

A Study on the Importance of the Second Bridge Project Construction in Kota Bharu, Kelantan

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Abstract: Traffic congestion often occurs at the Sultan Yahya Petra Bridge, especially during peak hours or the festive season, with many vehicles entering Kelantan. This caused the government to propose constructing the Palekbang-Penambang bridge project, the second bridge connecting Kota Bharu-Tumpat. The study was carried out at two different locations, namely the Sultan Yahya Petra Bridge and the construction site of the second bridge project. The purpose of this study was to determine the significance of the second bridge project based on feedback from respondents and road users about their satisfaction with the Sultan Yahya Petra Bridge. The respondents filled out a questionnaire on Google Forms, which was used to collect primary data. A total of 61 respondents were successfully collected. Quantitative methods, such as descriptive statistics in the form of percentages, were used to analyse the data collected from respondents. As a result, the analysis of primary and secondary data can provide a good resolution for identifying the factors that led to the construction of the second bridge project. The results show that the three categories, which are scale questions, straightforward questions, and multiple choice. that are critical to achieving the study's goals are satisfactory. The main factor in the construction of the second bridge, according to 90.2% of respondents, was traffic congestion. According to all respondents, bridge congestion is caused by a lack of infrastructure, such as new bridges or alternate routes to cross the Kelantan River. A more thorough investigation of the site or location of new bridge construction to meet basic needs should be revisited. To avoid traffic congestion, the parties involved must take this issue seriously by improving infrastructure or finding other alternatives to build a second bridge.

Keywords: Congestion, Construction, Kelantan, Second Bridge, Traffic

1. Introduction

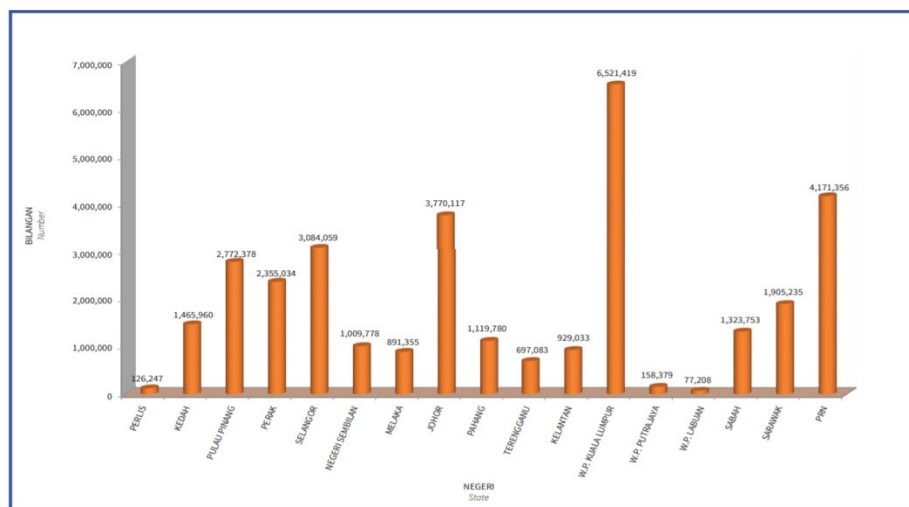
According to the data from the Department of Statistics Malaysia, the state of Kelantan has a total population of 1.923 million people [1]. As a result, traffic congestion is common on the main road connecting Kota Bharu and Tumpat, especially during peak hours and holidays.

Therefore, road users are forced to travel a great distance to their destination. The second bridge was built in response to a lack of infrastructure that could not accommodate the volume of traffic passing through the Sultan Yahya Petra Bridge. According to Malaysian Road Transport Department, there were 574,597 automobiles on the Kelantan Road from 2008 to 2015 [2].

Tourist and cultural attractions are inaccessible in this sense due to a lack of alternative facilities. Therefore, the area's economy was unable to flourish due to a lack of infrastructure. In order to alleviate the situation, the state and federal governments have agreed to construct a new bridge connecting Kota Bharu and Tumpat. Thus, this study's objective is to obtain feedback and opinions from local road users about their experiences with the Sultan Yahya Petra Bridge and determine the importance of the second bridge construction project.

Figure 1 shows the summary statistics of the cumulative total motor vehicles by the state of Malaysia in 2020. Based on the figure, a total of 929,033 vehicles are registered in the state of Kelantan and this number is increasing from time to time. This increase in the number of land vehicles has made communication infrastructure such as bridges unable to accommodate the high number of vehicles. In summary, these results suggest that the factors that are occurring should be overcome by solving the problem.

