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## **Master's Thesis**

in the Degree Program Sustainable Mobilities

leading to the Academic Degree of Master of Science (M.Sc.)

### **Multi-Factor Analysis of Public Transport Usage: A Case Study of Banda Aceh City, Indonesia**

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## Abstract

Banda Aceh is the capital city of Aceh, Indonesia, where the population is currently less interested in using public transportation. CDIA has reported that 77% of road users in Banda Aceh are motorcycle users. They also reported a difference of about several thousand users between public transport passengers and private motorized vehicle passengers. This phenomenon is a big problem before the occupancy of road users in Banda Aceh is wholly owned by personal vehicles. These problems are the background of this research, aiming to increase the use of public transportation, which in parallel also suppresses the use of private vehicles. This study specifically reviews the background of the low use of public transportation in this city, especially *Trans Koetaradja*, through a multi-factor analysis in economic, social, and government factors with the principle of supply and demand. This study uses mixed methods, where quantitative analysis is used to analyze users, and qualitative research is used to interview experts in public transportation. This study proves that the people of Banda Aceh are very dependent on private vehicles and feel that public transportation does not provide the flexibility provided by personal vehicles. On the other hand, *Trans Koetaradja* already has a good infrastructure, but it still needs more funding and attention to improve its performance, such as reducing waiting times. This study recommends the government apply a push and pull policy, where the government needs to suppress the use of private vehicles through related regulations. Simultaneously, the regulations could attract people to use public transportation to increase the load factor of *Trans Koetaradja*. Once the average load factor reaches 70%, *Trans Koetaradja* can start applying the paid system to increase its income.

**Keywords:** *Banda Aceh, Trans Koetaradja, public transportation, private vehicle, push and pull policy*

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## List of Abbreviations

BRT	: Bus Rapid Transit
CDIA	: Cities Development Initiative for Asia
KOPELMA	: <i>Komplek Pelajar Mahasiswa</i> (Students Complex)
GAM	: <i>Gerakan Aceh Merdeka</i> (Free Aceh Movement)
UNSYIAH	: <i>Universitas Syiah Kuala</i> (Syiah Kuala University)
DISHUB	: <i>Dinas Perhubungan</i> (Department of Transportation)
Rp	: Rupiah (Indonesian Currency)
UPTD	: <i>Unit Pelaksana Teknis Daerah</i> (Regional Technical Implementation Unit)
BLUD	: <i>Badan Layanan Umum Daerah</i> (Regional Public Service Agency)
BRI	: Bank <i>Rakyat</i> Indonesia (One of Indonesian Bank Name)
LKPP	: <i>Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah</i> (Government Goods/Services Procurement Policy Institute)
NVR	: Network Video Recorder
PCR	: People Counting Recorder
RON	: Research Octane Number
GDRP	: Gross Regional Domestic Product
WIB	: <i>Waktu Indonesia bagian Barat</i> (Western Indonesian Time)
CCTV	: Closed Circuit Television

# 1. Introduction

## 1.1 Background of Study

Many developing countries are now struggling to maintain and improve their public transportation use because of motorized vehicle ownership escalation (Bass et al., 2011). For example, along with the economic growth, the rise of private motorized transport ownership in Indonesia is rising by around 5% from 2018 to 2019. With the increase of personal automobiles, the use of local public transport declines significantly because alternative transports are inferior compared to private ones (Litman and Laube, 2002). This phenomenon causes an urge for transport authorities to improve the public transport system to create a more sustainable travel pattern before the problems caused by car dependency occur, such as crossing the busy streets filled with cars and motorbikes (Litman and Laube, 2002).

Banda Aceh, the capital city of Aceh province, is one of the cities in Indonesia that has low usage of public transport. In contrast, the ownership of cars and motorbikes keeps increasing. Banda Aceh Central Bureau of Statistics stated that there are 62,796 increases in motorbikes ownership from 2011 until 2018 (Open Data Banda Aceh, 2019a). One of the main reasons for this escalation is the ease of buying motorbikes and cars with low-priced down payments and installments (Serambi News, 01/19/16). At the same time, people tend to see public transport as an inflexible mode of transport. Numerous local public transports have—and would be—disappeared since the Indian Ocean Tsunami back in 2004 crashed this city. Right now, Banda Aceh only has three modes of local transports called *Becak* (pedicab), *Labi-labi* (minibusses), and Trans *Koetaradja* (BRT-lite). Pedicabs can barely be found in the city; they only exist around the city center where the market is. The target groups of this local transport are mothers and workers that are shopping around this area. The high rate of fees is primarily the reason why people are abandoning this mode of transport.

On the other hand, the existence of *labi-labi* is in crisis. Back at the beginning of 2000, the occupancy of this mode of transport can reach 100%, with 1.000 fleets served 17 routes, whereas today there are only 352 fleets work to serve ten routes, where in fact, only 80 *labi-labi* that commute (CDIA and Banda Aceh Government, 2017). The abandonment of this local transport might be influenced by the new public transport in the city and the new online ride-hailing system. Because of that, customers tend to find *labi-labi* to be uncomfortable compared to other transportation. In addition, numerous students who were the dominant user of this transport nowadays drive motorbikes or even cars.

In 2016, a BRT-lite system was launched by the Aceh Department of Transportation. This BRT-lite is called *Trans Koetaradja*, the same fleet that can be found in other cities in Indonesia since they are from The Ministry of Transportation. This new alternative mode is an effort to minimize the use of motorized transports in the city by providing a comfortable and flexible method of transport. The number of fleets and corridors serving keep increasing to expand the service. From the start of its launch until 2019, there are 4 million users of this transport (Aceh Department of Transportation, 2019). However, this number is still considerably low. According to recent studies by the CDIA presented in Table 1, it shows in AM peak hour, there are only 110 passengers per hour per direction for *Trans Koetaradja*. In contrast, there are 4,936 motorized transports driven in the same hour and destination (CDIA and Banda Aceh Government, 2017). This study proves that the increase in cars and motorbikes ownership reduces people's interest to use public transport.

**Table 1 Comparison of Public Transport and Private Transportations Passengers**

Public Transport's Passengers on Morning Peak Hour in Corridor 1			
Mode of Transport	Average Passenger per Hour per Direction	Average Frequency per hour	Average Occupancy per Service
<i>Labi-labi</i>	142	46	4
<i>Trans Koetaradja</i>	110	8	14
<b>Total</b>	<b>252</b>	<b>54</b>	<b>4.66</b>
Number of Private Motorized Vehicle Users on Morning Peak Hour in Corridor 1			
Mode of Transport	Unit Frequencies per Hour per Directions	Average Passengers' Occupancy per Mode	Total Passengers per hour per Direction
Private Car	1,196	2	2,392
Motorcycle	3,740	1	3,750
<b>Total</b>	<b>4,936</b>	<b>1.2</b>	<b>6,142</b>

Source: CDIA and Banda Aceh Government (2017, p. 67) with modification

Nevertheless, the willingness to ride this transport is still there, proven by the answers from citizens that prefer the government to improve this system rather than establish a new tram system in the city (CDIA and Banda Aceh Government, 2017). In this case, the government as the supply side should be willing to prove that Banda Aceh city supports the sustainable mobilities concept by shaping its citizen mobility behavior and improving the public transport system.

## 1.2 Hypotheses

Five hypotheses are used to achieve the expected result related to mobility behavior, supply and demand willingness, and the relationship between cause and implications of public transport's use. The hypotheses for this research are:

- 1) The dependency on private motorized vehicles decreases the use of public transport.
- 2) The inadequate provided facilities and infrastructure is one of the reasons why public transport is not commonly used.
- 3) The pricing system can improve the public transportation service; hence, the willingness to ride the public transport will follow.
- 4) The support from the government in shaping its citizen's mobility behavior can increase the use of public transport.
- 5) The inadequacy of public awareness toward the implications of the common use of public transport causes the use of this mode of transportation to decline even more.

## 1.3 Research Question, Aim, and Objectives

The urge to keep improving the public transportation system in Banda Aceh is vital before private motorized transport becomes a 100% mode of transport in the city. CDIA reported that 77% of roads had been occupied by motorbikes nowadays (CDIA and Banda Aceh Government, 2017). The implications for the environmental problem can be seen now where BMKG Banda Aceh recorded that in the decade of 2005-2015, the average temperature of this city was 0.3 higher than in the decade of 1995-2004 (Irwansyah et al., 2021). The increase of private motorized transport ownership plays a significant role in influencing the urban heat island problem in this city. Due to this urgency, this study was initiated to analyze the low use of public transportation in the city with the multi-factor analysis. The research question that will guide this study is **how to improve the public transportation system in Banda Aceh to increase the use of it?**

As this study wants to analyze both supply and demand sides, there are two factors that can be determined; factors that influence and influenced factors. Thus, a sub-question is developed: **What are the several factors from both supply and demand sides that influence and be influenced by the low use of public transport?**

The research questions aim to plan a better public transport system in Banda Aceh by analyzing the influencing and influenced factors from both supply and demand sides. The influencing

factors help determine the proper regulation as the outcome of this study. On the other side, the factors that be influenced by this problem help to support the importance of this study.

This study aims to provide a better understanding between citizens (users) and provider perspectives (in this case, the government and transport authorities) about the mobility system in Banda Aceh, especially the public transportation system. This study can be a lesson for both users and providers to create a sustainable transportation system in Banda Aceh city.

Several objectives that are to be gained through this study can be identified as follows 1) to find out the reasons behind the low use of public transport in the city; 2) to analyze the implications of it, and 3) to create recommendations related to shifting from private motorized vehicles to public transport.

#### **1.4 Scopes of The Study**

The scope of this study includes Banda Aceh as a specific location, where research on private and public transportation and the components that influence it is carried out. However, this study still looks at the role of the Aceh provincial government and the government of the Republic of Indonesia, considering that many regulations in the transportation sector come from the higher level of governance. This study focuses on increasing the use of public transportation that already exists in this city, especially Trans *Koetaradja* as a BRT-lite, without ignoring the role of labi-labi as public transportation, which used to be the transportation that was relied on by the people of Aceh. The influencing factors are limited by presenting matters that are relevant in the field of transport only. This study is based on the principle of supply and demand, which links between theories in the management of sustainable public transportation from the government side and public demand regarding the criteria for reliable quality public transportation. Additionally, the concept of cause and effect is also the basis of this study. The causes of the lack of public transportation's usage are discussed with the implications' analysis if this problem continues to increase.

#### **1.5 Structure of The Research**

In order to answer the research questions, there are six chapters of the writing section in this study, which are as follows.

**Chapter 1** introduces the problems that form the basis of this research; presents the research question as a guide to achieve the aims and objectives as well as expected hypotheses to be proven.

- Chapter 2** describes the location of the study, including its political and economic situations and historical events that influenced the governance structure to give the idea about the decision-making, the mobility situation, and relevant policies. It also presents literature reviews related to the research, such as supply and demand principles and the push and pull approach.
- Chapter 3** explains the methods that are used in the research, which is mixed methods. Additionally, it also discusses the type of data that are used in this study.
- Chapter 4** presents the findings obtained from online surveys and an expert interview about mobility behavior and preferences and opinion about the public transport system in Banda Aceh from both supply and demand sides.
- Chapter 5** discusses the findings and theories and pieces of literature related to that, assesses the methods used, proves the hypotheses, and answers the research question while giving recommendations related to that.
- Chapter 6** concludes the research by presenting a summary and limitations that are faced. Some further questions are also offered to support future research.

## **2. Background Information and Literature Review**

### **2.1 Profile of Banda Aceh**

#### **2.1.1 Geographic and Demographic Information**

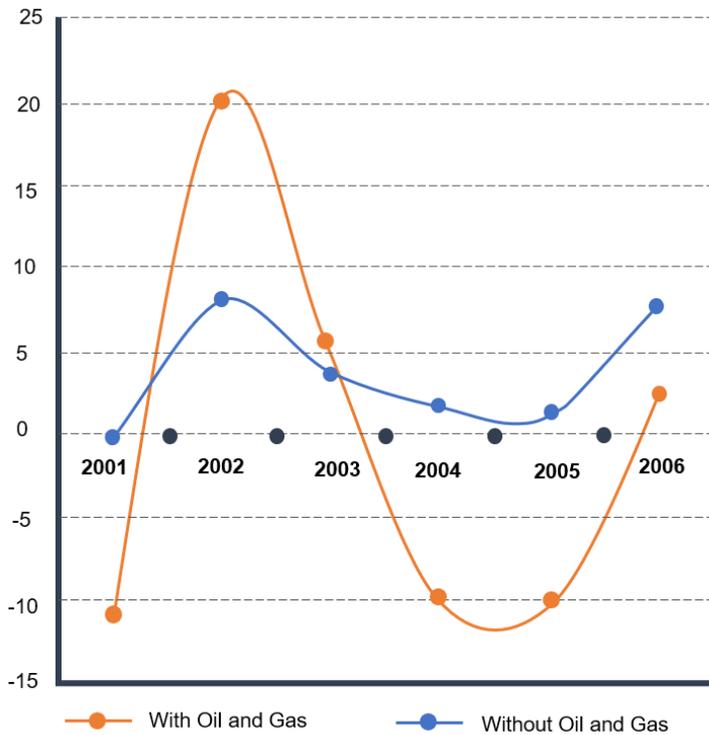
Banda Aceh is the capital city of Aceh Province. It is located on the top of Sumatera Island, one of Indonesia's biggest islands. Aceh Province has a size of 7,956 square kilometers (Indonesian Central Bureau of Statistics, 2019) with 119 islands, 35 mountains, and 73 main rivers. Banda Aceh City occupies 61.36 square kilometers of the province's area (Banda Aceh City Central Bureau of Statistics, 2019a). The city itself has nine subdistricts with 90 neighborhoods.

Banda Aceh City Central Bureau of Statistics (2019b) reported that there are 270,321 people in Banda Aceh with a density of 4.41 population/square kilometers. However, this data does not count the people who live in the city but do not register themselves as Banda Aceh citizens, such as students or workers from other districts studying or working in Banda Aceh. The urbanization happens because it is the city where the center of governance, business, and education of Aceh Province is centered. In Indonesia, governmental institutions such as Regional Police Institutions, Regional Military Institutions, and Governor Office are commonly located in the province's capital city. In this city, there are two most prominent universities in Aceh, called Syiah Kuala University and State Islamic University Ar-Raniry, located in KOPELMA, Darussalam, in subdistrict Syiah Kuala which is the most occupied subdistrict in the city (23.03%). As a result, Banda Aceh also becomes the center of business.

#### **2.1.2 History and Important Historical Events**

Banda Aceh is one of the oldest Islamic cities in South East Asia that is now 816 years old (Banda Aceh Government, 2021). It was also a famous trading center for tradespeople all over the world, considering its strategic location. It was a conflict area back in 1976 until 2005 with a separatist group named GAM that wanted to free Aceh from Indonesia because of political aspects. During this era, the economic system in Aceh was stagnant to almost down. The unsafe situation forces Acehnese to stay at home, while most of their occupation mainly was traders since back then, Aceh was the center for trading, followed by fishermen and farmers. This era formed the political economy with the existence of *Pajak Nanggroe* (Nanggroe Tax), where all citizens should pay the tax to support the weaponry of GAM to fight against the country (Ridhwan et al., 2015).

**Figure 1 Growth of Economics/Gross Regional Domestic Product of Aceh Province (2002-2006)**



Source: Aceh Province Central Bureau of Statistics (2007) with modification

Figure 1 shows the GDRP diagram from 2002-2006, wherein 2002, Aceh reached a period where the growth of its oil and gas industry reached around 20%. However, even though at that time four large enterprises generated at least 31 trillion Rupiahs in foreign exchange, the APBD of the province of Aceh at that time was only 150 billion Rupiahs per year, which means that the profits returned to Aceh did not reach 1% (Ridhwan et al., 2015). This issue was one of the peaks of the Acehese people's disappointment with the government because the people can only see the splendor of these companies without experiencing the actual results (Ridhwan et al., 2015).

In December 2004, the Tsunami disaster was destroyed Aceh and made the economy in this province decreased. The world's attention was given to this province to help reconstruct. They were also aware of the political problem between Aceh and Indonesia and became the facilitator to create a Memorandum of Understanding (MoU) between them. Finally, on August 15<sup>th</sup>, 2005, the MoU between Aceh-Indonesia was signed in Finland, then all the conflicts, including the political economy such as the Nanggroe Tax should be stopped. The economy in Aceh then started to get better since Indonesia promised to grant Aceh Special Autonomy Fund (OTSUS Fund) from 2008-2027.

### 2.1.3 Governance Structure

Since the signing of the MoU, based on Laws of The Republic Indonesia No. 11 Year 2006 (DPR Indonesia, 2006), Aceh has been declared a special autonomous region with its regional law and political party. Even though Aceh has its own autonomy, it still must follow several national regulations and laws. The provincial law called Sharia Law allowed Aceh to have its regulation called Qanoon. This regulation overall was ethically based on Islamic values and norms. There are several local political parties in Aceh. One of the most prominent ones is Aceh Party, whose membership is mainly dominated by GAM's ex-combatants. At the provincial level, Aceh is led by a governor where the mayor and the regents serve the five cities and 18 regencies. All of them are elected democratically every five years.

