in Makassar**

The availability and quality of good crossing transportation infrastructure are expected to encourage greater connectivity and connectivity between Makassar Municipality and small islands in the Makassar Municipality area, in order to achieve a certain economic scale that can increase economic activity widely and evenly and can increase the rate of growth. The economy in small islands by utilizing local potential [7,9,13].

The strategy for developing sea transportation between small islands in Makassar Municipality is formulated based on an analysis of internal and external factors that affect the inter-island transportation system in Makassar Municipality. SWOT analysis is used to identify strategies for developing transportation facilities and infrastructure through a regional approach, supporting inter-island and central movement (services and production), in particular, for the effectiveness of an integrated transportation system that can be used as a basis for policymaking in development of transportation between small islands in Makassar Municipality through internal factors that express strengths and weaknesses as well as external factors that express opportunities and threats.

The main points of discussion in the analysis of internal factors are the potential of the archipelago as a strategic island tourism area, the potential for marine fisheries, the characteristics of the crossing nodes of small islands, and the potential for generation and attraction of movement. These things reflect the strengths and weaknesses in the development of the archipelagic transportation network in Makassar Municipality. The development of the inter-island transportation network in Makassar Municipality is shown in the SWOT matrix in Table 1.

**Tabel 1. Matriks SWOT**

Internal factors		Strength (S)	Weakness (W)
		External factors	
2. The high need for shopping and trading	2. The transportation network system of connecting roads on each island is limited		
		3. Opportunity to develop tourist attraction	3. Low accessibility
		4. Frequency of inter-island crossing accommodation	4. The economy of the island community is not yet stable
		5. The natural potential of each island	5. Dock construction that is not suitable for water conditions
		6. There is already a node in the service area	
Opportunity (O)	1. The islands around Makassar Municipality have a strategic geographical location	1. Provide training for crew related to shipping safety	1. Improve safety equipment facilities for ships that will sail
	2. Natural resources are potential for the development of transportation and tourism	2. Increasing tourist attraction through the promotion of marine tourism by the Makassar Municipality government and the community	2. Opening shipping lanes in hinterland areas to open regional isolation
	3. Central government commitment to regional infrastructure support	3. Development of research and technology related to issues of effectiveness and efficiency of operating transportation facilities	3. Provide subsidies for traditional shipping
	4. High interaction between islands in the regional area of Makassar Municipality		
	5. Diverse community livelihoods		
	6. Tendency to strengthen the economic structure		
Threat (T)	1. Sea transportation service is not convenient	1. Construction of dock on islands and nodes in order to support movement patterns from to / between islands of Makassar Municipality	1. Provincial and local governments should increase the budget for inter-island sea transportation
	2. Shipping safety is still low	2. Adding the people's ship mode to connect islands that have not been served by regular transportation	2. Encouraging the private sector to invest in increasing marine tourism
	3. People prefer to use simple ship because of the cost factor	3. Improving the performance of tourist services on residential islands and special tourist islands	
	4. Unstable weather climate endangers shipping		
	5. Community economic instability in the marine transportation sector		

Source: Analysis Results, 2021

Based on the results of the weighting, it can be seen the strategies that can be carried out in answering the problems of developing inter-island transportation networks in Makassar Municipality. Based on the value of the weight and rating of each matrix element, it is known that the position of the development of the inter-island transportation network in Makassar Municipality is currently in quadrant IV. This position indicates that the inter-island transportation system in Makassar Municipality should be developed using alternative strategies to utilize strengths to overcome threats.