Figure 1: Data of the cumulative total motor vehicles by the state in 2020



1.1 Sultan Yahya Petra Bridge

Sultan Yahya Petra Bridge was completed in 1967 after being started in 1965. The primary goal of this bridge is to make it easier for people to cross over the Kelantan River. However, the bridge got too congested with vehicles over time and could no longer accommodate the heavy traffic. Sultan Yahya Petra Bridge had only two lanes when it was first built. Then, other bridges have constructed on the left and right of the original bridge. Thus, making this bridge the first triple-lane bridge in Malaysia.

1.2 The Importance of Bridge Construction

The second bridge was constructed since the present bridge, Sultan Yahya Petra Bridge is difficult to repair and will degrade the bridge's quality if the repair project is continued. The development of this second bridge has the potential to spur economic growth in other places as well. Not only that, the presence of a second bridge can help to alleviate traffic congestion. According to a study, bridges

erected beside highways can accommodate two lanes of vehicles moving at free speed and can be one method to avoid traffic congestion on the route [3].

The construction of a second bridge can also reduce the problem of traffic congestion which has been assessed in terms of traffic problems, saving time, and saving fuel. About 35 percent of the total traffic will pass through the bridge. According to the study, the time taken to cross the bridge will also save more time, which is about 60-70 minutes compared to the main road. [4].

In addition, the bridge can also facilitate the daily affairs of local residents to do businesses. According to the study, with the availability of roads for land transportation such as roads, highways and bridges can transport goods from one area to another more easily. This can improve the economy of the locals [5].

1.3 The Impact of Bridge Construction

The bridge can connect two areas, Kota Bharu-Tumpat. From an economic perspective, bridge construction develops trading activities that can boost the local trader's income [6]. Furthermore, this bridge can be a convenience when moving or transporting goods to other locations. Not only that, when a bypass road is established, new opportunities in small towns can also improve connectivity to major commerce areas.

From a social perspective, a new bridge can reduce traffic congestion, reduce delays, and accidents as well as provide a shortcut. Thus, it improves the volume of traffic flow. In addition, this new bridge can improve the local access to their destination which also reduces the travel time significantly.

2. Methodology

2.1 Location Identification

Palekbang-Penambang Bridge is located in the Kota Bharu area at coordinates $6^{\circ}8'33''$ and $102^{\circ}13'55''$. Palekbang in the Tumpat district and Penambang in the Kota Bharu district are connected by this bridge. This bridge also serves as a link between the districts of Tumpat and Kota Bharu. The site of the Palekbang-Penambang Bridge is depicted in **Figure 2**. The location of this bridge's construction is critical in many ways, including providing a direct route from Sultan Ismail Petra Airport to Tumpat without passing via Kota Bharu.

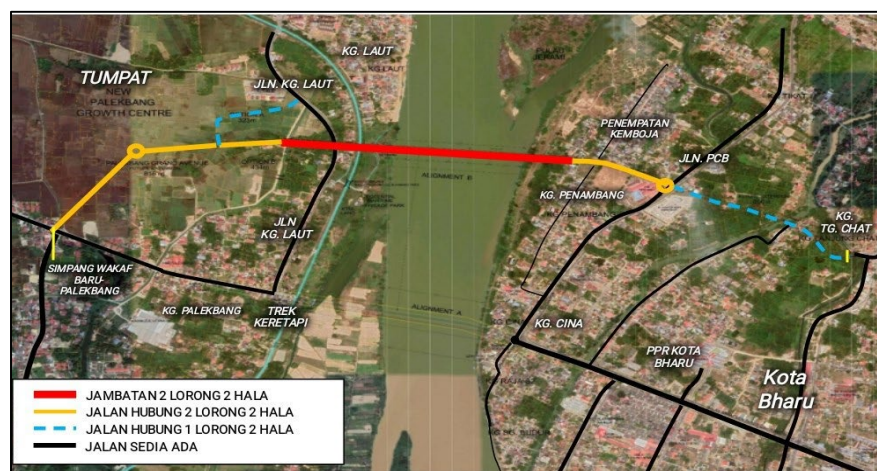


Figure 2: Location of Palekbang-Penambang Bridge, Kota Bharu

The study was conducted according to the flow chart as shown in **Figure 3**. The figure shows the procedures that were taken throughout this research was conducted.

