

Feasibility Study on the Transportation Network in the East Coast of Sabah

Mohd Azizul Bin Ladin, Fariq Ismeth Jaimin, Nazaruddin Abdul Taha, Lillian Gungat, Abdul Karim Mirasa, Sidah Binti Idris

Abstract: Sabah is located in the northern part of Borneo Island. Three nations share the island namely Malaysia, Brunei, and Indonesia. The study focuses on the transportation network in the east coast of Sabah, mainly Semporna and Tawau. In general, most of the transportation network in Sabah is known to be in poor conditions. Although there are efforts to revamp the transportation system, it is met with heavy resistance due to budget constraints. Transportation network in Tawau and Semporna is in poor condition as heavy trucks especially from palm oil plantations, quarries, and logging areas pass through the main road which goes through village areas. For this study, the information is gathered by conducting site visitation to the areas, engaging with local communities as well as collecting feedback through surveys.

Keywords : Transportation Network, Feasibility Study, Survey, Road Design, Transport System.

I. INTRODUCTION

Home to more than 3 million people of different ethnicity, and blessed with an abundance of natural resources, Sabah is grossly underdeveloped compared to its counterpart in Peninsular Malaysia. This is especially prevalent in the rural areas of Sabah. The road networks here is considered to be in poor condition, which is reflected in the cheaper road tax for vehicles in Sabah compared to West Malaysia [1]. In any developing nations, it can be divided into two areas, urban and rural areas. Within the urban areas of Sabah, mainly referring to Kota Kinabalu, the road network is better, and some type of public transportation is available albeit inefficient. In urban areas, the main issue faced is traffic congestion and public transport efficiency. While in the rural areas, connectivity and poor road conditions are the main problems. Gravel roads, mud paths and potholes are a normal sight for the people there.

Mobility in rural areas is a challenge and is only practical

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by owning a car. This is not only the case in Sabah, but it can be seen to be the same in other rural parts of the world. In Western Europe, where the population of the rural is much denser than in Sabah, the public transportation system is also lacking or inefficient to guarantee an independent travel [2]. In the effort to improve the livelihood of people in the rural areas and to bridge the development and economic gap between rural and urban areas, the transportation network must be improved. Therefore, this research was initiated to study the feasibility of the transportation network in the east coast of Sabah.

A. Background of Study Area

In Sabah there are five (5) administrative subdivisions, which are the West Coast Division, Kudat Division, Interior Division, Sandakan Divisions, and Tawau Division. When referring to the east coast of Sabah, it is generally aimed at Sandakan and Tawau Division. Tawau Division is separated into four (4) districts, which are Kunak, Semporna, Tawau, and Lahad Datu. The main area of interest for this research are Lahad Datu, Tawau, and Semporna. The Tawau Division is approximately 14,905 km² in area which is about 20% of the total area in Sabah, while the estimated population in this division is 412,375 people as of 2010. The ethnic indigenous people here make up the majority at 79.8% of the total population, while the second largest group is the ethnic Chinese which is estimated to be at 17.2%. There is about 0.4% of Indian population in Tawau, and 2.6% of the people are grouped as 'others'[3]. The main indigenous group of Tawau consists of Bajau, Suluk, Ida'an, Tidong, Cocos, Murut, Lun Dayeh/Lun Bawang, and there are also several minority mixed ethnic groups [4,5]. Semporna is a district to the eastern side of Tawau district, and to the south of Kunak and Lahad Datu. The town is approximately an hour and a half drive from Tawau airport, and is connected to the rest of Sabah via Roads. According to the Department of Statistics Malaysia (2010), the population of Semporna is estimated to be around 137,868 as of 2010. According to study done by Assoc. Prof. Dr Ismail Ali of Universiti Malaysia Sabah, a large population of the nomadic sea people, Bajau Laut also known as Pala'u is found in Semporna [6]. Historically, they lived in boats in the middle of the ocean and drifts between the seas of the Philippines, Malaysia, and Indonesia. As time progressed, some of the Pala'u has moved on to living on lands and some has chosen to live on top of water villages in the islands, and there are still some that continue to live in boats floating on the seas [7].



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The status of these people is still unclear as they are people with no nationality and not illegal immigrants [8]. The only highway that connects these four districts is the Malaysian Federal Route 13, which is now part of the Pan Borneo Highway. The overall road condition of the route is in poor condition due to the lower standard of construction used which was JKR R3. This standard has a design speed limit of 70 km/h with a minimum lane width of 3m [9,10]. After a research was done by the Public Works Department, the Federal Government initiated the Pan Borneo Highway project and it will be constructed using the JKR R5 standard which has a design speed limit of 100 km/h, and a minimum lane width of 3.5m [9]. The Pan Borneo Highway project was initiated to upgrade the existing route and is expected to be completed by 2025 [10].