Every head of a department service is structured directly under the governor. Thus, the decision for each provincial department—for instance, the Aceh Department of Transportation—is made from the responsible head of subdivision continues to the head of the department of service and should be approved by the governor.

### 2.1.4 Mobility System and Relevance Policies

There are five types of public transport here in Banda Aceh, as said before, *labi-labi*, Trans Koetaradaja and its feeder buses, pedicab, taxi, and DAMRI buses. There are currently 463 pedicabs working informally around the city center and Aceh Market. The ordinary passengers of this mode of transport are mothers who travel to the markets. The driver and passenger usually negotiate the fare per ride before commuting. This phenomenon describes the government limitations in regulating the pricing system of pedicabs (CDIA and Banda Aceh Government, 2017). Similar to pedicabs, the taximeter is not used in the pricing system of the taxi and the price is also discussed between driver and passenger. However, taxis commonly serve the area of the airport, similar to DAMRI buses.

*Labi-labi* and Trans *Koetaradja* are now two major public modes of transport in Banda Aceh. CDIA and Banda Aceh Government (2017) reported that the existence of *labi-labi* today almost disappeared as the occupancy and load factor are slowly decreasing because the public welfare is growing as well as the ownership of private motorized vehicles. *Labi-labi*, as the city-level public transport, works informally without schedule and stations. The operation is under the department of transportation of each city that covered, for instance, those which cover the area of Banda Aceh work under Banda Aceh City Department of Transportation (DISHUB Banda Aceh city).

Unlike *labi-labi*, Trans *Koetaradja* is a provincial level BRT-lite that works under Aceh Department of Transportation (DISHUB Aceh) with scheduled rides and stations. Today, DISHUB Aceh is in progress to separate the operator and regulator; hence in the future, Trans *Koetaradja* will have a more autonomous operator to manage the finance independently, whereas DISHUB will only act as the regulator (CDIA and Banda Aceh Government, 2017).

### ***Governor's Regulation About Trans Koetaradja Operations***

In Governor's Regulation (2016) concerning the operation of Trans *Koetaradja* buses, the operation time of this public transportation started from 06.30 – 18.30 WIB. Article 8 Chapter IV (2016) of this regulation stated **two types of fare for passengers** that support the operation: 1) students rates and 2) college students and public rates where the collection of tickets is conducted by e-ticketing. In the same chapter, Article 9 (2016) stated a subsidy of free rides for Trans *Koetaradja's* passengers should be given until the load factor of this public transport averagely reaches 70%. The grant will be discontinued if the average load factor has already reached 70%.

This regulation also stated the role of institutions and society in Chapter V (2016), where every school principal in Banda Aceh city and Aceh Besar regen and the parents or guardians should **disallow students with no driving licenses to bring motor vehicles to schools**. This regulation is in collaboration with the Indonesian Republic Police (Governor of Aceh, 2016). Article 12 (2016) also stated that no motorized vehicle is allowed to park on the buses' routes.

### ***Regulations Related to Driving License and Automobile Tax***

CDIA and Banda Aceh Government (2017) reported that **13% of their respondents drive cars and motorbikes illegally**. In this manner, the Indonesian National Police (07/01/21) already mentioned that every driver who does not have a legal driving license should pay Rp 1,000,000 (Article No. 281). However, such violation is indeed among the most common cases in Banda Aceh and throughout Indonesia. Ironically, **motorcyclists often do bribery** because they see fines as troublesome; **even the police are also involved in these activities** (Indonesian National Police, 07/01/21). Thus, in this case, whoever commits bribery will be penalized.

Regarding dependence on the use of motorized vehicles, the people of Indonesia have again benefited from the program from Bank Indonesia. This program aims to **lessen the provisions for the down payment on credit/motor vehicle financing to at least 0 percent for all types of new motorized vehicles** started from first March 2021 until the end of the year (Movanita

and Ulya, 02/18/21). The government has also **incentivized the reduction in the Sales Tax on Luxury Goods (PPnBM) for cars** starting in March (Movanita and Ulya, 02/18/21). Thus, people can directly bring home their motorized vehicles in installments without paying a down payment.

### ***Motor Vehicle Testing and Fuel Usage***

In the Ministerial Regulation from Ministry of Transportation followed the Laws No. 22 Year 2009 about Traffic and Road Transport (Minister of Transportation of the Republic of Indonesia, 2015), the owner of motorized vehicles should regularly do standard tests for their vehicles (including cars, motorbikes, buses, trailers, etc.). This test starts from the first year after issuing the certificate of ownership and every six months after that. This regulation aims **to guarantee the technical use of motorized vehicles, supporting environmental sustainability from the emission** caused by motorized vehicles. It provides public service to the community (Minister of Transportation of the Republic of Indonesia, 2015). This test includes the visual inspection, manual, the arrangement of motorized vehicles, and roadworthy test including the emission and exhaust gas smoke thickness (Minister of Transportation of the Republic of Indonesia, 2015). DISHUB Aceh conducts this test at the provincial level under the department of Traffic and Road Transport (LLAJ).

In addition, there is a national subsidy given by the government in collaboration with PERTAMINA, as a monopoly holder of fuel distribution in Indonesia. This subsidy is for fossil fuels from refining crude oil (known as Premium gasoline). The price per liter of gasoline is calculated based on PERTAMINA's essential cost of fuel supply and the population's ability to pay (Nugroho, 2005). The result of this subsidy is, Premium gasoline is the cheapest gasoline in Indonesia. **Contrary to motor vehicle testing regulation, this subsidy is considered harmful to the environment and public health** as Premium has Research Octane Number (RON) 88, which has higher dangerous exhaust gas. Until now, the government has not entirely eliminated the distribution of premium fuel. However, restrictions on the number of tanks have already been implemented in several areas (Asmarini, 11/16/20).

Regarding this, **the public is still unable to completely switch from premium because the price is the cheapest** compared to all types of fuel. Even though PERTAMINA has its non-subsidized offer—called Peralite gasoline with RON 90—which is considered more environmentally friendly than premium, the public considers the price difference seems expensive, where it is only around Rp 1,000. In fact, transportation standards in Indonesia

already require the use of EURO4 standard fuel (BensinKita News, 03/10/21). In this case, Indonesia already has the fuel that fits the standard of EURO4, namely the Pertamina group, with RON of 92 & 95. However, the higher and non-subsidized price makes most people reluctant to choose this fuel.

### ***Aceh Green Project***

There are 15 of Great Aceh Plans presented by Aceh Government in Draft Qanoon Year 2017 about Aceh Mid-Term Development Plan (RPJM) Year 2017-2022 to achieve “The Realization of a Peaceful and Prosperous Aceh through a Clean, Fair and Serving Government.” One of the missions is to have an **integrated infrastructure and sustainable environment through the support of Aceh Green**, wherein this strategy there is a point to design a green growth plan as part of the sustainable principles’ implementation in the development of Aceh (Aceh Government, 2017). One of its implementations in the mobility sector is providing electric buses to be the leading project as green transportation. This strategy is supported by State Electricity Company (PLN ) Aceh by providing charging stations (Aceh Department of Transportation, 01/12/21) even though in the Qanoon’s draft, **the function of the transmission of the electricity network in Aceh is still not optimally working** (Aceh Government, 2017).

### ***Transport Planning and Car Free Day Campaign***

Several points are still heavily congested in Banda Aceh, for instance, the routes to KOPELMA and Surabaya Intersection. To overcome this, now both areas have built underpasses and one flyover at the Surabaya Intersection. Moreover, the Public Works and Spatial Planning Department of Banda Aceh has planned to construct another flyover in front of the governor's office, where there is a convention hall, and a mall is also being built (Department of Public Works and Spatial Planning (PUPR) of Banda Aceh, 2020). They also plan to widen roads in the surrounding area to solve the problem of traffic jams. In the city center area, several one-way routes are applied to reduce the volume of motorized vehicles.

On the other side, there is a weekly event by the city government called Car Free Day (CFD), which happens every Sunday from 06.30 – 10.30 WIB by not allowing motorized vehicles to pass through one street in the city center (Simpang Jambotape – Simpang 5) named Daud Bereueh Street. Similarly, DISHUB Aceh launched Friday as No-Car Day, but no particular restriction to use cars on that day. This initiative was initiated based on the recent report by the Central Bureau of Statistics that there is a 9,05% average growth of private motorized numbers in Indonesia (Aceh Department of Transportation, 09/18/20).

## **2.2 Literature Review**

Litman and Laube (2002) stated that the transport sector is “a major economic sector” that can virtually influence other sectors, for instance, the environmental sector where it contributes to the world’s CO2 emissions around 23% with the 80% growth in emissions (Soto et al., 2018). There are two significant types of transport, which are public and private. In their report, Balcombe et al. (2004) classified the public transport modes: buses and coaches, taxis and private hire vehicles, tramways and light rail, and ‘heavy’ urban rail. Among these four, buses and coaches are the most commonly seen and used mode of transport, considering the area covered, fares relatively cheap, flexibility, and numerous fleets availability (Balcombe et al., 2004; Rohani et al., 2013). The private transportation, on the other side, is divided into two, motorized and non-motorized. The non-motorized transports are walking and cycling, where those two also play a role as “feeder mode to public transport” (Litman and Laube, 2002). Litman and Laube (2002) also argued that there is such a competition between private motorized transport and public ones, as personal vehicles offer flexibility in time. On the other side, some policies force the drivers to shift to public transports.

The public transport offers a service of transportation that has fewer negative impacts on the environment with social equity and efficient accessibility to travel (Krygsman et al., 2004; Murray, 2001). However, as automobile ownership is growing, the users tend to inherit the flexibility and freedom offered by this mode of transport and caused declines in public transport’s use (Murray, 2001). Litman and Laube (2002) argued that the growth in consumers’ financial status does not necessarily become the reason for the increase in automobile dependency. They contended that the wealthier regions have tendencies to have “balanced transportations systems” while some more impoverished regions do not (Litman and Laube, 2002).

### **2.2.1 The Supply and Demand Principles in Public Transport System**

The two roles of the public transport system should be taken into account to support this mode of transport: the operators or service providers and the users’ demands. The transitions are significantly influenced by the government that in which any of the changes also require changes in policies and funding support from the government (Docherty et al., 2018; Rohani et al., 2013). Nevertheless, the quality of public transport management and services should also be acknowledged and “be reconsidered by the various stakeholders in politics, the economy, planning, and civil society” (Schwedde and Hoor, 2019).

## Governing The Mobility and The Policy Effectiveness

Docherty et al. (2018) reviewed the arguments about the role of government in the socio-economic transition where the “**politics and power struggles**” efficiently shift how government provides the services. They conclude that the government interventions and management of this “smart transition” to provide the advantages from mobility service to individuals optimally, equity in “mobility opportunities”, and “reducing the impact of mobility on the environment, and particularly with regard to decarbonization” (Docherty et al., 2018). Schwedes and Hoor (2019) recommended the call to governments to start planning for **multimodal mobility** where the active modes of transport are combined with public transport. They also added that the **push and pull measure** should be applied to offer the image of the unattractiveness of cars (Schwedes and Hoor, 2019). Schwedes and Hoor (2019) added that the use of a single push or policy might lead to an unsuccessful result. Thus the use of both these policies would result in the best impact. In other words, the optimal results can be achieved by combinations of “improved functionality of public transport” and implemented fares that aim to decrease the attractiveness of cars—for instance, road pricing (Holmgren, 2015). Contrary to that, Litman and Laube (2002) stated that **policies commonly favor the use of automobiles** such as road investment, designing the road to be less safe for other modes of transport except for motorized vehicles, and generous subsidies on parking fare. Additionally, the fuel subsidies also support the higher use of private motorized vehicles.

The push policy aims to show the “less beneficial” sides of using automobiles or seeking the “**behavioral principles**” where the freedom of people’s travel choices is restricted (Eriksson et al., 2008; Steg and Tertoolen, 1999). Table 2 shows seven measurements that can be used in shaping travel behavior to decrease the use of automobiles based on the explanation from Steg and Tertoolen (1999).

**Table 2 Push Policy Measurements and Effectiveness**

Measurement on Behavior Change	Application and Effectiveness
<b>Economic Measure</b>	The commonly used policies are fines, tax, and pricing, making automobiles a high-maintenance and expensive mode of transport. Steg and Tertoolen assumed that those measures imply the rational reactions where people tend to choose the cheaper option with the “highest utility”. However, some studies prove that motorized

	vehicle keepers tend to be prepared for the higher prices they should pay when they afford an automobile (Steg and Tertoolen, 1999).
<b>Physical Alternatives and Physical Changes</b>	In this measure, the circumstances shape the mobility behavior by controlling the directions and traffic while parallelly promotes the alternative modes. However, this measure might be somewhat ineffective as the road users already mastered the routes to travel (Steg and Tertoolen, 1999).
<b>Technological Innovations</b>	This measurement aims only to allow less-polluting cars and restrict the ones with “damaging exhaust gas”. However, Steg and Tertoolen argued that this measure would only be optimally applied in a “controlled manner and associated with other measures”. The introduction of environmental-friendly vehicles also requires adaptation (Steg and Tertoolen, 1999).
<b>Legal Regulation with Enforcement Measure</b>	This measure combines the law and rules where the violation of rules will imply consequences, such as fines. However, this measurement requires an adequate organization to conduct and control because it is responsible for securing people’s trust and not violating it to gain the willingness to follow the measure (Steg and Tertoolen, 1999).
<b>Organizational Change</b>	This measure aims to create and modify organizations and institutions that support the sustainable mode of transport. However, it might be hard to unite people's preferences and keep the organization consistent with the goal as the sustainable concept would compete with the economic considerations (Steg and Tertoolen, 1999).
<b>Provision of Information, Education, and Communication</b>	This measure aims to raise awareness of the implications of the high use of private vehicles, such as the environmental impact and the importance of alternative modes. At some point, this measurement might hard to apply as people’s choice of mode of transport tend to be a habitual behavior where this might “decrease the dept and complexity of the decision-making process, as well as reducing the scope for changing behavior through persuasion.”

	However, this measure still plays a vital role in informing individuals about the environmental implications of automobile use to support other policy measures (Steg and Tertoolen, 1999).
<b>Social Modelling and Support</b>	This measure's background is that mobility behavior tends to be influenced by social aspects such as social comparison and norms. However, Steg and Tertoolen argued that social factors only slightly influence behaviors.

Source: Based on Steg and Tertoolen (1999, pp. 64–66)

Steg and Tertoolen (1999) stated that the ideal policy should be designed with the combination of strategies and aims the most significant factors involved in the increased use of private motorized vehicles.

### **Satisfaction Demand on Public Transport’s Quality Service**

While on the other side, **pull policy** targeted the improvements in the quality of alternative travel modes (Eriksson et al., 2008). The willingness of the governments to subsidize the environmental-friendly transportation service is needed to shift the use of private vehicles to alternatives (Groot and Schuitema, 2012). Compared to push measures, the pull measures tend to be acceptable in society because it is non-coercive (Groot and Schuitema, 2012). The satisfaction of the quality of public transport—specifically buses—is essential to assess the economic performance and the success of the service provided (Rohani et al., 2013). The quality buses that users demand are as follows:

**Table 3 The Criteria of Public Buses Quality**

<b>Criteria</b>	<b>Meanings</b>
<b>Reliability</b>	: The service provided should be consistent and dependable.
<b>Responsive</b>	: The agency that provides the service should be fully ready and prepared.
<b>Competence</b>	: Acquired the skill and knowledge in performing the service.
<b>Access</b>	: The availability of access and contact.
<b>Courtesy</b>	: The attitudes of the operators (politeness, respect, and friendliness).

<b>Communication</b>	: Good communication from the provider and understandable for all passengers.
<b>Credibility</b>	: The provider should be trustworthy to the passengers.
<b>Security</b>	: The alternative service should be safe for passengers.
<b>Understanding</b>	: The provider should fully understand the demand and needs of the passengers.
<b>Tangibles</b>	: The service should have a physical environment that represents itself.

Source: Rohani et al. (2013, p. 173)

Rohani et al. (2013) classified the quality of buses' services mostly demanded by passengers into five: reliability, safety, communication, comfort, and cleanliness. Moreover, there is a study that proves the increase of headway can increase the demand. At the same time, the change of frequency increases the ridership by adding the fleets while parallelly improve the waiting time and overcrowding at the bus stops (Rohani et al., 2013).

### **2.2.2 The Implications of Public Transport's Inferiority**

Overall, the set of push and pull policies stated in the previous sub-chapter would be effective only if they were acceptable by society. Hence, the policies should emphasize its aim to contribute to environmental problems as the awareness of environmental issues as a norm tends to activate the willingness to reduce the use of private motorized vehicles (Eriksson et al., 2008). In this sense, as stated before, the knowledge about environmental effects caused by the dependency on personal motorized vehicles should have campaigned to the individuals.