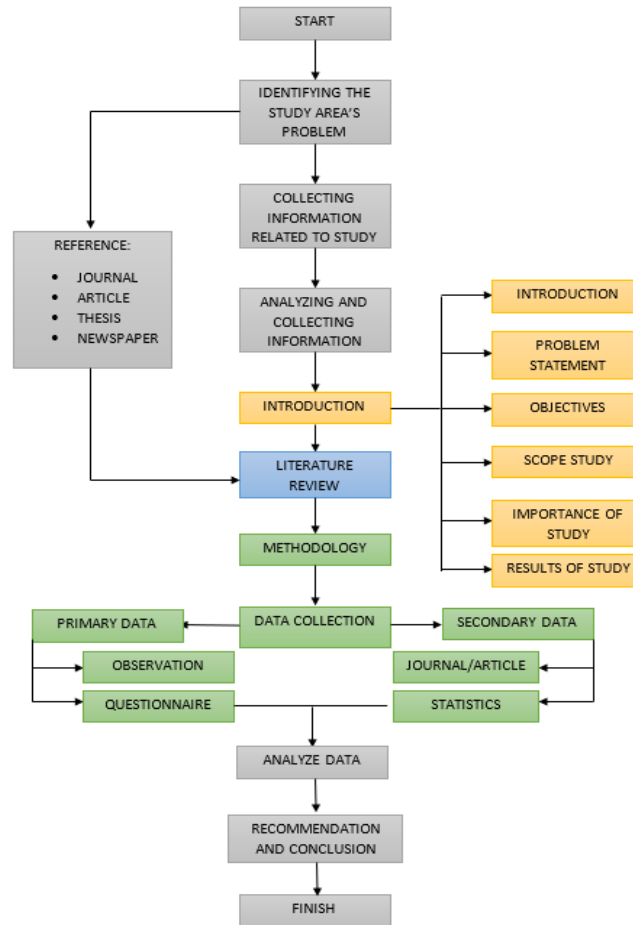


Figure 3: Flow Chart of Methodology

2.2 Data Collection

The data was collected using two methods which are primary data and secondary data. The below description explain the detail of the methods.

2.2.1 Primary Data

In primary data, two methods were used which are observation and questionnaire.

2.2.1.1 Observation

The observation approach is used across the research region, and it's necessary to keep an eye on what's going on with the Sultan Yahya Petra bridge and the second bridge construction project area. These observations can yield more pure data, and the researcher will be able to more accurately record the results of the observations in order to report the study's findings.

2.2.1.2 Questionnaire

In the questionnaire, there were two methods: a manual technique including interviews with a set of questionnaire questions and a modern one involving the usage of Google Forms on the internet. For the manual method, the way to obtain data is by giving the respondent fill out the form provided and by cooperating between the respondent verbally. It is appropriate for older individuals who are unfamiliar

with current technology. Furthermore, modern approaches can be used by competent individuals such as students, employees, and government officials, who can fill out questionnaires using Google Form. This has a positive effect on the researcher's ability to examine data in a more efficient and timely manner. The users of the Sultan Yahya Petra Bridge and the people of the study region are given priority in gathering data for this study. Users of the bridges and residents of the research region will be given a set of updated questionnaires.

2.3 Data Analysis

In the questionnaire, three types of questions were constructed, namely scale questions, straightforward questions, and multiple choice. The scope of this questionnaire also includes three main categories for this research, namely the duration and purpose of bridge use (environmental change), the importance of the construction of the second bridge project, and the impact of the project on the socio-economic population. The main reason for this division is to facilitate respondents and researchers to obtain better and more comprehensive data on the factors influencing the construction of the second bridge project.

Respondents were openly selected based on gender, age, occupation, area of residence, and place of destination. Respondents' data will be analyzed whether they live in the study area, the area near the study, or outside the study area that uses the Sultan Yahya Petra bridge as a communication route, the destination being whether they use this bridge as a public facility. Therefore, several questions were posed in identification. This component aims to find out the background of the respondents to determine whether they are bridge users or residents in the study area.

As for the perspective of the duration and purpose of bridge use (environmental change), it asked respondents about bridge use as their daily route, and respondents were given a situation or scenario that would show their response by assessing the level of linear scale. For example, respondents were given a situation where the Sultan Yahya Petra Bridge could not accommodate the increase in the number of vehicles from year to year due to the old and unsystematic design of the bridge. In this section, the researcher can learn about the changing purpose of the Sultan Yahya Petra Bridge over time, as well as the length of time that respondents benefited from using it on a daily basis.