B. Transportation in Rural Areas

Transportation in rural communities where walking or cycling is not feasible is important for the population to be able to access the healthcare services provided. The mode of transportation used by the rural population are personal vehicles, public transport, and non-emergency medical transport to satisfy their healthcare needs. According to the American Public Transportation Association, approximately 9% of public transit riders in small urban and rural areas has healthcare services facilities as their destination. When no mode of transportation is available, unaffordable, or difficult to access, some rural community members may not be able to access basic healthcare services. This in turn can lead to negative consequences for managing health conditions.

In terms of employment and education opportunities, the economic stability of rural areas is highly dependent on a reliable means of transportation. One of the most common barriers to employment for people in rural areas are the longer commute time and lack of transportation options. Not only that, due to the longer travel distances and lower population densities, any existing transportation services available in the rural areas usually costs more compared to the transportation services in urban areas. The American Public Transportation Association has reported that 34% of public transit trips has worked as the primary destination. The same report also shows that 12% of all transit trips in rural communities are to and from school. Rural children also face the same issue of longer travel time due to the longer distance required to travel to school. There have been many studies on the problem of transportation; however, most of these studies are focused on the objective of minimizing travel costs, or enhancement of capacity [11]. These objectives are more focused on urban areas and it is not applicable to rural areas. On the other hand, for a rural road network, the objectives should be adjusted accordingly, as road expansion is not a priority for rural transportation, but cost minimization or maximization of coverage area should be a top priority [12]. In rural areas, poor road surface condition directly affects the vehicle operation cost and travel time. Which, in turn, negatively impacts the socio-economic costs [13]. Further elaborating on this, bad road condition increases the rolling resistance and road roughness, which directly influences the vehicle speed, fuel consumption and repair costs. Thus, by improving the road surface, it will directly contribute to the improvement of

the operation costs. Another pressing issue in rural road network is the insufficient road coverage. Improvement of road network coverage is essential for the development of the area and also to provide opportunity for social and economic activities [12]. Several researches have been conducted in developing nations with the focus on the relationship between road network conditions and economic developments [14,15,16].

II. METHODOLOGY

In this study, it first started from the desk study to gain information on the study area such as the geography of the location, history as well as the latest available population size. Site visitation was also performed to identify obvious issues especially on the condition of roads. Survey questionnaires were then distributed to the locals to gain a better understanding of the daily conditions faced by the locals, especially in the deeper more rural parts of the area. Several selected locations were also visited for local engagement activities. During the engagement activity, survey questionnaires were distributed among the locals that were present. All the data collected through the survey is analyzed by using the SPSS Statistics software.

III. RESULTS

In the survey, the main issues of road network in Tawau and Semporna were asked and the response can mainly be categorized into two (2), the transportation system and road design and condition.

A. Demographic Analysis

From the total number of respondents, the highest percentage of them is between the age of 21 to 30 followed by age group 31 to 40 being 32.40% and 24.20% respectively. People that are aged between 41 to 50 are at 18.8%, while those that are aged between 51 to 60 is at 11.60%. The last two are people that are under the age of 20 at 8.20% and those that are aged over 60 at only 4.80%. These data are shown in Table 4.1 and Figure 4.1 below.

Table 4.1: Number of respondents based on age range

| Age Range | Frequency |
|-----------|-----------|
| Under 20 | 17 |
| 21 to 30 | 67 |
| 31 to 40 | 50 |
| 41 to 50 | 39 |
| 51 to 60 | 24 |
| Above 60 | 10 |
| Total | 207 |