### **Environmental Effects and Road & Traffic Problems**

The environmental issues caused by the use of non-mass transports are the higher emissions exhausted from the cars and motorbikes and the energy needed to produce these modes of transportation (Steg, 2003). The harmful emission also contributes to increasing urban heat islands in a city (Irwansyah et al., 2021). Additionally, the damaged environments can affect society through illness and disabilities caused by poor air quality. Additionally, it can also affect the market value for specific areas of the environment (Litman and Laube, 2002). Transport also contributes 16% to noise pollution that affects the sleep and communication of the community (Steg, 2003).

Suppose the road and traffic conditions are mostly occupied by the private motorized. In that case, communities will experience particular problems such as troubles at crossing the streets and commuting, which would be lesser happen in a balanced transportation city (Litman and Laube, 2002). The most common problem is congestion would be likely to happen, especially during the peak hour or days. Traffic accidents are most likely to happen (Kharizsa et al., 2015) due to the higher capacities of private motorized vehicles.

### **Automobile-Dependent City**

The city that favors automobile-oriented planning tends to have less space for pedestrians and parks with greenery to socialize, increasing the paved roads and parking facilities (Litman and Laube, 2002; Steg, 2003). The planning is only beneficial for the automobile users, where the society who do not own private transports will be disadvantaged because the business places are focused on automobile users (Steg, 2003). Thus, society is influenced by the stigma that one's activity could not be done without motorized vehicles (Kharizsa et al., 2015).

Some studies showed that the developing country population tends to have higher use of it when it comes to automobile ownerships; they see this as a symbol of success (Kharizsa et al., 2015). This causes the society to be less dependent on mass transportation, leading to the decrease of the public transportation quality because of the low demand (Litman and Laube, 2002). The flexibility of automobiles tends to seem like one contributor to productive economic activities as it helps the mobility of people. Contrary to that, Litman and Laube (2002) discussed where a study proved that "there are no obvious gains in economic efficiency from developing car dependence in cities" as the phenomenon of the car-dependent city gives "significant losses in external costs" of the economic sector. This phenomenon happens because automobile dependency reduces the development and competitiveness in economic activity in society as the increase of transportation costs tends to shift substantial sums of money aside from more productive uses and promote imported goods consumption (Litman and Laube, 2002).

### 3. Methods and Data

In this chapter, the method used for analyzing the topic will be explained, and the data collected will follow.

#### 3.1 Mixed Methods

This study adopted mixed methods that used both qualitative and quantitative methods. This method was introduced in 1995 by Campbell and Fisk and is famously used by researchers in social science and human sciences (Creswell, 2009). The method is labeled as “mixed methods” where two approaches—quantitative and qualitative—are used in a study with two types of components: two ways of collecting data or two research questions addressed (Tashakkori and Creswell, 2007b). This study wanted to analyze both supply and demand sides, wherein an expert interview is conducted to understand the actual situation based on the service’s supplier view. Since the users or demand side are citizens of Banda Aceh, it is impractical to interview each person; thus, a survey is conducted to gain a sample size representing public transport users in Banda Aceh. The research question (see chapter 1.2) emphasized the need for mixed methods in this study. This is important because the research question as guidance for the research should imply how the research would be conducted (Tashakkori and Creswell, 2007a).

Based on Creswell (2009), in a research design, there are three units involved; philosophical worldviews, strategies of inquiry, and research methods. In the worldview, this study positioned itself as **pragmatism**. This view generates every manner applicable to conceive the main focus of the research (Creswell, 2009), which is the low usage of public transport in Banda Aceh. As in this study, the analysis of users is conducted in the first place quantitatively. This step is categorized as **sequential mixed methods** where either qualitative or quantitative step can be used as the starting point (Terrell, 2015). During this treatment, priority can be granted to each or both data (Terrell, 2015). In this research, both parties are prioritized because both sides are equally important for this research purpose. Terrell (2015) specified this strategy as **sequential transformative** because the quantitative becomes the first analysis, where the beneficial point of this strategy is when it comes to reporting and application of data it is uncomplicated. As for the pain point, it takes long time to generate the data.

The third component involved in a research design is where the analysis and evaluation of the data happened in the research method (Creswell, 2009). This study used an online questionnaire as a quantitative approach and an expert interview as the qualitative one. The explanation of the research methods can be seen below.

### 3.1.1 Quantitative Analysis: Online Survey

The first data collection started with quantitative data, where an online questionnaire was sent out to people in Banda Aceh. A sequence of procedures is given to a population measured quantitatively using a **cross-sectional or descriptive survey**. The aim of accomplishing this survey is to compare the relation between pre-existed and present precisely. Thus, if the same survey would be conducted in the future, it can be compared with the current results (Ebrahim and Bowling, 2007). Ebrahim and Bowling (2007) stated that the descriptive survey is used to create a new movement from identifying measured variables of a population. Several measurements that are usually aimed by this method are social behavior, assumptions, and psychological attitudes (Ebrahim and Bowling, 2007).

**In this study**, some of the questions were adopted from the existing survey by CDIA and Banda Aceh Government (2017), such as the payment willingness question and financial ability questions. The goal of adopting some questions with some changes is to present the actual and include additional data from 2021 that hopefully can be refreshed in the future study again. There are variables and types where it assigns to feature samples that wanted to be measured (Creswell, 2009): population, travel preferences and behavior, economic aspects, and public transport's opinion. Those variables are measured quantitatively using the demographic questions, multiple choices, and Likert scales from one to five representing the quality of infrastructure (very poor to very good). Demographic question is essentially used to know the basic information of the respondents to create a sample, whereas travel preferences and behavior questions are used to measure any the transformation of respondents' mode of transport choices. The economic measurement aims to present respondents' financial ability, and the opinion of the respondents is used to be compared and discussed with qualitative analysis later.

The media used to conduct the quantitative survey in this study is an online survey platform from Google Form. This platform was chosen because of the simple interfaces, and it costs free. Wright (2005) stated that online survey has advantages for researchers in reaching unreachable populations, time-saving because the researcher can parallelly work on other cases. Also, it does not require higher costs than conventional surveys using paper and door-to-door meeting the respondents. Additionally, this type of survey is beneficial to this study in the distance since the proposed participants (Indonesia) are not in the same country as the researcher (Germany). The deployment of this online survey is by sending out the link to Google Form via social media broadcast message. Snowball sampling is also conducted by asking people to broadcast it to their accounts to obtain diverse people. This sampling method

usually uses connections to open access to other groups of people that the researcher does not have direct access to (Etikan and Bala, 2017). This method is helpful to obtain variation in respondents' age, occupation, and financial ability, which are also the focus of this topic.

The quantitative data analysis can be done with various methods, such as using an application named SPSS, R, or Microsoft Excel. It would be impractical to analyze the data conventionally without any help from a digital application if the researcher has a wide range of respondents. This study used **Microsoft Excel** to calculate and filter the chosen data, which is later presented in figures.

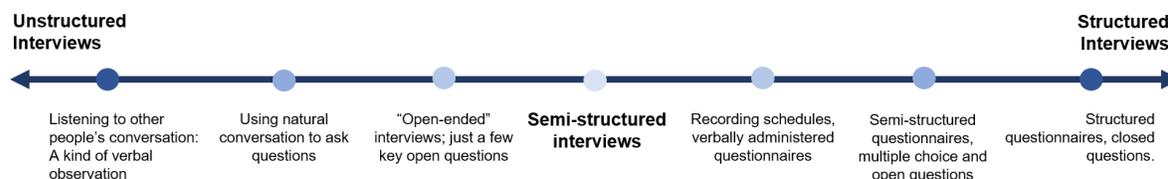
### 3.1.2 Qualitative Analysis

The qualitative analysis analyzes the supply and demand to understand the perspective of both parties related to public transport's service in Banda Aceh. Qualitative research aims to gain information and confirmation, explore additional discoveries that could cover the existing data, and operate with a systematic procedure to obtain opinions and values (Mack et al., 2005). Mack et al. (2005) also added that if a study used quantitative and qualitative data, the qualitative analysis results could be beneficial to other perspectives of the topic—for instance, the norms and social values—and additional information on the relation between quantitative and qualitative data. Different from quantitative data, the qualitative analysis uses an open-ended question and is more flexible than structured, close-ended, and identical questions offered by quantitative analysis (Mack et al., 2005). In this study, an expert interview is conducted as part of qualitative research to understand the perspective of the Trans *Koetaradja* department towards the operations and opinions of this public transport.

**An interview** is a data collecting approach where the researcher asks open-ended questions to the interviewee or in a group of the participants to gain participants' opinions, and it is conducted by having a meeting, via telephone, and nowadays the internet also plays a significant role (Creswell, 2009; Norman K. Denzin & Yvonna S. Lincoln, 2018). The modernized remote interview is an advantageous approach regarding the distance between interviewer and participants. It also gives accessibility to interview isolated or in-danger population that is unreachable (Norman K. Denzin & Yvonna S. Lincoln, 2018). There are two types of interviews based on the questions, which are structured—where the questions and answers are already predicted by the interviewer—and non-structured interviews where the response is not expected beforehand by the researcher to gain factual answers from the respondent (Ciesielska and Jemielniak, 2018). However, Norman K. Denzin & Yvonna S. Lincoln (2018) presented an argument from Parker (2005) about how an interview **cannot be**

**fully structured** because the interviewer cannot expect the interviewee to behave entirely as structured. Additionally, Norman K. Denzin & Yvonna S. Lincoln (2018) added that on the same side, **no unstructured interview is completely unstructured** because the guidance to conduct an interview should be there before the interview starts. Overall, this statement leads to the advantage of actively involved participants in a qualitative discussion without neglecting the essential goals of the conversation.

**Figure 2 The Verbal Data Dimensions**



Source: Ciesielska and Jemielniak (2018, p. 79) with modification

Regarding the argument, Norman K. Denzin & Yvonna S. Lincoln (2018) then grouped the interview into the **relatively structured interview**, **relatively unstructured interview**, and **semi-structured interview**. The fairly structured interview is conducted similarly to the questionnaire, where the answers from the participants are almost already expected. Meanwhile, the relatively unstructured interview is the conversation between the informant (interviewee) and listener (interviewer). During the conversation, the researcher acts as the host that should not disturb the interviewees while they are giving information. This study used a **semi-structured interview** as an approach where the presence of the interviewee is not limited only to provide the answers that were already expected, but also the interviewer is allowed to narrate the conversation. The dimensions of these three types of interviews are illustrated in Figure 2.

Since the aim of conducting qualitative research in this study is to gain a deep understanding from the supply side, The Head of Trans *Koetaradja* Department in Aceh—Mr. M. Hanung Kuncoro—is invited as an expert in this field. **The expert interview** is commonly used in social research because it gives practical and focused information from the expertise, especially in the economic aspect and the information of the targeted organization (Bogner et al., 2009). In terms of political views, interviewing the experts may explain how the expert who works under the political and social environment makes a decision (Bogner et al., 2009). The suggested approach to do an expert interview by Bogner et al. (2009) is not doing “Ignorance as Method” in this approach. Instead, a knowledge preparation about the proposed topic of the interview should be prepared to obtain an open interview that would stick to the guidance. A set of

proposed questions and information of Trans *Koetaradja* are prepared before the expert interview to open the discussion.

Before the interview, consent from the interviewee that stated that they allow the interview to be recorded is needed. This consent aims to facilitate the process of transcription. Bogner et al. (2009) argue there is **no standardization in transcription**, such as a detailed, thoroughly transcribed interview is the right thing while the less one is not. In this study, since the interview is conducted in Bahasa, Indonesia, **the translating process** is done parallelly with transcribing.

The next step in analyzing the expert interview is **coding or indexing**. Several categories from the transcript are made as much as the information gained. This helps to break down and highlights the conversation to write systematic findings. The topics that wanted to be highlighted in this study are decision-making, social and economic problems, and projects and plan for the Trans *Koetaradja*. The coding or indexing process is done by conventional highlighting using colors on a printed-out transcript.

### **3.2 Data**

There are two types of data that are used in this study. Firstly, primary data from the conducted online survey and expert interview. These data are primarily conducted and analyzed by the researcher using the tools already stated in the last subchapters. The analysis of this primary data will be presented in the next chapter. Then it would be interpreted and discussed with secondary data in Chapter 5.

The secondary data is the data that has been collected through academic journals and books. The tools used to obtain secondary data are Google Scholar as the search engine for scientific journals and primary Google as a search engine to read local news. Additional sources from local news and official governance and organization websites are also used to describe the actual situation and condition in the targeted area of study. Websites that are used most of the time are SAGE Publication, Research Gate, Springer, Elsevier, and online libraries. The official websites that are commonly used in this study are Banda Aceh Central Bureau of Statistic (2019a, 2019b), Banda Aceh Government (2021), Aceh Government, and DISHUB Official Website (2019).

## 4. Results

This chapter will discuss the results of two primary data collection, which are an online questionnaire and one expert interview with the head of the Trans *Koetaradja* department.

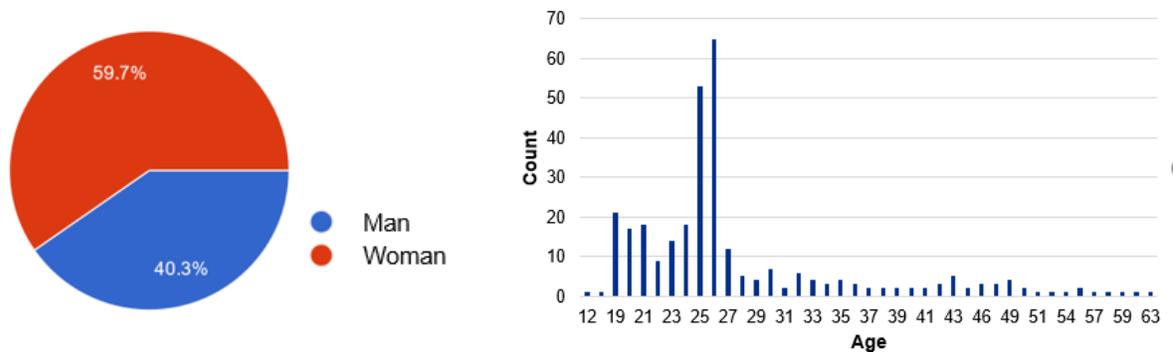
### 4.1 Online Questionnaire

For the purpose of the research, a link to an online questionnaire using Google Form was sent out to Banda Aceh citizens through broadcast messages (WhatsApp) and social media (Facebook, Instagram). This questionnaire aims to know the sample's demographic information, understand citizens' economic capability to afford their travel behavior, whether the citizens are private motorized vehicle dependent or trips dependent, and their views toward the public transportation system in Banda Aceh. The multiple-choice questions and Likert scales were used, and one essay question was given to the respondents to achieve open-ended answers. With a total of 33 questions<sup>1</sup>, this questionnaire lasted no more than 10 minutes, with 310 respondents in two days. The results of this method are presented below.

#### 4.1.1 Basic Information

The first four questions are essential information about gender, age, address, and occupation. In general, most of the respondents are women with an average age of 26-27, as shown in Figure 3.

**Figure 3: Gender and Age of Respondents**



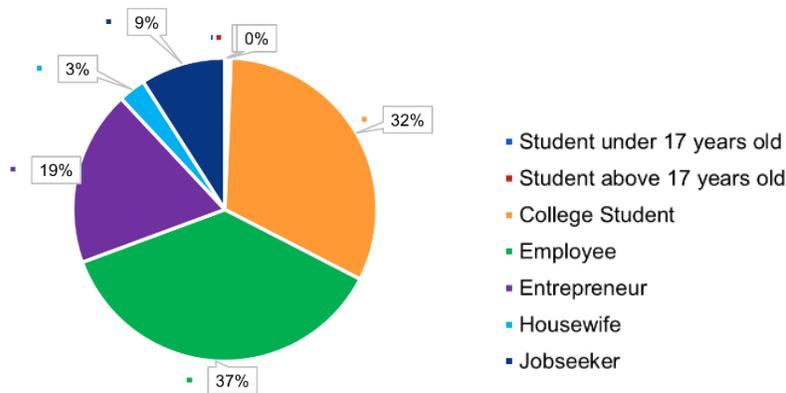
Source: Own Survey (2021)

Based on the diagram above, there is only a small number of gender differences. While in age count, most respondents have age 26-27, but there is a diversity in age. However, this survey

<sup>1</sup> See Appendix 1 to read the full questionnaire questions.

cannot represent all groups of citizens in Banda Aceh because only two students participated. Below, Figure 4 shows respondents' occupations.