In the next category, the questionnaire asked respondents about the important factors in the construction of the second bridge project. Respondents were asked by selecting whether the factors provided met the criteria on the importance of the construction of the second bridge project and were also able to add other relevant factors. From these questions, information on the types of factors that are important for the development of the second bridge project in Palekbang-Penambang in this part will be obtained.

The impact of the project on the socio-economic status of the population is another category of questions for the respondents. Respondents will be provided with several positive and negative effects to answer the questions provided, and even so, respondents can choose more than one effect. This part is used to gather information regarding the project's socio-economic impact on the inhabitants in the research area.

Last but not least, this questionnaire will also be asked of the respondents about the bridge and the second bridge project. Respondents were asked four short questions regarding the condition of the Sultan Yahya Petra Bridge and the construction of the second bridge, whether to their satisfaction or not. For example, respondents were asked about the weaknesses and improvements of the bridge. From these questions, it can be shown whether the bridge meets the criteria and is suitable according to the current situation. Respondents can share their thoughts and suggestions for improving the transportation system and infrastructural amenities in this area.

3. Results and Discussion

This section contains the findings of a questionnaire-based study that focused on a specific group of people around Kota Bharu and Tumpat, Kelantan. The outcome is presented in **Table 1**. In terms of the number of responders, 61 have provided information.

3.1 Scale Question

Table 1 shows the element included in the questionnaire, which is about the duration and purpose of using the Sultan Yahya Petra Bridge. Based on the table, it is clear that the majority of people using the bridge agree that this bridge is the busiest bridge in Kelantan due to its being the only bridge in the city. A total of 44.3% of respondents agree that the bridge cannot accommodate the increase of vehicles per year due to the old and unsystematic design of the first bridge. This led to respondents agreeing to improve the current bridge or build a new one. The respondents believe that the reason for the congestion is that the Sultan Ismail Yahya Bridge is closed for use. Not only that, 45.9% strongly agree that the population density in Kota Bharu and Pasir Pekan is one of the factors that affects the density of the bridge. A whopping 70.5% of respondents strongly agree that traffic congestion occurs, particularly during peak hours and the holiday season, making it difficult for road users to get to their destinations. In addition to that, most of them also believe that congestion at the bridge occurs because of a lack of infrastructure, such as a new bridge or an alternate route to cross the Kelantan River. Lastly, most of the respondents give their own opinion regarding the comfort of using the bridge, and the majority of them agree that the bridge is still in good condition.

Table 1: Scale Questions

Elements	Questions	Strongly Disagree (1)	2	3	4	Strongly Agree (5)
Duration and purpose of using Sultan Yahya Petra Bridge	The busiest bridge in Kelantan and the only bridge in the city.	(0)	(0)	(13.1)	(42.6)	(44.3)
	Cannot accommodate the increase in number of vehicles per year due to old and unsystematic design of the bridge.	(1.6)	(3.3)	(9.8)	(41.0)	(44.3)
	Congestion occurred when Sultan Ismail Petra Bridge in Tendong, Pasir Mas closed.	(0)	(0)	(14.8)	(39.3)	(45.9)
	The congestion is due to the population density in Kota Bharu and Pasir Pekan.	(0)	(0)	(11.5)	(42.6)	(45.9)
	Congestion occurs during peak hours and festive season.	(0)	(0)	(8.2)	(21.3)	(70.5)

Congestion occurs due to lack of infrastructure to cross Kelantan River.	(0)	(0)	(12.1)	(37.7)	(49.2)
The comfort of using the bridge is in good condition.	(3.3)	(18.0)	(24.6)	(34.4)	(19.7)

Notes: number of respondents (percentage %)

3.2 Multiple Choice Questions

Table 2 shows the respondent's choices for the questionnaire, which is separated into two sections. The first section is the importance of the second bridge construction. A whopping 90.2% of responses were recorded for the traffic jam. This clearly shows the most important factor that contributed to the construction of the second bridge. This is followed by population density, with 70.5% of responses. This reason is also one of the major factors for the bridge's construction to cope with the traffic congestion. About 57.4% of respondents believe constructing the second bridge can have an impact on socioeconomics. Up to 45.9% and 42.6% of responses were recorded for the bridge design and lack of infrastructure, respectively. This is because they agree that the width of the current bridge and the lack of alternate routes have become the reasons for the construction of a second bridge.