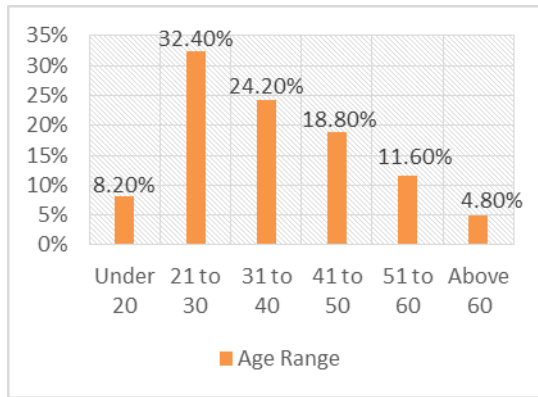


Figure 4.1: Age range of respondent

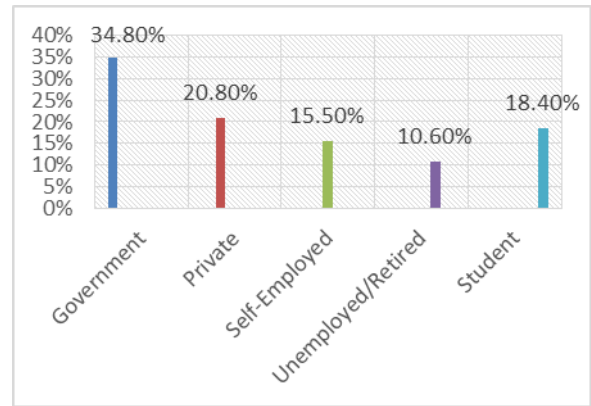


Figure 4.3: Percentage based on employment sector

According to the data gathered presented in the Figure 4.2 below, it can be seen that 77.30% of the respondents' choice of daily transportation is by car. That is 160 people out of the total 207. Then second highest from that is people who walk for their daily commute at 6.80% just 0.5% more than the people who travel using public bus at 6.30%. Motorcycle is fourth at 4.30% out of the total respondents. Since the introduction of Grab, people has started to use it for their daily commute, in this case, a total of 2.90% of the people choose Grab as their daily transportation. The remaining 2.40% choose to use "Pirate" as the local call it as their daily commute. Essentially, these are private cars that charge fares to the people riding it, similar to taxi, but without the permit.

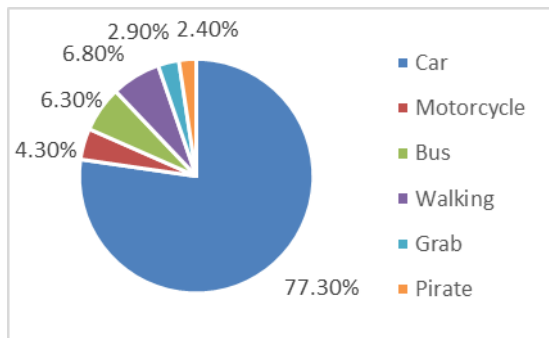


Figure 4.2: Percentage of people according to daily vehicle type

Besides, based on the response gathered from this study, there are 18.40% students and 10.60% that are unemployed or retired. That is 38 persons and 22 persons respectively, while a total of 147 people are employed in the government, private sector, and self-employed at 72, 43, and 32 persons respectively. This is shown in Figure 4.3 below. Since there are a total of 71.10% of the people that are working, 34.80% in the government sector, 20.80% in the private sector, and 15.50% that are self-employed, it is assumed that all these people are commuting daily to work. When compared to the data of total private vehicle usage in Table 4.4, the total number of people that commute using car is 160, and the total number of people working are 147. There is a difference of 13 people between those that are employed and those that are driving. Although not conclusive, it can be assumed that these people are the ones who contribute the most to number of traffic.

B. Transportation System

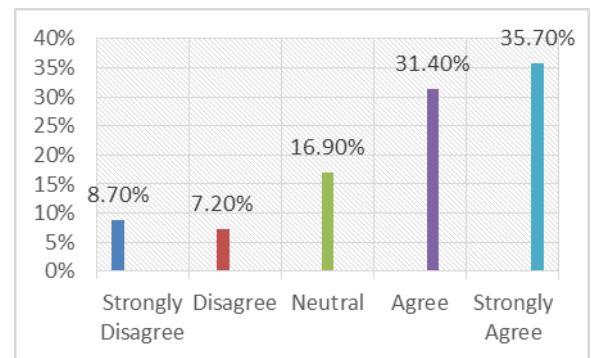


Figure 4.4: Response towards the statement "Lack of Efficient Transportation System"

For the question "lack of efficient transportation system", the result found as shown in Figure 4.4 above. 35.70% strongly agreed to the statement, and 31.40% agreed. 8.70% strongly disagreed and 7.20% disagreed with the statement given. The remaining 16.90% were neutral towards the statement. This could be due to the fact that the issue has been prevalent for so long that it no longer bothers the locals. However, based on the results it can be assumed that 67.10% agreed to the statement.