**Figure 4: Respondents' Occupations**

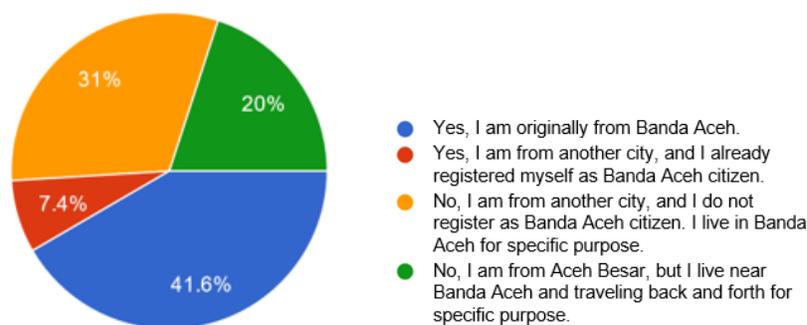


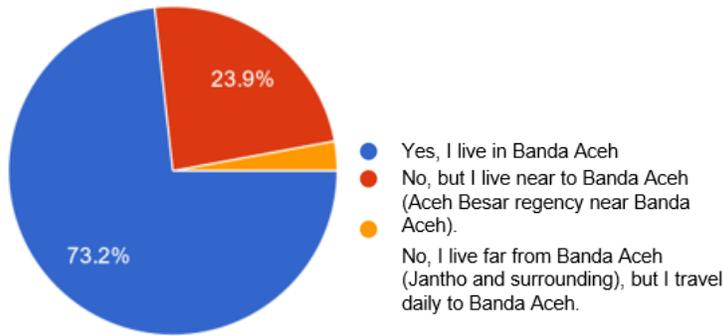
Source: Own Survey (2021)

In this occupation question, respondents can choose which one is their job from those seven options. They can also state or specify their job by typing it in a short answer box if they could not find it in multiple choices. However, the responses from free answers only added an impractical group of occupation because initially, the answers only define their specification kind of “employee”. Meanwhile, this question aims to know their mobilization, whether they work in an office with a working hour, flexible working hours as entrepreneurs, or stay-at-home homemakers. Thus, to clean up the data, the specific work is grouped into the initial choices of job. For example, some short answers stated that they are doctors. These answers are then grouped into the employee.

#### 4.1.2 Population Distribution

**Figure 5: Respondents' Origin (above) and Current Address (below)**





Source: Own Survey (2021)

This question aims to determine the users of Banda Aceh roads—are they all originally from Banda Aceh, or is there urbanization that leads to vehicle increase? The two figures above show that only 41.6% of respondents are originally from Banda Aceh. The least are people who come from other cities outside Banda Aceh and live or go back and forth for a specific purpose, such as studying in university. The lower figure aims explicitly to target respondents' addresses, whether in Banda Aceh city or in Aceh Besar district surrounding the capital city. The result was that 73.2% of respondents live in Banda Aceh, including those not coming from this city.

**Figure 6: Respondents' Vehicles Origins**



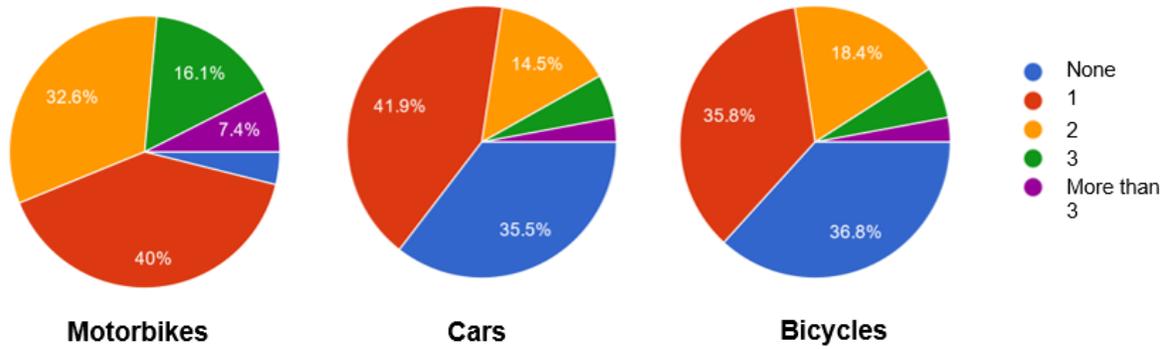
Source: Own Survey (2021)

Besides that, a question about their vehicle's origins was also asked. Figure 6 shows the majority of users have a Banda Aceh license plate, while 36.1% of people bring their own motorized vehicle from their hometown. Overall, based on all three figures above, it can be said that the majority of users of Banda Aceh roads are not coming from its city itself.

### 4.1.3 Travel Behavior

In this survey, participants were also asked about their ownership of vehicles and daily mode of transport, followed by questions about their frequently used roads and how long they spend their time on travel. These questions aim to know their travel preferences.

**Figure 7: Respondents' Vehicle Ownerships**

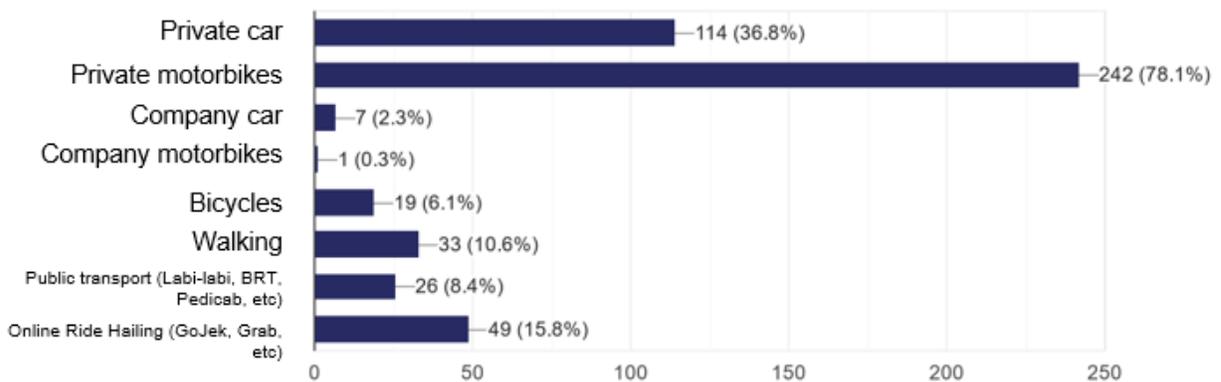


Source: Own Survey (2021)

In this context, almost all respondents have at least one motorbike in their homes. Only 12 (3.9%) participants said they do not have a motorbike. 7.4% stated that they have more than three motorbikes at home, meaning that almost one person in a household has their own motorbike. Contrary to that, 36.8% answered that they do not have any bicycles at home, while 35.8% said they only have one. Nevertheless, some people also said they have more than one bicycle at home.

On the other hand, almost half of respondents (35.5%) said they do not own a car, while 41.9% said they only have one. "More than 3" is an unexpected answer to the car ownership question, but still, there are 9 (2.9%) participants who said they do own it. However, in this case of the car, another question about respondents' daily mode of travel showed that some participants use their company cars. The result can be seen below.

**Figure 8: Respondents' Daily Mode of Transport**



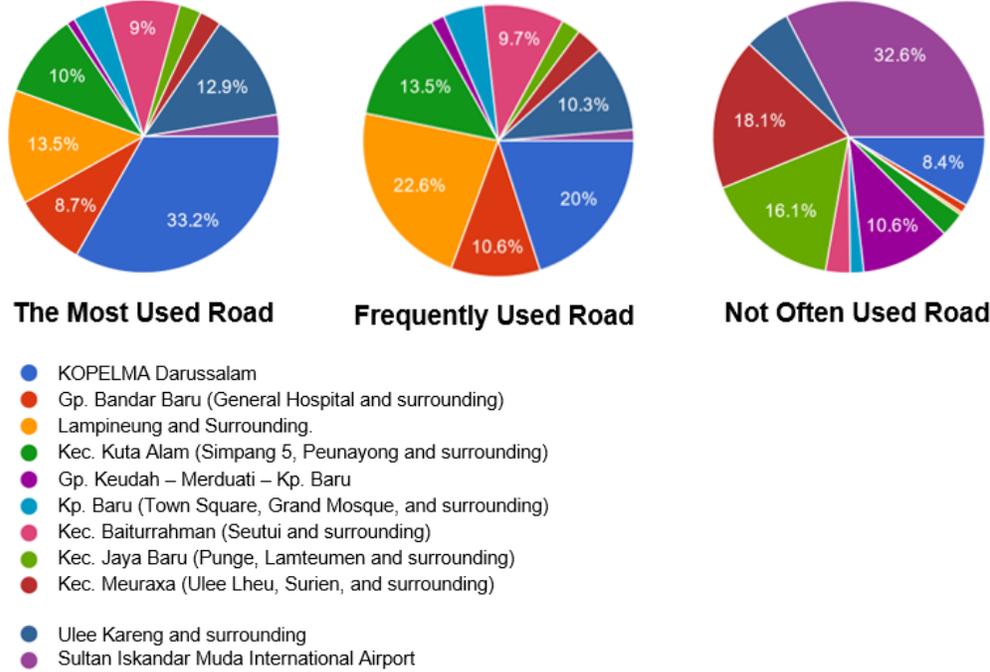
Source: Own Survey (2021)

This question is followed by multiple options where respondents can choose more than one answer if they have one. In total, there are 491 answers from 310 respondents for this question. 78.1% chose private motorbikes as their daily mode of transport, followed by private cars

(36.8%). In the last paragraph, it said that company cars might be one of the reasons the car ownership is high, but in Figure 8, it can be seen that only 2.3% of participants use company cars. Public transport is losing to online ride-hailing with the difference of 7.4%, which is quite a gap. Despite that, based on this diagram, Banda Aceh citizens are still willing to use bicycles (6.1%) and walking (10.6%) as the mode of transports. This result shows that there is a slight possibility to increase this group of roads users.

In addition, this survey also analyzes the routes used by respondents and the time spent for each daily journey. The result can be seen in the figure below.

**Figure 9: Respondents' Routes Usage**



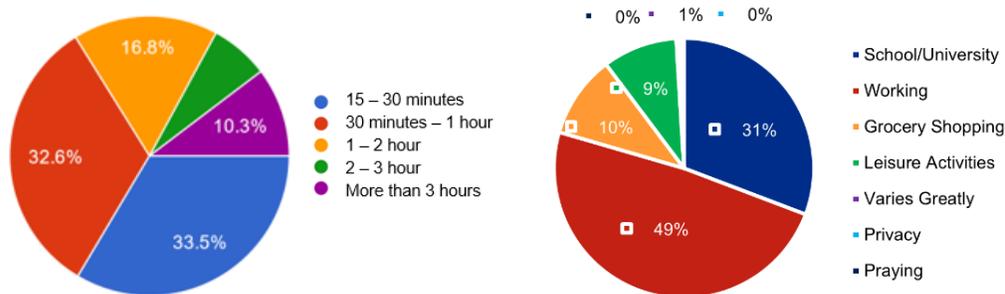
Source: Own Survey (2021)

In this question, respondents must choose the roads they use with three different usage levels; the most, frequently, and not often use. This question aims to reference public transport to expand to one area if this area still is not included and determine if the road covered with public transport corridor and if that so, what is respondent's mode of transport.

Based on Figure 9, the most used road is KOPELMA Darussalam; wherein this location, there are two prominent universities: UNSYIAH and UIN Ar-Raniry. This location becomes the most-used road because most of the respondents are college students, and some of the employees work in this education complex. The second-used road is Lampineung and surrounding, followed by Ulee Kareng with a slight difference. These two routes are connected to each other,

wherein several neighborhoods, offices, and many local favorite coffee shops are located. Along with it, these two routes also become the first and second frequently used road. The difference is Lampineung is the first one in this category, and the third-used road is Kec. Kuta Alam, which is the city center. The airport is the less used road because it is far from the city center and no respondents have daily routines to travel there.

**Figure 10: Respondents' Daily Travel Time (left) and Purposes (right)**



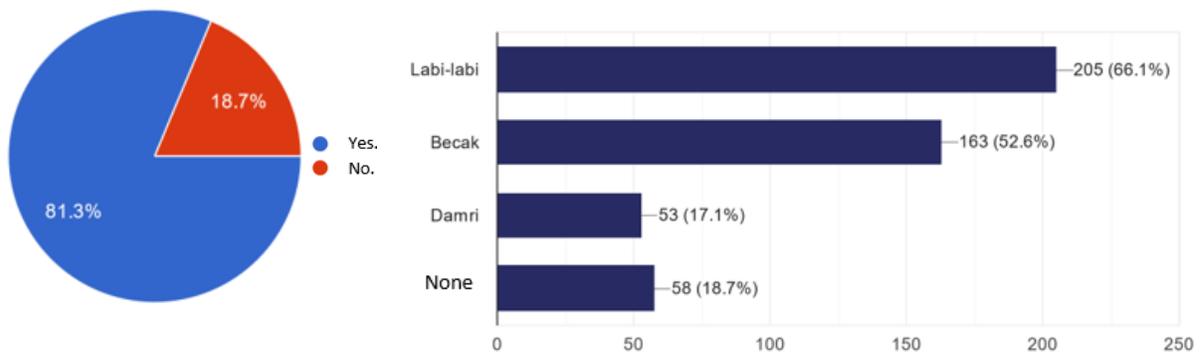
Source: Own Survey (2021)

The lower figure shows the result of participants' travel purposes. If the time spent on a daily journey is analyzed, most people only travel for a maximum of one hour per day (see Figure 10). This question also received impractical answers; thus, the result was cleaned up by grouping the similar responses, the same method as occupation's answer (see chapter 4.1.1). After the cleanup, the result shows that most respondents' purposes of travel are working and studying.

#### 4.1.4 Public Transport Usage and Opinions

Before Trans *Koetaradja* existed in 2016, there were (and are) some local public transports that are usually used by Banda Aceh citizens, such as *labi-labi*, *becak* (pedicab), and DAMRI (bus). In Figure 11, it can be seen what kind of local transports that participants used before Trans *Koetaradja* exists.

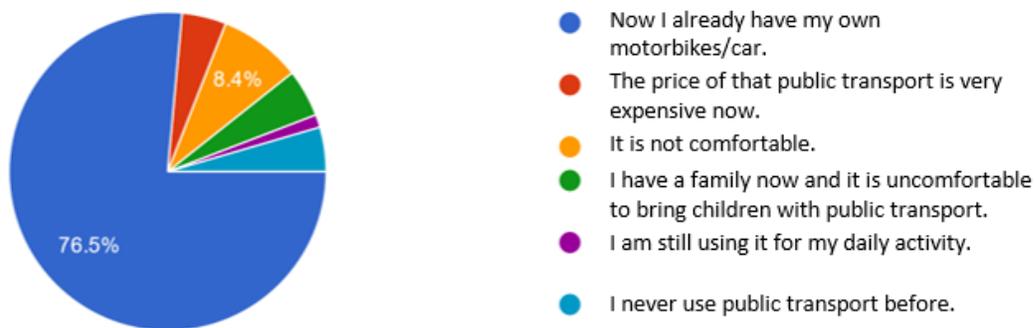
**Figure 11: Ratio of Local Public Transport's Users (left) and Public Transport Used before BRT-lite (right)**



Source: Own Survey (2021)

It can be seen that most people used the local public transport, even before the Trans *Koetaradja* existed. Two popular public means of transportation back then were *labi-labi* and *becak* (pedicab). Figure 12 illustrates the answer from participants about the main reason behind why they are not using public transport anymore. Most of the respondents said that it is because they already have their motorbikes or car.

**Figure 12: Respondents' Main Reasons to Not Use the Public Transport Anymore**

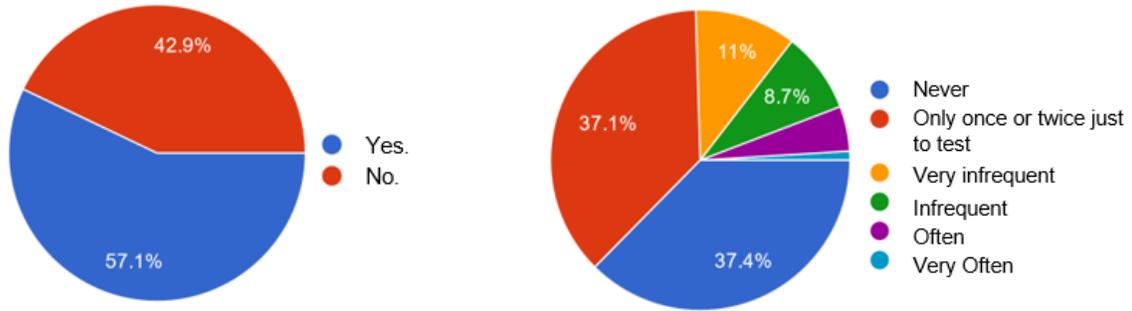


Source: Own Survey (2021)

However, there is a slight lack in this data. There should be an option in options of answers that said, "I prefer Trans *Koetaradja* to this public transport," so there would be a comparison between public transport before BRT-lite is launched in Banda Aceh and the BRT-lite itself.