Next, it is about the responses that were recorded as the vital impact of the second bridge's construction on the locals' socioeconomics. Almost all respondents, 98.4% of whose responses were recorded, strongly agree that the second bridge can reduce traffic congestion. Since the traffic jam is the main issue, constructing the second bridge could give them a proper traffic flow. Other than that, 78.7% of respondents agree that constructing the second bridge, can shorten travel time and distance as it can provide an alternative route for the people there. About half of the respondents agree that the second bridge can improve the economy of the local people and also increase job opportunities for them. 47.5% of respondents believe by constructing the second bridge can increase their degree of accessibility for them. Lastly, about 37.3% of respondents agree that this second bridge can let them save fuel when crossing the Kelantan River.

Table 2: Multiple Choice Question

Elements	Choices	Responses
The importance of second bridge construction	Population density	70.5
	Bridge design (width)	45.9
	Traffic jam	90.2
	Socioeconomic impact	57.4
	Degree of accessibility	21.3
	Lack of infrastructure	42.6
The impact of the second bridge construction project on the socio-economy of the locals	Improve the economy of the local people	50.8
	Increase the degree of accessibility	47.5
	Save fuel	37.3
	Reduce traffic congestion	98.4

Shorten travel time and distance	78.7
Increase job opportunity	49.2

Notes: number of respondents (percentage %)

3.3 Open-Ended Questions

Table 3, shows the questions and the summary from the open-ended questions section that have been acquired.

Table 3: Open Ended Questions

Questions	Summary
Shortage at Sultan Yahya Petra Bridge	The majority of respondents reported that the bridge has limited capacity to accommodate the number of vehicles on the road, particularly during peak hours and during the holiday season. The respondents indicate that there is no alternative route in order to cross the Kelantan Bridge.
Improvement for Sultan Yahya Petra Bridge	According to the respondents, most of them suggest that constructing a second bridge can improve the current bridge. Some of them would like the current bridge to be widened to improve traffic flow.
Disadvantages of Palekbang-Penambang Bridge construction project	Half of the respondents believe that this project would affect the community, and some of them agree that this project will take a very long time to finish. Not only that, this project affects and limits the road around the construction project.
Improvement for the Palekbang-Penambang Bridge	Most of the respondents wanted the project to be sped up in order to avoid traffic congestion around the area. Other respondents recommend adding alternative routes to avoid traffic congestion in the meantime.

4. Conclusion and Recommendation

Based on the study that has been conducted on the importance of the construction of the second bridge project in Kota Bharu, Kelantan, the objective of this study was achieved because it identified the factors of the importance of the construction of the second bridge project. The analysis obtained a total of 61 respondents to obtain feedback and views on the satisfaction of the use of the Sultan Yahya Petra Bridge from people who live in Kota Bharu, Tumpat, Pasir Mas, Kubang Kerian, and surrounding areas who are also users of the Sultan Yahya Petra Bridge. The statement on traffic congestion at the Sultan Yahya Petra Bridge is supported based on 49.2% of respondents who think that congestion at the bridge occurs due to a lack of infrastructure, such as a lack of new bridges or alternative routes to cross the Kelantan River. After being studied and scrutinized, the performance of Sultan Yahya Petra Bridge could not accommodate the increase in the number of vehicles from year to year due to the old and unsystematic design of the bridge, based on the 44.3% of respondents who strongly agreed with the questions asked in the questionnaire. In this context, the parties involved need to take this problem seriously by improving the infrastructure or finding other alternatives to constructing a second bridge to avoid traffic congestion, especially during peak hours or during the festive season. However, as a user of the Sultan Yahya Petra Bridge, it is necessary to take the initiative to plan the trip as best as

possible to avoid severe congestion. In addition, bridge users should always be careful when using the Sultan Yahya Petra Bridge.

There are some recommendations to improve this study in the future. Further studies are needed to investigate the factors in more detail to meet the basic needs and benefit the surrounding population, especially road users. Next, the number of respondents is very important to obtain more significant data. Factors that influence the number of respondents are the type of day and time that are appropriate to conduct research with the method of interviewing respondents. In addition, the improvement in statistical terms of the number of vehicles influenced by the total population needs to be updated from time to time for future research as it has difficulty in obtaining this information. Thus, the researcher suggested that future studies need to be improved in terms of the methods used so that no problems occur during the research.

Acknowledgment

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