Next was the limited type of public transportation system. Only 3.40% strongly disagreed, and 15.50% disagreed toward this statement. This reflects the actual condition on site were the only means of public transportation is by bus. However, this service is only available in certain areas, which is supported by the result of this survey that is shown in Figure 4.5. The statement limited type of public transportation system shows that 32.90% and 31.40% of the respondent strongly agreed and agreed with the statement. 16.90% felt indifferent towards the statement.

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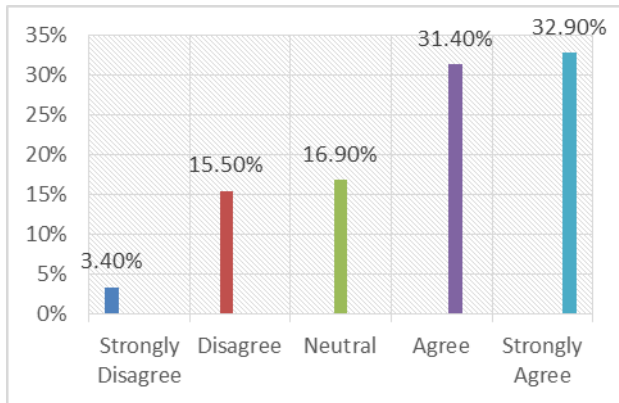


Figure 4.5: Response towards the statement “Limited Type of Public Transportation System”

It also found that the public transportation does not cover a wide area. This is supported by the result of the survey as shown in Figure 4.6 whereby 74.40% of the respondents agreed and strongly agreed that the public transportation system availability is not balanced. 13.50% were neutral towards the statement, while 10.10% disagreed to the statement. Only 1.90% of the people strongly disagreed. During the site visitation, it can be visually seen that the public bus only serves several areas. People who disagreed to this statement could potentially be those that rarely use the bus or people that have a better access to public bus facilities compared to the other respondents.

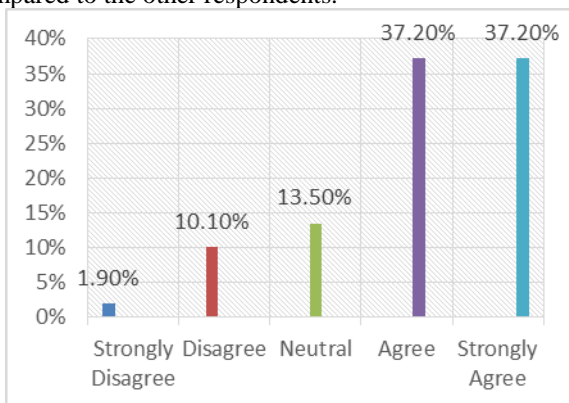


Figure 4.6: Response towards the statement “Imbalance Public Transportation Access”

C. Road Design

Based on the results of the survey, 56.50% strongly agreed that the roads in Tawau and Semporna has many potholes. 23.70% of the respondents agreed and 15.0% were neutral about the condition. There were only 3.90% and 1.0% that disagreed and strongly disagreed respectively. 56.50% represents 117 persons, seeing that there are more than half of the respondents who strongly agreed to this, this is one of the most pressing issue. The results as shown in Figure 4.7 below.

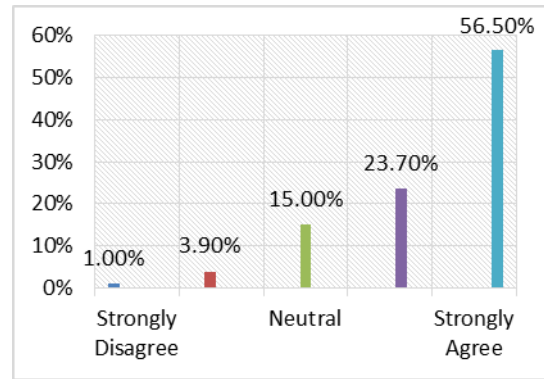


Figure 4.7: Multiple potholes on the road

According to the results as shown in Figure 4.8, 45.40% strongly agreed that the roads are uneven due to settlement. Unevenness due to constant use by heavy vehicle does not fall under this category. In this case, the settlement is mainly due to poor construction. No one strongly disagreed to this statement, while there are 6.30% that disagreed. 18.4% were neutral and the remaining 30.0% agreed that settlement on road is an issue in their region.