Furthermore, the total number of passengers and their opinions toward Trans *Koetaradja* were also asked in the questionnaire, and the result can be seen in Figure 13.

**Figure 13: Ratio of Trans Koetaradja Passengers (left) and Reasons to Use It (right)**



Source: Own Survey (2021)

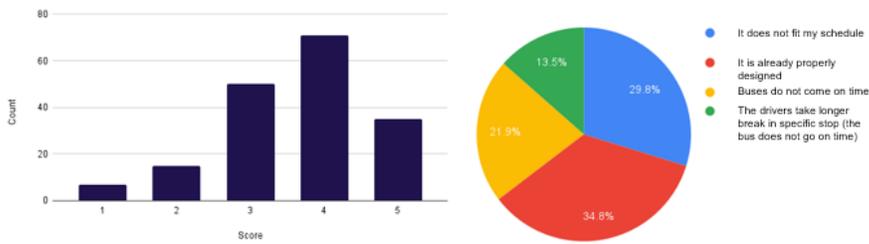
Based on Figure 13 (left), there is a slight difference between passenger and non-passenger percentages. However, on the right figure, it can be seen that most people who use Trans *Koetaradja* only use it once or twice to test this only BRT-lite system in Banda Aceh. Meanwhile, people only lower than 8.7% of respondents often use this BRT. This means that among this questionnaire, the users who often use Trans *Koetaradja* are deficient.

The four following questions asked about participants' evaluation of their experience in using Trans *Koetaradja*. In this case, to receive a detailed answer, the answers are filtered into two groups; people who answer that they **EVER** use Trans *Koetaradja* and people who **NEVER** use it. This filter aims to know the evaluation from the user using the bus and assumptions about this service from those who never use it. Firstly, the analysis of people who use this BRT-lite system is presented.

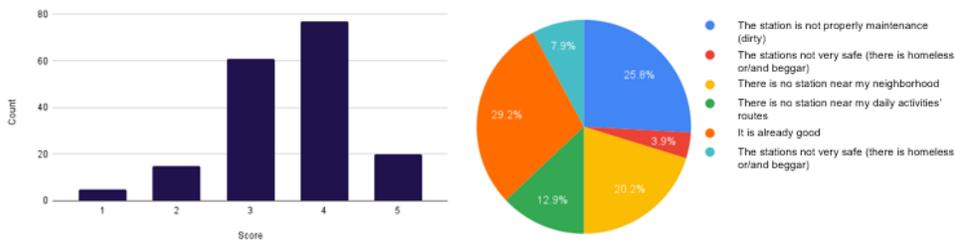
**Figure 14: Evaluation of Trans Koetaradja by Passengers**

**Answers from Respondents Who Rides Trans Koetaradja**

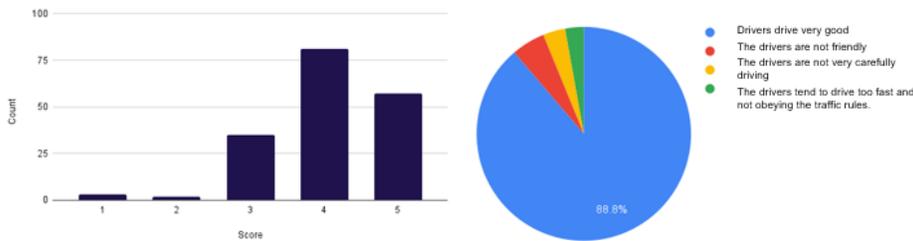
**Rating of Trans Koetaradja's Time Schedule & Reasons**



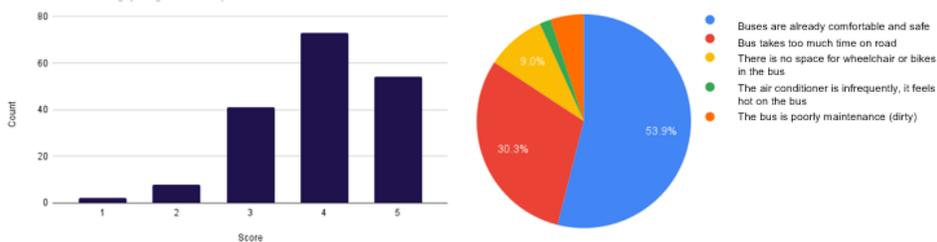
**Rating of Trans Koetaradja's Stations' Services & Reasons**



**Rating of Trans Koetaradja's Drivers' Attitudes & Reasons**



**Rating of Trans Koetaradja's Buses Services & Reasons**



Source: Own Survey (2021)

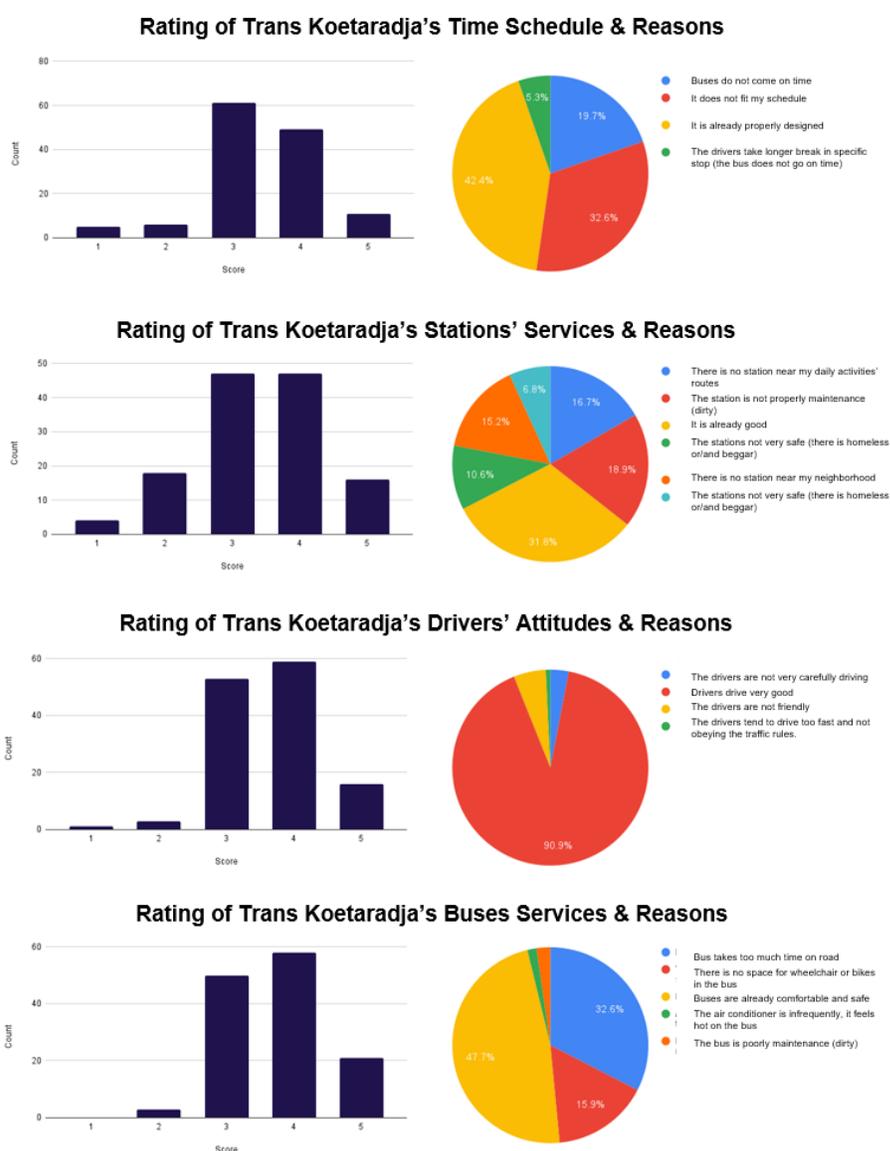
On the scale of 1 (very poor) until 5 (very good), overall passengers gave four scores for Trans *Koetaradja* evaluation. In general, people feel comfortable with the service provided by DISHUB. However, there are some problematic thoughts from passengers. First, 34.8% of people said that the schedule is already properly designed, 29.8% said that the plan does not

fit their daily activities, and 21.9% said buses do not come on time. In this problem, DISHUB should pay attention to the buses' estimated time arrivals.

In the evaluation about stations service, some people also choose three (neutral), and there are two big reasons why this station is quite problematic: they think that the stations are not properly maintenance (dirty) (25.8%). There are no stations near their neighborhood (20.2%). The field supervisor should pay attention to stations cleanliness. In terms of the availability of BRT-lite in the area, DISHUB should plan to expand the corridors or plan for launching feeder buses.

**Figure 15: Evaluation of Trans Koetaradja by Non-Passengers**

**Answers from Respondents Who NEVER Rides Trans Koetaradja**



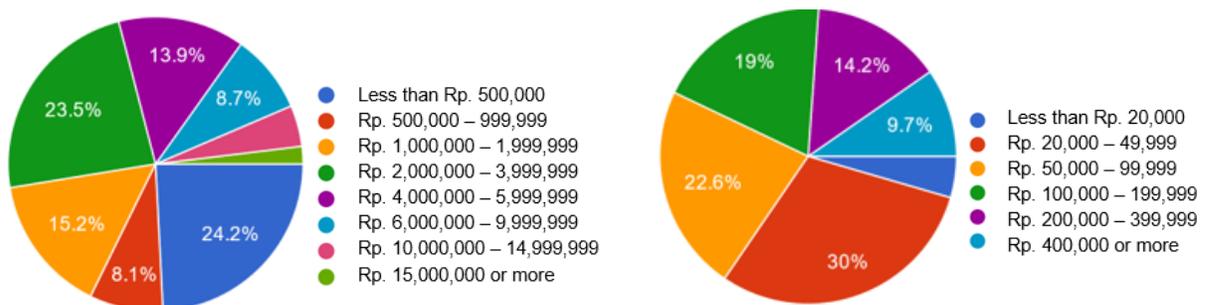
Source: Own Survey (2021)

Overall, there is no problem with driver's attitudes. Almost all respondents said that the drivers drive very well. The same goes for the bus conditions. However, in this last evaluation, people also stated that the buses take too much time on the road. This can be because of the congestion, or the drivers stop too long in one station because there was overlap in buses schedule.

Figure 15 shows that overall, non-passengers gave 3 (neutral) and 4 (good) scores for the evaluation. This can be because they do not have a clear assumption about the buses' service. Nevertheless, same with the passengers, non-passengers also think that the time schedule does not match their schedule and the buses do not come on time. Meanwhile, for the evaluation about stations, the answers quite vary. Most respondents answered it is already good (31.8%), where other respondents also think that the stations are dirty (18.9%). They cannot find it near their daily activities' routes (16.7%) and no station near their neighborhood (15.2%). In general, the responses from non-passengers are similar to the passengers'. Differently, some non-passengers (10.6%) also said that the stations not very safe. In this case, the field supervisor should take care of the stations' safety. Similar to passengers, respondents who never use *Trans Koetaradja* think that the drivers drive very well, and the buses conditions are already comfortable and safe. Furthermore, some of them also said that the unavailability of space for wheelchairs or bicycles is problematic. *Trans Koetaradja* can start thinking about providing this space; as Figure 3 shows, at least one household in Banda Aceh has one bike at home.

#### 4.1.5 Financial Capability and Willingness to Pay

**Figure 16: Respondents' Monthly Incomes (left) and Weekly Travel Costs (right)**

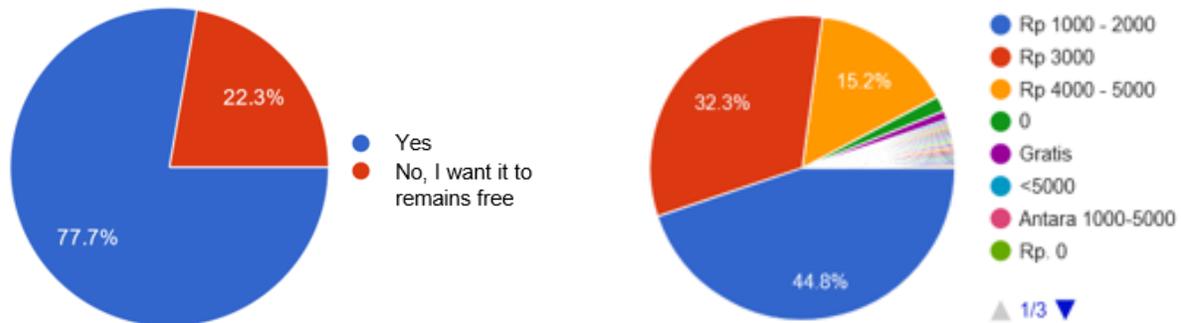


Source: Own Survey (2021)

Based on the figures above, the average income of respondents is around less than Rp 500,000 – Rp 3,999,999, with an average weekly travel cost of Rp 20,000 – Rp 199,999. Most respondents with income lower than Rp 500,000 spend around Rp 20,000 – Rp 49,999 for their weekly travel cost. This result shows the ability of citizens to pay for commuting. Thus this later

can be the basis to calculate the best price for public transport. Regarding that, a question about payment willingness for public transport was also offered in the survey, and the result can be seen in the figures below.

**Figure 17: Willingness to Pay for Public Transport (left); Price Possibility (right)**



Source: Own Survey (2021)

Interestingly, 77.7% of respondents said they are willing to pay the ticket to use Trans *Koetaradja* for improvement purposes. In the following question, respondents were asked to choose how much price they are willing to pay. The result became disorganized because participants can specify the price they want besides the offered choices, with a short answer which did not set into a “number only” answer. In this case, the result of this question cannot be reliable, but approximately it is said that the majority are willing to pay around Rp 1,000 – Rp 3,000.

**Figure 18: Ticket Options**

**27. If there is two options in buying ticket: single ticket for single use and a day ticket for multiple use as much as you want in a day, would you like to try this ticketing system?**

310 responses



Source: Own Survey (2021)

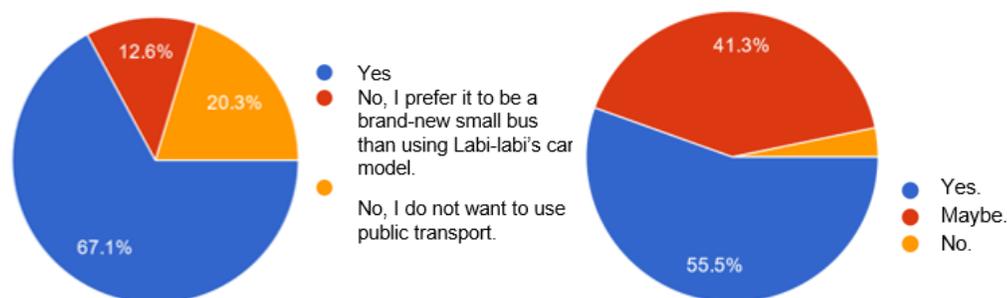
A “what if” question (see Figure 18) is offered to understand how much willingness to pay the respondents to have and can be an idea for DISHUB to start using this ticketing system. More than 50% of people said that they are interested in using single and a day tickets for the journey,

probably because they usually use this BRT-lite service. However, the rest of the respondents (39%) said they are not interested because 1) they do not usually use public transport, and 2) they want Trans *Koetaradja* to remain free.

#### 4.1.6 Willingness to Shift to Public Transport

The last three questions were asked respondents about the possibilities for them to shift to public transport. Two “what if” questions were offered to know participants’ opinions and could be a helpful idea for Trans *Koetaradja*’s plan. The result can be seen in Figure 19.

**Figure 19 Possibilities to Ride Labi-labi as Feeder (left); Possibilities to Use Public Transport in The Future (right)**



Source: Own Survey (2021)

Based on the figures above, respondents are most interested in using *labi-labi* as a feeder (67.1%), but the least said that they do not want to because 1) they do not want to use public transport (20.3%) and 2) they would like to have a new model of fleets for feeder buses. The first reason is quite interesting because, in the right figure, it shows that the ratio of people who would likely to shift to public transport (55.5%) and still uncertain about using it (41.3%) is very slightly different. In this case, the “maybe” answer implies the uncertainty in the data result, which might lead to the tendency not to use it or the other ways. However, the last question was an open-ended question where people were asked to share their opinion of why they do not want or still uncertain about using the buses. From the color-coded answers<sup>2</sup>, it can be found out that most people prefer to use the private vehicle because it provides flexibility in terms of time and distances, comfortability to not share a room with crowded mass, and safety.

## 4.2 Expert Interview

An expert interview was conducted with The Head of Trans *Koetaradja* Department, Mr. M. Hanung Kuncoro from DISHUB. Because of the distance, the discussion was done through an

<sup>2</sup> See Appendix 2 to see the full answers.

online meeting form, and it lasted for one hour with 20 questions. Initially, the guiding questions were only around 12 questions. In the progress of the interview, because the interviewee was very informative, some questions popped up during the interview. This interview was recorded with consent for transcribing purposes. Several criteria are made based on the indexed result of the interview. All the information below is adapted from the transcript of the expert interview with Mr. Hanung Kuncoro (2021)<sup>3</sup>.