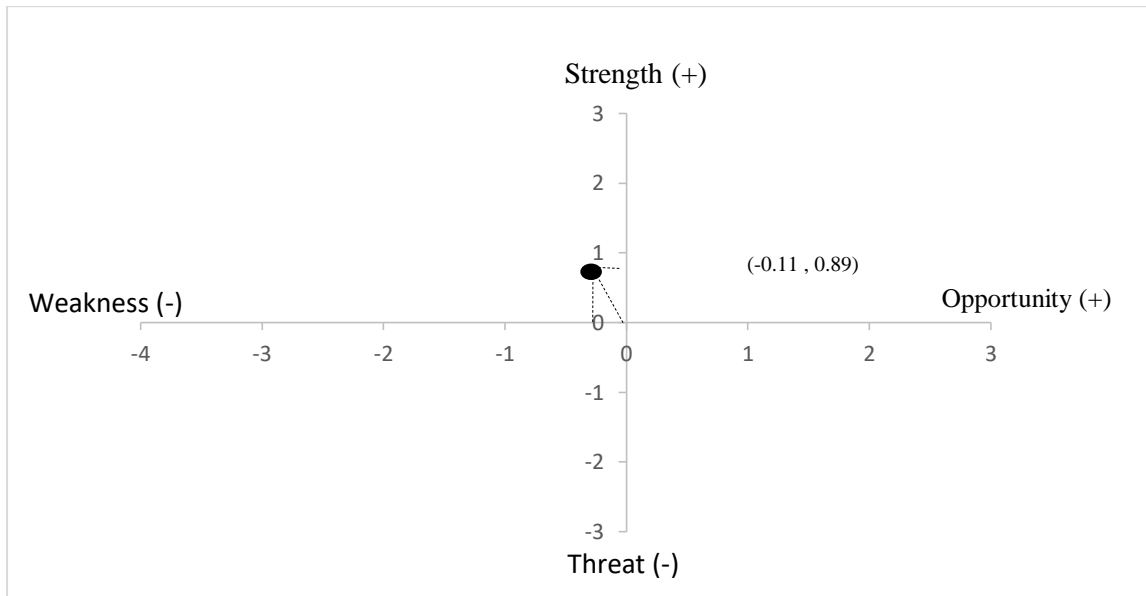


Figure 2. Internal and External position of SWOT

### Transport Network Development Strategy

Program planning is based on the chosen strategy from SWOT analysis in the development of inter-island transportation in Makassar Municipality. The implementation programs are as follows;

- a. Construction of sea transportation facilities and infrastructures on islands and nodes to support mobility between inter-islands or Makassar Municipality are; Construction of local piers with boat moorings on several islands. This program is intended to increase interaction and economic growth of island communities by building Harbord and boat moorings. Construction of the Bangkoa Harbor and Poutere Port facilities. This program includes the construction of parking lots, waiting rooms, and others to increase passenger comfort.
- b. Adding traditional ship to connect islands that have not been served by regular transportation. The programs are; conduct a feasibility study to increase the tradional ship mode. This program is used to assess whether or not the addition of people's boat modes is feasible, as well as the impact caused by the addition of modes. Coordinate with stakeholders for the addition of traditional ship modes to get input for the addition of traditional ship modes.
- c. Improving the performance of tourist services on residential islands and special tourist islands. The programs are; adding regular routes to islands that have potential as marine tourism objects, such as Samalona Island, Kodingareng Keke Island, and others. Improving the tourist attraction of the island through planning and promotion of marine tourism by the Makassar Municipality government and the community.

## IV. CONCLUSION

Characteristics of community movement in the archipelago in Makassar Municipality can be explained that the majority of community movements from the island to the Municipality of Makassar (91%) occur on the Barrang Caddi Island route to Makassar, from Kodingareng Lompo Island to Makassar by 95%. The purpose of people traveling to and from Makassar Municipality is for family visits and trade. The highest route is the Barrang Lompo Island route to the Municipality of Makassar, namely (96%), the majority of the movement is for social, government, and economic activities. The pattern of community movement in the Sangkarrang Islands District which is the object of research is dominated by routes to and from Makassar Municipality, the largest movement occurs on the Barang Lompo Island - Makassar route or vice versa. The greatest potential for inter-island community movement occurs on the Barrang Lompo Island route and vice versa.

The strategy for developing the inter-island transportation network in Makassar Municipality is the construction of archipelagic transportation facilities and infrastructure on the islands and the development of nodes in order to support the pattern of movement from/to/between the islands of Makassar Municipality. It is necessary to increase the operation of people's ships in order to improve relations between islands that have not been served by regular transportation. This is to anticipate the increasing demand for transportation services, apart from family visits, trade, and tourism.

## REFERENCES

- [1]. Makassar City Central Statistics Agency, 2020
- [2]. Wulandari A. 2009. Analysis of Transportation System between Small Islands in Makassar City (Thesis). Makassar: Hasanuddin University.
- [3]. Adisasmita, R., 2005, Archipelago Economics, Makassar
- [4]. Adisasmita, R. 2006, Maritime and Regional Development, Garaha Ilmu, Makassar
- [5]. Edwards, J.D, Jr, P.E., 1992, Transportation Planning Handbook, Institute of Transportation Engineer, Prentice-Hall, Eaglewood Cliffs, New Jersey
- [6]. Jinca, M.Y., Lindasari, E., 2007, Transportation Fundamentals, Teaching Materials for Staff Level Transportation Technical Training, Makassar
- [7]. Djameluddin I. 2010. Transportation between Small Islands in Makassar City Area. XIII FSTPT Symposium (p.1). Semarang: Soegijapranata Catholic University
- [8]. Sitti A.C, Asri S all. 2018. Application of Category Analysis Mdek in Determining the Generation of Passenger Movements on Kodingareng Lompo Island. Proceedings of the National Scientific Seminar on Science and Technology Volume 4 November 2018. Faculty of Engineering. Hasanuddin University
- [9]. Jinca, M.Y., Ralahalu, K.A., 2013, The Ddevelopment of Indonesia Archipelago Transportation in Maluku Province.
- [10]. Khisty, C.J., Lall, B.K., 2003, Fundamentals of Transportation Engineering, Erlangga, Jakarta.
- [11]. Jinca, M. Y. 2011. Indonesian Sea Transportation. Surabaya: Brilliant International
- [12]. Pattinaja, Y.I., 2008, Clustering and Small Island Carrying Capacity: Small Island Spatial Planning Approach, Urban and Regional Development Planning Training, Makassar 07-11 July 2008
- [13]. Bronsini, M.S., 2004, National Transportation Network And Intermodal System, Mc. Graw-Hill Handbooks, Handbook of Transportation Engineering

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