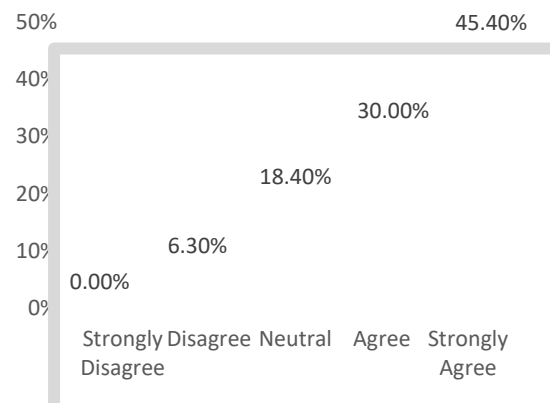


Figure 4.8: Uneven road due to settlement

Another issue that was highly discussed during the community engagement is the lack of road maintenance. The survey result confirms that, the pattern of the graph also shows a similar pattern with the previous two (2) issues asked as potholes and uneven roads are highly correlated to the lack of maintenance of the road. 48.30% of the respondents strongly agreed that the roads in Tawau and Semporna lacks maintenance from the authorities. 32.40% agreed to the statement and 15.0% were neutral about it. 3.40% disagreed and only 1.0% strongly disagreed with the statement. This could be that there is less road damage in their area, or it is closer to the authority to be monitored compared to the other respondents. However, this could not be confirmed solely through the result of this survey only. Since the area is mostly known for palm oil, and logging activities, the sight of heavy vehicle carrying palm kernels and logs on the road is the norm. Unfortunately, several of these roads cut directly into the heart of the villages, and there are no alternative routes. The heavy vehicles are not suited for the current road geometry design which causes distress among the locals as most houses are near the main roads that these heavy vehicles pass through.

As can be seen in Figure 4.9, 48.30% and 27.50% of the respondents strongly agreed and agreed that the roads in their areas are narrow. 19.30% were neutral on the condition and 4.30% disagreed to the statement. Only 0.50% which is 1 person strongly disagreed that the roads are narrow.

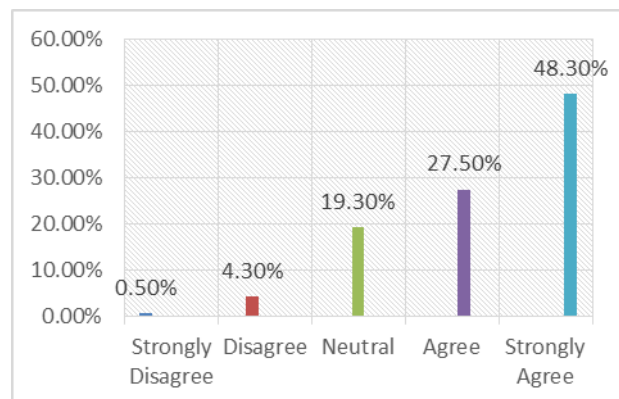


Figure 4.9: Narrow roads

IV. CONCLUSIONS

As a conclusion, it can be clearly seen that the main problem is the road design itself. It has been long overdue for an upgrade. The level of service for the current road is lacking so far behind as a new public transportation system will not going to help in solving the problem. Hence, the current road must be upgraded to a more suitable level to sustain the capacity of the current usage. Other than that, alternative routes could be planned to bypass the main routes. This alternative route should be designed for heavy vehicles as they are able to avoid housing areas where they have no business nor intention of stopping in that area in the first place. As the time frame for this study is only 12 months, its period is insufficient to cover the entire region especially in the far more rural areas. Thus, it is recommended to do the future study within a longer time frame depending on the study area covered.

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Dr Mohd Azizul bin Ladin is currently working as a Senior Lecturer at Universiti Malaysia Sabah. He holds B.S, M.S., and PhD degrees in Civil Engineering from Universiti Kebangsaan Malaysia in 2008, 2009 and 2014 respectively. In 2006, he joined the Engineering Department in National University of Malaysia as an assistant lecturer. Then, he started working in the Public Works Department as a Civil Engineer from 2009 until 2011. He had published more than 20 journals and more than ten proceedings. His main areas of research interest are Sustainable Urban Transportation, Public Transport System, and Traffic Safety. In 2014, he received an international award for his outstanding research work in ACCETSE conference. In 2017, he received the best paper award in the International Interdisciplinary ICT Practise Conference as well as in 2019; he won the best speaker award in ICSTR Sydney. He had supervised several research projects in highway and transportation engineering. He is also a member of Board of Engineers Malaysia (BEM) and Malaysia Board Of Technologists (MBOT). Other than teaching and research, he is also active in social service as an invited speaker.



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