#### **4.2.1 Basic Information**

UPTD Mass Transit: Trans *Koetaradja*, a BRT-lite system that works under DISHUB. This service was launched back in 2016 and was a part of Road Transport Traffic. Mr. Hanung was in charge of writing reports for separation purposes. The separation happened because LLAJ had too much on a plate if this BRT-lite service was still under them. Until now, the total number of passengers who have ridden this bus service is around four million users. In 2020, Trans *Koetaradja* was off due to the government's instruction regarding COVID-19 health protocols.

Today, Trans *Koetaradja* has 91 stations with 52 units of buses operated by a driver and a conductor. The six corridors cover Banda Aceh city and the surrounding. The most crowded station is Mesjid Raya Baiturrahman as the city center and Jami's Mosque of KOPELMA as it is in the school and universities area. Also, the station in Mata le is crowded because it is one of the tourist attractions places. In general, the corridors have a 50% load factor. Only one corridor has the highest load factor at 64%, while the lowest is 46%. From the first time it is launched, this bus service planned to only subsidize citizens with one-year free rides, and after that, citizens can use E-Money cards sponsored by BRI with only Rp 1 per ride. However, the tagline "Only Rp 1 you can ride Trans *Koetaradja*" never happened, and Mr. Hanung also did not know what was happened. Thus, until now, the government of Aceh still subsidies free rides for this public transport service.

Nowadays, Trans *Koetaradja* is in the middle of shifting from UPTD to BLUD. This separation aims to grant a half liberation for Trans *Koetaradja* to manage its financial management while the government will still be the controller. Therefore, Trans *Koetaradja* can decide its fares and manage them in the future but still need approval from the government. This separation is still in process because there was some change in DISHUB. For instance, the interviewee himself just joined the department of Trans *Koetaradja* in early 2021. Nevertheless, he said that they are near to finish this process.

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<sup>3</sup> See Appendix 3 to read full interview transcript.

#### **4.2.2 Financial Status: Pricing System and Budgets**

When the interviewee is asked why Trans *Koetaradja* still offers a free ride, he said that this BRT-lite should have at least a 70% load factor to apply the paid ride system. Thus, the subsidies aim to increase the load factor before it can be a paid ride. In fact, in Qanun No. 2 the Year 2019, it is already stated the prices' ranges for this BRT-lite service, which are Rp 5,000 for public and Rp 2,000 for students. However, Mr. Hanung said in his point of view if Tans *Koetaradja* would be a paid ride on public transport, the standard fare was Rp 3,000. Even with today's average load factor, he said it would be profitable to support this service with this number. Nevertheless, he thinks that this pricing system will be postponed until the next regional election.

In fact, DISHUB has already done some trials on how the payment would be; manual tickets that you can buy directly from the drivers, card-tapping (e-money), and manual printing tickets. Mr. Hanung also said an already settled budget for 1,000 BRIZZI (E-Money cards sponsored by BRI) and a card-tapping machine for next year's allocation plan.

DISHUB already prepared Rp 14,7 Billion for buying electric buses from the LKPP Ministry of Transportation's sectoral electric catalog (e-catalog). These e-buses will later be used as feeder buses for Trans *Koetaradja*'s main corridors. The initial plan was to cover five feeder routes with 25 fleets of e-buses (five buses for each route). Meanwhile, the budget can only afford only four e-buses. One or two built-in feeder stations with approximately Rp 56 million each will be built this year.

Furthermore, DISHUB also allocates the budget to control Trans *Koetaradja* operational hours to repair the old NVR (from 2019) and connected PCR to the screen display on buses and stations.

#### **4.2.3 Infrastructure's Improvement: Feeder Buses**

As said in the last paragraph, Trans *Koetaradja* is now in the process of buying e-buses from the LKPP sectoral e-catalog to work as a feeder. This planning was born with a comprehensive profit calculation between electric and conventional buses. The conventional ones use solar as fuel. For every 1 liter solar used, the bus can travel up to 3 kilometers, where 1-liter solar is around Rp 5,500. Technically, the operating age of a conventional bus is 5+2 years, where it works optimally for five years, and the rest of two years it will need high maintenance. Right now, the conventional buses that are driven in Banda Aceh are already in this two years phase.

On the other hand, with one 1 kWh, the buses can drive up to 5 kilometers, where per kWh is around Rp 1,400. The operational age for electric buses is 8+2 years, with the same meaning as conventional buses. In this way, even though the first step requires plenty of expenses, it is also a significant saving and investment.

DISHUB already did several assistances with the Ministry of Transportation, and now they are waiting for the finalization of sectoral e-catalog. Once the catalog is finalized around July, it will be purchased directly, and it takes 1-2 months until the buses arrive in Banda Aceh. Thus, this department targeted to launch the e-buses around September-October. These e-buses later will serve five routes as follows:

- 1) KOPELMA
- 2) T.P. Nyak Makam (Lampineung)
- 3) Al-Mahirah Market – Jambo Tape
- 4) Ulee-Lheu – Simpang 5 (city center)
- 5) Simpang 5 – Simpang 3 (Seutui) – Simpang Keutapang – Simpang Dodik

Since the budget can only afford four buses, each route will only be covered by one e-bus. One last road will be covered by a conventional bus instead. This planning is almost completed; the department is already done with the kilometer's predictions, the stations for feeders, and even the prediction of load factors because they have done the trial phase for three months.

Around September, DISHUB will start to build the stations for feeders, but only one or two pick-up points will have a built-in station. The rest of the pick-up stations will have the signages and bus stop marks on the road. The limited construction of the station happened because one station requires a budget of approximately Rp 56 million, and the allocation is limited.

#### **4.2.4 Infrastructure's Improvement: Control Cameras and Digitalization**

In 2019, 23 Network Video Recorder (NVR) was built in the buses to control the drivers and situation inside the buses with web-based camera technology. This feature allows the staff to remotely control the drivers to keep the buses arriving on time at the station. Even though the rest of the fleets do not have NVR, DISHUB still controls the activity through CCTV that is built in the stations, and there are field supervisors, although Mr. Hanung said he wants all the buses to have NVR. Thus, everything is in the system. However, the NVRs' connections and wires from 2019 are now not in good condition due to poor maintenance. Hence, they should repair these recorders, and it is expected to be done this year.

In addition, there is a People Counting Recorder (PCR) to count the passengers to obtain the real-time load factor of the bus. This year, they already planned to have a screen on the bus's front windows to report how many seats were left on the bus. Therefore, the passengers in the station will know, and there will not be any miscommunication problem anymore between conductor and passenger. Additionally, they will connect this information to the screen display on the stations to give real arrival time to passengers at the station. However, they could not build the shows for all stations because they have 91 stations, and the budget is limited. Thus, they will put it on the most crowded stations.

Today, passengers can search for the Trans *Koetaradja* application called ETA on Android phones. The application still needs improvement, and hopefully, it will be done by this year. The plan is to improve the interfaces; thus, the users can detect buses' real-time positions.

#### **4.2.5 The Probability to Use *Labi-labi* as Feeder**

The same question in the questionnaire was asked to Mr. Hanung about adopting *labi-labi* as feeders for Trans *Koetaradja*. In this case, he said, *labi-labi* is not under Province's DISHUB, but it works for cities' DISHUB, which means that it is an in-city public transport, whereas Trans *Koetaradja* is an in-province public transport. He said that there is no such idea, but Trans *Koetaradja* is open for any innovations, but there should be profound research beforehand. For instance, the Indonesian Engineer Community (PII) once suggested the idea of input pedicabs in the Trans *Koetaradja* service as a feeder. Mr. Hanung said that that was a great idea. He understands that the initial idea is to empower pedicabs' drivers. Thus, he said to PII to conduct further research because they do not want any future problems because of this innovation, such as the social problem within the pedicabs drivers or other public transport drivers.

#### **4.2.6 Main Problems**

When he is asked about what is—in his opinion—the biggest problem that Trans *Koetaradja* faces right now, Mr. Hanung said it is not about the driver nor the congestion. They already have two kinds of timetables: peak hour timetable and off-peak hour timetable. The calculation is already accurate, where the congestion and traffic time are also considered. Thus, it is not about congestion.

The biggest problem of Trans *Koetaradja* right now is the waiting period that takes too long. Last year, Trans *Koetaradja* was allocated for Rp 13 billion budget for all units to serve six corridors less than 12 months due to the pandemic. This year, the budget, total fleets, and corridors are still the same, whereas they should be able to operate full year. After the

calculation, with Rp 13 billion, the operation service becomes smaller, and the headway between the buses is twice longer than usual (before it was 15 minutes). In fact, DISHUB can quickly solve this problem by cutting off around 18 staff of Trans *Koetaradja* (9 drivers and nine conductors) and save the budget for operational ride costs. Ethically, they could not just fire the staff, especially during this pandemic era. Hence, the increased waiting period is the implication.

#### **4.2.7 Political Willingness**

E-buses as the feeder is part of the Aceh Green Project by the governor of Aceh. This is a form of support from the government for a better environment in Aceh. However, there is no such regulation to minimize private motorized vehicles or push people to use more public transport, Mr. Hanung said. However, some lecturers in UNSYIAH supported the idea to push the college students to use only public transportation where they will receive fines if they ignore the rule. As a trade, the lecturers asked for a guarantee from Trans *Koetaradja* to provide a competent and on-time bus service. In this respect, Mr. Hanung honestly still thinks that they could not guarantee that.

Besides that, there is one Constitution (UU) No. 22 about LLAJ where it followed by Ministerial Regulation (PM) No. 133 the Year 2015 about periodical testing of motor vehicles. Every motor vehicle that does not complete the exhaust emissions standard could not be ridden on the road. In Aceh itself, there is UPTD for this test in every district but only six or eight of them that are working optimally, including in Banda Aceh. From Mr. Hanung's perspective, this regulation should be taken care of. He added that Banda Aceh might not be there yet for the regulation, such as odd-even rationing policy, but there is a possibility to do the study about it. Currently, his mission is only to provide this service for every area in Aceh, so everyone could get equal rights to use public transport. DISHUB also tries its best to campaign the public transport service to citizens while also improving the facilities and infrastructures.

#### **4.2.8 Future Expansion**

The expansion of Trans *Koetaradja* service to reach other districts outside Banda Aceh depends on its load factor. Mr. Hanung submitted the idea for expansion to Aceh Pidie and Pidie Jaya, but the head of DISHUB said that there should be a study about that beforehand. Because if it would be a free ride, the social problems should be analyzed before there would be a problem in this aspect. On the other hand, if it would be a paid ride, the load factor should be predicted and calculated so there will not be any loss. Moreover, since Trans *Koetaradja* is still not yet a BLUD, they could not choose their scope of service area by themselves.

## 5. Discussion

### 5.1 Evaluation of The Results

The online survey result presented in the last chapter might not represent students and housewives in Banda Aceh. Only below 3% of these groups responded to the questionnaire. As the capital city, it is common for Banda Aceh to have urbanization. Even though 73.2% of respondents live in Banda Aceh, less than 50% obtained Banda Aceh citizenship. It means that most people live and commute within Banda Aceh for specific purposes, where most of the respondents' occupations are working and studying. The respondents' occupations can explain the figure where most of them only spend up to one hour per day on roads, which means either they stay in the workplace or university. Another reason might be they travel back and forth multiple times with small distances, depends on their origin and destination of travel.

Regarding the ownership of private motorized transportation, most respondents at least have one to two motorbikes and cars at their homes. Interestingly, when the result of "how many motorbikes do you have at home" was filtered to "none," nine respondents answered, wherein seven people answered that even though they do not have motorbikes, they do have cars. Moreover, out of that seven people, three of them responded to have three cars at home, and those are their daily modes of transport. When the results are investigated further, one stated that their monthly income is from Rp 15,000,000 and more, the second person has Rp 4.000.000 - 5.999.999, and the last one only has income below Rp 500,000. As cited before, Litman and Laube (2002) stated that the growth in economic ability is not the only factor that increases the use of automobiles. **For instance, in this case, the personal income does not affect their mode of transport, while the family financial status does.**

The respondents' daily mode of transport showed that 78% uses motorbikes, showing **an increase of 1% compared to the CDIA and Banda Aceh Government (2017) report in 2017.** There was also an increase in the use of private cars, as CDIA reported that only 11% of their respondents use cars, while there are 36.8% respondents in this study. However, in this study, respondents can choose multiple modes of transports, while CDIA might allow the respondents to choose only one. 15.8% of people choose to use ride-hailing as their mode while only 8% chose public transport. This result indicates the tendency of people to use private transportation than public as they see ride-hailing as more flexible and comfortable than public transport. However, 25% of respondents choose walking, cycling, and using public transport as their modes. As stated by CDIA and Banda Aceh Government (2017), Banda Aceh **still has a possibility to shift their population's choice of mobility to sustainable ones.**

Looking back to respondents' previous mode of transport before the BRT-lite existed or years before 2016, around 81.3% of respondents answered that they use public transport, wherein 66.1% used *labi-labi*, and 52.6% used pedicab. Figure 3 showed that most participants are 26-27 years old. Thus, this phenomenon might happen because when they used public transport (before *Trans Koetaradja*), **they did not have any legal license to drive motorbikes or cars.** Figure 12 showed that 76.5% shift to the private automobile because they own it right now. Ironically, only a small number said that they still use public transport until now. This data also shows that the shift of mode of transportation might take years to process, and the same will happen to shift it back to the sustainable ones.

Similar to the report by CDIA, around **77.7% of respondents are willing to pay for *Trans Koetaradja* tickets** to improve the quality of the service. According to Kuncoro (2021), **the main problem of *Trans Koetaradja* is the limitation of budget.** For instance, the budget for the service is limited; thus, the waiting period and headway become longer. He also mentioned that there is a possibility of applying paid rides, but before it is applied, *Trans Koetaradja* should have at least a 70% average load factor. As stated in PERGUB Governor of Aceh (2016), the subsidy of free rides will be continuously given until the load factor reached 70%, averagely. In this case, the transport authorities and government should have the regulation that pushes the population to use public transport more.

The online survey is also asked the opinion of individuals about shifting *labi-labi* as *Trans Koetaradja* feeders, and around 67.1% of respondents said they would like to have that. However, this plan seems difficult to implement after the interview with Mr. Kuncoro, as *labi-labi* works at city-level transport authorities. In contrast, *Trans Koetaradja* works at the provincial level. Mr. Kuncoro said that further research would be needed because they do not want **any social problems** to happen between the drivers.

Regarding the opinions from respondents toward *Trans Koetaradja* service and infrastructure, the result was divided into two groups of respondents; people who ride *Trans Koetaradja* and people who do not ride but have assumptions about it. Interestingly, most of the respondents from both groups answered 4 (good) to all the questions, wherein the group of non-passengers, the neutral answer (3) also appeared repeatedly. However, when they are asked about willingness to shift to public transport, only half of them answered yes, while 41.3% said maybe and the least said no. Most reasons received from the long-answer section said that they do not want to use public transport as it is not flexible as a private motorized vehicle. They stated

that **the roads in Banda Aceh are still not really congested; thus, the use of public transport is not necessarily needed.**

Contrary to that, Banda Aceh, in fact, already experiences congestion in several areas and specific hours. However, the implication of this congestion phenomenon is the construction of an underpass to expand the roads (Banda Aceh City Council of Representatives, 2020), or this kind of transport planning known as **induced travel**. Induced travel is “an increase in total vehicle mileage due to roadway improvements that increase vehicle trip frequency and distance, but exclude travel shifted from other times and routes” (Litman, 2021). In the longer term, induced travel **added external costs and attracted the city to be more automobile-dependent (Litman, 2021). This planning favors automobile users with the underlying statement to reduce** congestion.

## **5.2 Relevance to The Research Questions and Hypotheses**

This section will discuss the relevance of the results and the research question. As stated in **Introduction**Chapter 1, the research question of this study is: **how to improve the public transportation system in Banda Aceh to increase its usage?** With a sub-question: **what are the several factors from both supply and demand sides that influence and be influenced by the low use of public transport?**

Based on the result and discussion, there are several main problems behind the low use of public transport in Banda Aceh, which come from both the users and providers. In Banda Aceh’s case, the individuals already depend on automobiles, where they do not see public transport as a flexible commute. While on the other side, the provider is also responsible for serving the ‘flexibility,’ and government uses the power of regulation to shape the transport behavior. Not only limited to that, several factors including economic and social also play a role in transport attitudes in this city. A more detailed explanation of the factors influencing and implications of this phenomenon will be discussed in the next section.

### **5.2.1 Factors that Influence the Low Use of Public Transport**

#### ***Economic Factor***

It is said by Steg and Tertoolen (1999) that motorists are already prepared for higher prices they should pay for the maintenance of their automobiles. However, in this case, even regulations at the country level favor the private motorized vehicles users. In the economic sector, **motorists tend to be benefited from the government through fuel subsidies and automotive tax relief.** The result chapter showed individuals who use cars or motorbikes could

only spend Rp 20,000 – Rp 49,999 per week for transport. It is because they see the profit with this much spending on subsidized fuel than using public transport. Even though there are also subsidies to ride *Trans Koetaradja* freely, as Litman and Laube (2002) said, even though developing countries mostly subsidize their public transport, it does not efficiently work out, as people tend to compare the profit they can obtain. **Compared to free but inflexible rides, individuals tend to choose the paid one—whose also not expensive—that could give them the flexibility in time and place.** If the public transport wanted to remain free, it needs to be a “cheaper option with highest utility” (Steg and Tertoolen, 1999) to attract users. Otherwise, the regulations that favor the use of automobiles should be reduced. Moreover, the regulation can raise the tax or fuel price so that the public transport will be more profitable for users.

### ***Political Willingness***

Table 2 shows the push measurements by Litman and Laube (2002). It is said that there are various measurements through a set of regulations to shape the population’s mobility. The first measure is the economic measure, as stated in the paragraph above. Then, restrict the people to drive the automobile, producing higher damaging exhaust gases (Litman and Laube, 2002). In this case, **Banda Aceh already follows Indonesian laws about motor vehicle testing** (see Chapter 2.1.4). Based on Open Data Banda Aceh (2019b, 2020), there was only a 655 difference in the number of private motorized vehicles to be tested. This number is minimal compared to more than 3,000 personal motorized vehicles that should be tested each year. Mr. Kuncoro (2021) also said that this regulation should be strengthened. It is one of the country-level laws to reduce the volume of private and public, or even motorized business vehicles by eliminating those that do not pass the test.

On the other hand, the government already tested and will launch the electric buses as a feeder for *Trans Koetaradja* with the goal for their **long-term transport investment to reduce the emission** (Kuncoro, 2021). This plan is a good start for Banda Aceh, as it might also attract the passengers to ride the e-buses as electric vehicles are still new. However, the government **should be aware that electricity is still one of the main problems** in Banda Aceh (Aceh Government, 2017), as stated before in chapter This planning for e-buses is a part of the Aceh Green Project. It is also part of the willingness of the government to maintain its credibility to the passengers (Rohani et al., 2013) as the users demanded good quality bus services. However, when Mr. Kuncoro (2021) was asked about whether there is any regulation that aims to reduce the use of private motorized vehicles or not, the interviewee answered that **Banda Aceh is not yet on such regulation to push motorists to shift to public transportation.**

Meanwhile, based on the discussions and facts that have been described, Banda Aceh needs regulations that suppress the reduction of private motorbikes to increase the use of public vehicles.

Based on the open answers given by the respondents, it can be seen that some people still see that Banda Aceh is not too congested, so the use of motorized vehicles is still considered acceptable. This opinion indicates that there is a lack of awareness of traffic problems caused by motorized vehicles. In fact, Banda Aceh has reached an era where traffic jams have already occurred, as evidenced by the widening of roads and bridges and the addition of underpasses and flyovers as a solution to congestion. In this case, the government should **prevent the accumulation of congestion** by having strict regulations on the use of private motorized vehicles.

### ***The Quality of Public Transport Services and Infrastructures***

Based on the expert interview and respondents' answers, the main problem of Trans *Koetaradja* is the long waiting period. Regarding this case, Mr. Kuncoro (2021) said that the problem is in **the limited budget for the operation**. Thus, he expected that Trans *Koetaradja* could be separated as soon as possible. This separation will give this service a minor liberalization to set the fares for ticketing to gain more profit. However, before they can set the fares, Trans *Koetaradja* should reach the load factor by 70% on average, based on the Regulations of the Governor of Aceh (2016). Prior to that, they should be more attractive to gain the passengers. Another reason from the respondents about their opinion towards the buses is that there are no stations near their neighborhood and daily destinations.

Regarding this matter, DISHUB **needs to allocate its feeders to several residential areas**. Still, first, it needs to be reviewed further on how many passengers will increase with the addition of stations in the housing. It should be done to avoid wasting funds without increasing the load factor. Nevertheless, **overall infrastructures that are provided by Trans *Koetaradja* already in good condition**. Based on the interview, it can be seen that DISHUB continues to improve the quality of its infrastructure by monitoring the performance of drivers so that the departure and arrival schedules of buses are always on time. They are also providing two types of plans for peak hour and off-peak hour. Respondents also answered that they are satisfied with the buses and stations conditions.

### ***City Planning that is Beneficial for Motorists***

As previously stated, urban planning in Banda Aceh tends to be oriented towards motorized vehicles. When there is a problem such as congestion, the resulting solution is road widening

or underpasses and flyovers. This plan is known as induced travel. Such planning will reduce active mobility, such as walking and cycling, which leads people to prefer using motorized vehicles because **walking or cycling is considered too dangerous and uncomfortable**.

### 5.2.2 Factors that be Influenced by This Phenomenon

Several implications have been experienced in Banda Aceh that already stated before. In the matter of road and traffic, **several congestions** have already happened. Moreover, because the solution to this problem is adding routes for motorists, **the roads for pedestrians become lesser**. As said before, it would be hard to cross the roads in a city full of motorized vehicles. If the motorists keep being benefited by the transport regulations, they will tend to drive uncarefully, as they seem neglected the safety or other roads' users. These issues lead to increased traffic accidents, within the motorists or between them and pedestrians. The addition of the road then continues to add new issues, such as the increase of **Banda Aceh's average temperature** of about 0.3°C between two decades (Irwansyah et al., 2021).

### 5.2.3 Proof of the Hypotheses based on The Research Results

The first stated five hypotheses that are expected to be proven in this research, which are:

- 1) The dependency on private motorized vehicles decreases the use of public transport.
- 2) The inadequate provided facilities and infrastructure is one of the reasons why public transport is not commonly used.
- 3) The pricing system can improve the public transportation service; hence, the willingness to ride the public transport will follow.
- 4) The support from the government in shaping its citizen's mobility behavior can increase the use of public transport.
- 5) The inadequacy of public awareness toward the implications of the common use of public transport causes the use of this mode of transportation to decline even more.

**The first hypothesis is proven correct**, where the biggest reason for not using public transport in this city is the dependency on private motorized vehicles. As stated in the last section, even though there is the subsidy for public transportation, people still choose the personal vehicles as it is viewed as more profitable rides that can provide flexibility and accessibility that public transits.

Based on the results of the survey and interviews, it can be said that **the second hypothesis is neither wholly true nor false**. Facilities regarding long waiting periods and limited access to stations are indeed the most significant problems at this time for Trans *Koetaradja* users.

Still, on the other hand, the infrastructure provided is adequate. It is evidenced by the detailed efforts made by DISHUB to control the bus speed in the main corridors at certain times through the use of NVR and PCR. Moreover, the plan to use electric buses as feeders is also considered as supporting infrastructure for the bus service.

The **third hypothesis can be proven true through the results of an interview** with Mr. Hanung Kuncoro as the head of UPTD Trans *Koetaradja*. He said that the provision of paid bus services was considered to increase revenue for Trans *Koetaradja* so that problems such as long waiting times could be resolved. This means that bus services should be in accordance with public demand, which should increase the public's willingness to use this transportation.

Based on the works of literature that have been discussed, the government plays a significant role in producing regulations that can shape sustainable transportation behavior in society, **as expected by the fourth hypothesis**. One of them is by adapting push and pull regulations in the transportation sector to suppress the use of private motorized vehicles and increase the use of public transportation.

**Regarding the fifth hypothesis**, the survey results prove that people tend to think that as long as traffic problems such as congestion are not as severe as in big cities thus, driving with private vehicles is still very reasonable. It shows that people are not aware of the prolonged impact resulting from the increase in the use of private vehicles. In this case, the public should be educated further about the implications of high personal use and what are the preventive measures for future problems if this continues to occur.

### **5.3 Recommendations**

Based on the discussion above, the recommendations that could be given to improve the use of public transport in Banda Aceh is to create a set of push and pull policies, which are:

- 1) Since the subsidies and taxes that benefit motorists mostly come from the country-level laws, the provincial government cannot do anything about that. However, Banda Aceh's government can strengthen the existing motor vehicle testing laws to reduce the volume of private motorized vehicles.
- 2) Banda Aceh government can adopt the odd-even rationing policy where each even and odd license plate number vehicles can only be driven on different days. This kind of regulation is already implemented in Jakarta Metropolitan City, but Banda Aceh could implement this regulation as a prevention for the upcoming traffic problems.

Additionally, instead of creating more roads for motorized vehicles, the government could just add more one-way routes regulation as the opposite of induced travel.

- 3) Society participation. Government should strictly ask the principals not to allow students under 17 years old and those who do not have a legal driving license to bring any motorized vehicle to school. The government could also collaborate with universities in KOPELMA Darussalam to create shuttle buses as transportation for the academic community to mobilize within the university complex.
- 4) Enforcement support. Government should make sure that the regulations are under adequate control. For instance, police should be rigorous if, in the future, the odd-even rationing policy would be applied. Police should strictly control and fine people who sell and buy fake license plates.
- 5) Public awareness and education. Government should start creating missions to campaigning for the environmental problems caused by motorized vehicles to shape individuals' thoughts about it.
- 6) Quality control. The public transport should have adequate quality and provide reliable services and accessibility to everyone, to make all the regulations that are mentioned above compelling. In the end, no regulations would be efficient to shift people from their private vehicles if the public transit could not provide the same, even better, service.

The policy set aims to push people to shift from private motorized vehicles through the regulations that give pain points to their use of it. Parallely, it shows the advantage of using public transport by improving and maintaining the quality of services.

#### **5.4 Reflection on Methodology and Results**

Overall, the use of mixed methods in this study is beneficial to assess the demand of users and how the government and transport authorities as the providers fulfill the need and improve the quality of transportation in Banda Aceh. Although there were some technical errors in the online questionnaire, these could be resolved by data cleansing, which was carried out at the data analysis stage. The survey results may not be representative of all the people of Banda Aceh but are sufficient to represent the age group that is currently the largest population in the city (which is the productive age population). Due to time constraints, interviews with users could not be conducted, which should be helpful to explore further assessments by the community of public transportation and their vehicle driving habits.

The interview with the expert from Trans *Koetaradja* was also considered very useful and informative for this research. Similar to the questionnaire. Initially, there were at least two interviews with experts in transportation, one of which was an expert who was not from the government. However, after contacting two non-governmental organizations and receiving no response, while the time available was also limited, it was decided only to conduct one interview. This is, of course, also a reflection of the results of this study. It can be said that the results of this study are fully oriented towards the role of the government in public transportation.

On the other hand, the discussion of the literature related to this issue is considered sufficient, considering the time provided to conduct this research. However, some factors may not be explained in more detail to avoid providing information that is not very relevant to this topic. Some information is also considered sensitive because it relates to conflict issues that have existed in this province. Considering that the research location is an area in a country with a national language that is not English, most of the literature is Indonesian. However, translations of news titles or literature have been included in the bibliography, with the aim to provide transparency in this research.

## **6. Conclusion**

### **6.1 Summary**

As the capital city of Aceh Province, Banda Aceh is in the urge to shift its population travel behavior from the high dependency on private motorized vehicles to public transit. As is known from this study, the difference between personal vehicles and public transportation in this city is very significant. It can be seen that people are slowly leaving public transportation one by one in this city, where one of the reasons for this is an increase in income. One reason for the increase in revenue is that since the signing of the MoU for peace between Aceh and Indonesia, Aceh is given special autonomy funds every year to support the regional economy. Several studies say that developing countries tend to regard motor vehicle ownership as a symbol of success, and maybe this is also the case in Banda Aceh. People then experience dependence on motorized vehicles, where they have habits and views that they will not get flexibility in transportation other than using private vehicles. That is not entirely wrong, because based on the study results, public transportation in Banda Aceh still needs to make a lot of improvements in terms of time flexibility and accessibility. However, these two problems that come from the provider and the user must be addressed simultaneously.

As the holder of the largest power in the city and provincial government, the government must immediately think preventively before transportation problems in the city of Banda Aceh are getting worse and difficult to fix. The present times are the right time to start preventive measures, where the city has begun to experience congestion at several points, which is then resolved by development centered on the satisfaction of private vehicle users. Solutions like this will continue to add new problems. In the future, the city will be filled with wide roads and flyovers for motorized vehicles with poor air quality due to the emission of harmful gases. In terms of infrastructure quality, public transportation in the form of BRT-lite in Banda Aceh is adequate. According to user demands, the main problem lies only in waiting times and providing accessibility to residential areas. However, to continue improving, this public transportation needs to reach a load factor of 70% to start implementing ticket fees to support the quality of its service. Therefore, the government needs to work parallelly in changing people's transportation behavior and strengthening the push policy so that both sides of the problem can be resolved.

This study recommends the Aceh government start implementing a push and pull policy that aims to increase the use of public transportation in Banda Aceh by implementing regulations that suppress the use of private vehicles to switch to people using public transport. On the other

hand, in parallel, the government must continue to improve the quality of public transportation provided to attract public interest. Otherwise, all pressing regulations will only be useless and will develop new problems. The government is also advised to cooperate with strict enforcement and invite authorized institutions to participate, such as schools and universities. Existing regulations from the national government need to be tightened again to achieve significant results, such as regulations regarding standard motor vehicle tests.

The plan to re-shape the public transportation behavior in the people of Banda Aceh should not be difficult, considering that actually, quite many people are still interested and often use public transportation. Moreover, based on the dynamics of transportation preferences in Banda Aceh, public transportation was once the transportation that people relied on.

## **6.2 Limitations**

Overall, this research has proved the hypotheses described at the beginning of the study and can answer the research questions. However, there are some limitations experienced by this research. First, the data provided by the Central Statistics Agency on the number of private vehicle ownership is limited to only owners who have Banda Aceh citizenship. That limits the study in knowing how much influence urbanization has on the increase in personal vehicles. Still, regarding the limitations in data collection, the same thing happened to the data regarding the number of Trans *Koetaradja* passengers. As a result, the study cannot show in detail the increase in the number of passengers per year.

Second, there is limited access to directly observe the performance of public transportation in the city of Banda Aceh at this time. This study cannot objectively present observations due to the distance between the author and the study location. Then, the following limitation lies in the lack of further understanding of the user's perceptions. Although the questionnaire was considered to represent users, several questions need to be studied more deeply through user interviews that were not carried out. The same thing happened to the interview with the expert. As has been said, there should be more than one expert interview to get various opinions from several experts, which can then be analyzed by looking for similarities and differences. However, this research is limited to the view of the head of the Trans *Koetaradja* Department. After further review, experts in the top level of governance in charge of issuing regulations are quite necessary to be interviewed to know the decision-making process regarding regulations in the transportation sector.

### **6.3 Further Research**

As is well known, there are some limitations experienced by this study. Therefore, in the future, there needs to be research that discusses more:

- 1) Public opinion. There is a need for research that specifically discusses the factors that influence the driving behavior of the people of Banda Aceh. This study aims to identify further how dependent society is on public transportation to find suitable regulations to regulate these psychological problems.
- 2) Decision-making in government. As stated earlier, this study does not have the opinion of a person who has a role in government decision-making. So that in future research, data on this matter is needed.
- 3) Implications for the environment. Future research is also recommended to discuss this factor specifically to show how much influence the high use of private vehicles has on environmental damage.

# Appendix

## Appendix 1 Table of Questionnaire

No.	Questions	Choices of Answer
1	How do you identify yourself?	<input type="radio"/> Male <input type="radio"/> Female
2	How old are you?	
3	Do you live in Banda Aceh?	<input type="radio"/> Yes, I live in Banda Aceh. <input type="radio"/> No, but I live near to Banda Aceh (Aceh Besar regency near Banda Aceh). <input type="radio"/> No, I live far from Banda Aceh (Jantho and surrounding), but I travel daily to Banda Aceh.
4	What is your occupation?	<input type="radio"/> Student under 17 years old <input type="radio"/> Student above 17 years old <input type="radio"/> College Student <input type="radio"/> Employee <input type="radio"/> Entrepreneur <input type="radio"/> Housewife <input type="radio"/> Jobseeker <input type="radio"/> Other, please specify: ...
5	How much is your monthly income?	<input type="radio"/> Less than Rp. 500,000 <input type="radio"/> Rp. 500,000 – 999,999 <input type="radio"/> Rp. 1,000,000 – 1,999,999 <input type="radio"/> Rp. 2,000,000 – 3,999,999 <input type="radio"/> Rp. 4,000,000 – 5,999,999 <input type="radio"/> Rp. 6,000,000 – 9,999,999 <input type="radio"/> Rp. 10,000,000 – 14,999,999 <input type="radio"/> Rp. 15,000,000 or more
6	How much does your weekly travel cost?	<input type="radio"/> Less than Rp. 20,000 <input type="radio"/> Rp. 20,000 – 49,999 <input type="radio"/> Rp. 50,000 – 99,999 <input type="radio"/> Rp. 100,000 – 199,999 <input type="radio"/> Rp. 200,000 – 399,999 <input type="radio"/> Rp. 400,000 or more
7	How many motorbikes do you have in your home?	<input type="radio"/> None <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> More than 3
8	How many cars do you have in your home?	<input type="radio"/> None <input type="radio"/> 1 <input type="radio"/> 2 <input type="radio"/> 3 <input type="radio"/> More than 3
9	How many bicycles do you have in your home?	<input type="radio"/> None <input type="radio"/> 1

		<ul style="list-style-type: none"> <li>○ 2</li> <li>○ 3</li> <li>○ More than 3</li> </ul>
10	What is your daily mode of transport?	<ul style="list-style-type: none"> <li>○ Private car</li> <li>○ Private motorbikes</li> <li>○ Company car</li> <li>○ Company motorbikes</li> <li>○ Bicycles</li> <li>○ Walking</li> <li>○ Public transport (Labi-labi, BRT, Pedicab, Damri, etc)</li> <li>○ Online Ride-Hailing (GoJek, Grab, Maxim, etc.)</li> </ul>
11	What is the purpose of your daily travel?	<ul style="list-style-type: none"> <li>○ School/University</li> <li>○ Working</li> <li>○ Grocery Shopping</li> <li>○ Leisure Activities</li> <li>○ Other, please specify: ....</li> </ul>
12	How many hours do you travel in a day? (Back and forth)	<ul style="list-style-type: none"> <li>○ 15 – 30 mins</li> <li>○ 30 min – 1 hour</li> <li>○ 1 – 2 hours</li> <li>○ 2 – 3 hours</li> <li>○ More than 3 hours</li> </ul>
13	Which route do you use THE MOST?	<p><b>(Same drop-down menu answer for each question)</b></p> <ol style="list-style-type: none"> <li>1. KOPELMA Darussalam</li> <li>2. Gp. Bandar Baru (General Hospital Zainoel Abidin, Lampriet and surrounding)</li> <li>3. Lampineung and Surrounding.</li> <li>4. Kec. Kuta Alam (Simpang 5, Peunayong Traditional Fish Market and surrounding)</li> <li>5. Gp. Keudah – Merduati – Kp. Baru (Keudah – Pasar Aceh Surrounding)</li> <li>6. Kp. Baru (Blang Padang Town Square, Baiturrahman Grand Mosque, and surrounding)</li> <li>7. Kec. Baiturrahman (Seutui and surrounding)</li> <li>8. Kec. Jaya Baru (Punge, Lamteumen, and surrounding)</li> <li>9. Kec. Meuraxa (Ulee Lheu, Surien, and surrounding)</li> <li>10. Ulee Kareng and surrounding</li> <li>11. Sultan Iskandar Muda International Airport</li> </ol>
14	Which route do you FREQUENTLY use?	
15	Which route do you NOT OFTENLY use?	

16	Are you a registered Banda Aceh citizen?	<ul style="list-style-type: none"> <li>○ Yes, I am originally from Banda Aceh.</li> <li>○ Yes, I am from another city, and I already registered myself as a Banda Aceh citizen.</li> <li>○ No, I am from another city, and I do not register as a Banda Aceh citizen. I live in Banda Aceh for a specific purpose.</li> <li>○ No, I am from Aceh Besar, but I live near Banda Aceh and traveling back and forth for a specific purpose.</li> </ul>
17	Is your private motorized vehicle registered as the vehicle from Banda Aceh?	<ul style="list-style-type: none"> <li>○ Yes, it is originally from Banda Aceh.</li> <li>○ No, I bring it from my hometown.</li> <li>○ I buy it secondhand in Banda Aceh.</li> <li>○ I do not know.</li> <li>○ I do not have a motorized vehicle in Banda Aceh</li> </ul>
18	Do you ever travel with Trans <i>Koetaradja</i> ?	<ul style="list-style-type: none"> <li>○ Yes</li> <li>○ Never</li> </ul>
19	How often do you use it?	<ul style="list-style-type: none"> <li>○ Never</li> <li>○ Only once or twice just to test</li> <li>○ Very infrequent</li> <li>○ Infrequent</li> <li>○ Often</li> <li>○ Very Often</li> </ul>
20	For what purpose do you use Trans <i>Koetaradja</i> ?	<ul style="list-style-type: none"> <li>○ Never</li> <li>○ Only for testing</li> <li>○ School/University</li> <li>○ Working</li> <li>○ Grocery Shopping</li> <li>○ Leisure activities</li> </ul>
21	<p>On the scale from 1 (very poor) to 5 (very good), how do you find Trans <i>Koetaradja</i>'s schedule?</p> <p>Sub question: what is the MAIN problem?</p>	<p><b>Answer for sub-question:</b></p> <ul style="list-style-type: none"> <li>○ It is already good.</li> <li>○ The schedule does not match my daily activity.</li> <li>○ The drivers take a longer break at the specific stop (the bus does not go on time)</li> <li>○ The bus does not come on time.</li> </ul>
22	<p>On the scale from 1 (very poor) to 5 (very good), how do you find Trans <i>Koetaradja</i> stations service?</p> <p>Sub question: what is the MAIN problem?</p>	<p><b>Answer for sub-question:</b></p> <ul style="list-style-type: none"> <li>○ It is already good.</li> <li>○ There is no station near my daily routes.</li> <li>○ There is no station near my neighborhood.</li> </ul>

		<ul style="list-style-type: none"> <li>○ The station is not properly maintenance (dirty)</li> <li>○ The stair-only stations' stairs are very steep, and there is no ramp.</li> <li>○ The stations not very safe (there is homeless or/and beggar)</li> </ul>
23	<p>On the scale from 1 (very poor) to 5 (very good), how do you find the drivers of Trans <i>Koetaradja</i>?</p> <p>Sub question: what is the MAIN problem?</p>	<p><b>Answer for sub-question:</b></p> <ul style="list-style-type: none"> <li>○ It is fine.</li> <li>○ The drivers are not very carefully driving.</li> <li>○ The drivers tend to drive too fast.</li> <li>○ The drivers are not friendly.</li> </ul>
24	<p>On a scale from 1 (very poor) until 5 (very good), how do you find the bus service?</p> <p>Sub question: what is the MAIN problem?</p>	<p><b>Answer for sub-question:</b></p> <ul style="list-style-type: none"> <li>○ It is already excellent and comfortable.</li> <li>○ The bus takes too much time on the road.</li> <li>○ The bus is dirty.</li> <li>○ The air conditioner is infrequently on.</li> <li>○ There is no space for wheelchairs or bikes on the bus.</li> </ul>
25	<p>Would you like to pay for using Trans <i>Koetaradja</i> to improve the service (driver's training, creating a busway, adding more stations and fleets)?</p>	<ul style="list-style-type: none"> <li>○ Yes</li> <li>○ No, I want it to remain free</li> </ul>
26	<p>If yes, how much would you like to pay?</p>	<ul style="list-style-type: none"> <li>○ Rp. 1000 – 2000</li> <li>○ Rp. 3000</li> <li>○ Rp. 4000 – 5000</li> <li>○ More than Rp. 5000, please specify:</li> </ul>
27	<p>If there is two option in buying a ticket: a single ticket for single-use and a day ticket for multiple uses as much as you want in a day, would you like to try this ticketing system?</p>	<ul style="list-style-type: none"> <li>○ Yes.</li> <li>○ No, because I do not use public transport.</li> <li>○ No, because I want it to remain free.</li> </ul>
28	<p>Have you ever used other local transport in Banda Aceh before Trans <i>Koetaradja</i> exists?</p>	<ul style="list-style-type: none"> <li>○ Yes</li> <li>○ No</li> </ul>
29	<p>If yes, what did you use?</p>	<ul style="list-style-type: none"> <li>○ Labi-labi</li> <li>○ Becak</li> <li>○ Damri</li> <li>○ None</li> </ul>
30	<p>What is the MAIN reason you are not using this local transport anymore?</p>	<ul style="list-style-type: none"> <li>○ I already have my motorbikes/car.</li> <li>○ The price is very expensive now.</li> <li>○ It is not comfortable.</li> <li>○ I have a family now, and it is uncomfortable to bring children by public transport.</li> </ul>

		<ul style="list-style-type: none"> <li>○ I am still using it for my daily activity.</li> <li>○ I never use public transport before.</li> </ul>
<b>31</b>	If Labi-labi is improved and works under Trans <i>Koetaradja</i> as a feeder bus to reach the neighborhood, would you like to try it?	<ul style="list-style-type: none"> <li>○ Yes</li> <li>○ No, I prefer it to be a brand-new small bus than using Labi-labi's car model.</li> <li>○ No, I do not want to use public transport.</li> </ul>
<b>32</b>	Suppose the public transport system in Banda Aceh is already good (there is a busway, the buses are on time, the stations are everywhere). Would you like to shift from private motorized vehicles to public transport?	<ul style="list-style-type: none"> <li>○ Yes</li> <li>○ Maybe</li> <li>○ No.</li> </ul>
<b>33</b>	If you said no, please specify your reason	*Long answer*

## Appendix 2 Color-Coded Answers from Open-Ended Question in Questionnaire

No	Answers (translated)	Color Code
1	Because it takes a long time on the roads (with the public transport).	.
2	It is not comfortable (the public transport).	.
3	I already have my private vehicle to reach my destination, and it saves both time and distance (than public transport).	.
4	It is hard to use it (public transport) when urgent.	.
5	It is hot and crowded, so there is too much CO2 inhaled, which does not look good for health.	.
6	Maybe a private vehicle is more flexible to go anywhere.	.
7	The stations are too far away.	.
8	It feels not too comfortable to use it.	.
9	I do not have any particular reason.	
10	Because it is more flexible to use my vehicle than public transport.	.
11	Because it takes time to wait for public transport and I already have my vehicles.	.
12	Because I feel more comfortable using my vehicle and the roads in Banda Aceh are not too crowded and no congestion.	.
13	I have my vehicle.	.
14	The answer is not related to the topic.	
15	I'm afraid there will be bad people (if I use public transport)	.
16	It is more efficient to use a private vehicle.	.
17	Sometimes there is an emergency business that should be done in a short time, so I cannot wait for public transport.	.
18	During this COVID-19 time, I am avoiding public transport. It has been a year since the last time I use public transport.	.
19	Because I already have my motorbike and it is flexible to go everywhere.	.
20	It is more flexible to use a private vehicle.	.
21	Only because it does not fit my activities schedule.	.
22	The departure schedule of public transport (Trans <i>Koetaradja</i> ) does not fit my activity. The headway is long between one bus to another. There is no station in my neighborhood. The buses' directions are limited.	.
23	It is more comfortable to use a private vehicle.	.
24	It is complicated (to use public transport) while it is much more practical to use a private vehicle because the roads are still not very busy.	.
25	I think the main problem of Trans <i>Koetaradja</i> is there is no night schedule, or there might be one, but I do not see this service operates at night. Also, the ramp in the stations is steep, especially for disabled people.	.

	<p>In my opinion, why labi-labi was more usable than TK is because it is not attached to a schedule, and it can pick up and drop off the passengers anywhere (no stations needed). At the same time, the minus point can distract other road users.</p> <p>Meanwhile, why online ride-hailing is the most used than TK and labi-labi is because it is safer (the passengers are under company protection with the help of the application's feature), it picks up. It drops off the passengers directly to the destination, and the payment can be in cash or e-money.</p>	
26	The stations are far away.	.
<b>Total Codes: 39</b>		 <ul style="list-style-type: none"> <li> : 7</li> <li> : 7</li> <li> : 3</li> <li> : 2</li> <li> : 10</li> <li> : 8</li> <li> : 2</li> </ul>

### Appendix 3 Expert Interview Transcript

No	Questions	Answers
1	<p>Is Trans <i>Koetaradja</i> still free for all passengers? Why?</p> <p>What happens to the e-Money subsidies from BRIZZI?</p>	<p>Yes, it is still free. The subsidy of free rides is given to increase the load factor. Right now, the highest load factor is around 62% in only one corridor. Some corridors, in general, have a 50% load factor, where the lowest load factor is 46%. To be a paid ride, the BRT-LITE should have at least a 70% load factor. So right now, the focus is to increase the load factor.</p> <p>We also hope that in the future, the BRT-Lite lite will be a paid ride soon. To be honest, the subsidies of this BRT-LITE lite burden the local government budget. But, one of the primary government duties is to serve the citizens, so the offerings are still the right way.</p>
2	<p>Is there any plan to start using paid rides for Trans <i>Koetaradja</i>? Based on the survey, 241 respondents say they are willing to pay for Trans <i>Koetaradja</i> to be improved</p>	<p>Yes. Actually, in Qanoon No. 2 Year 2019, there is an exact price for buses, 5,000 for public and 2,000 for students. In my view, if this price would be realized, I think the price should be only in 3,000. Actually, with today's load factor, the BRT-Lite will gain profit if the price is used. But, if we want to talk outside the academic field, this is all about politics. Even though the regional head election is postponed until 2024, this regulation might be burdensome for today's governor. So I think, during his period, this pricing system might be delayed.</p> <p>Further evaluation about when is the right time for the pricing system to be applied might be conducted. In my view, Trans <i>Koetaradja</i> is near to that place since the concept of UPTD Trans <i>Koetaradja</i> is directed to be a regional public service agency (BLUD). Once the separation is finished, it can manage its financial status even though the finance is still 50:50 share with the Aceh government.</p>
3	<p>The BRT-LITE report by CDIA says that Trans <i>Koetaradja</i> is in the process of separating between regulator and operator, where transport authorities only work as regulators and</p>	<p>There were some changes in a staff position in early 2021; I'm still new here for the past few months. I saw that the separation process is not yet finished, and the new staff are continuing the project. But there are only fewer things to be considered from the administration, facilities, and infrastructure of Trans <i>Koetaradja</i>.</p>

	<p>private companies as the operator.</p> <p>Is it already separated? What was the reason behind this idea? Is there any correlation between separation and low demand for the bus?</p>	<p>So I hope it will be finished in my period. For now, not yet because there is some consideration from the head of the transportation department.</p> <p>Further explanation about separation:</p> <p>So the concept of BLUD is where the government still in control of Trans <i>Koetaradja</i>, so it is still a part of government service. But, Trans <i>Koetaradja</i> can decide its rates by itself, but the government should know the financial statements. So from (fixing) the rates, we can manage our income independently.</p>
<p>4</p>	<p>Are the feeder buses still working?</p>	<p>We are already in the process until this mid-year, where there are five e-buses as feeder buses. So we are already budgeting Rp 14,7 billion for these e-buses, and now it's in the process of e-catalog. So we will not auction it, but we buy it from sectoral e-catalog, so the ministry will be the one who made the e-catalog (RKPP). So right now, we are now waiting for them, we did some assistance with them, and they said there only be one more assistance through the online meeting (because of the situation [covid] there is no face-to-face meeting) to make this finalized. It will appear on the ministry sectoral e-catalog once it is completed. Then, we will buy it (from e-catalog).</p> <p>Actually, in the first plan, we wanted to have 25 e-buses to cover five feeder routes.</p> <p>1st route: UNSYIAH</p> <p>2nd route: T.P. Nyak Makam</p> <p>3rd route: Pasar Almairah &gt; Jambo Tape (SMA 3)</p> <p>4th route: Bundaran Ulee-Lheu &gt; Simpang 5</p> <p>5th route: Sp. 5 &gt; Sp. 3 &gt; Sp. Keutapang &gt; Sp. Dodik</p> <p>So with these five routes, we hope that five units of e-buses can serve each route. But this e-bus is very expensive, so with 14,7 billion, we can only afford four units of e-buses. We already did a test drive for this e-bus, so we will use four e-buses as feeders where one route will use a conventional bus for a temporary</p>

		<p>period. So if the question is, when will the feeder be operating? We target it will happen around September - October this year. So if the e-catalog will be ready in July, we will buy it, and the process will take around 1-2 months for the fleets to arrive in B.Aceh.</p>
5	<p>I read the latest news that now Trans <i>Koetaradja</i> has e-buses that in the trial phase. When will it launch? (see answer no.3)</p> <p>And what is the background of launching the e-buses? Considering Banda Aceh's electricity system is not reliable for this service.</p>	<p>As the staff that works under the governor, we should follow the Aceh Green project, which is the one big project by this period's governor. So, e-buses is should be a part of Aceh Green because it is zero-emission. Also, after the test drive, we targeted some variables—first, comparing the saving rate between e-buses and conventional ones. We have this calculation, but I forgot, it was around one to dozens. If every kilometer we use solar, 1-liter solar is around Rp 5.500 and can drive until 3 km. So we already calculated and compared, the result was e-bus is more economical than conventional ones for the use of fuel and electricity factors.</p> <p>Meanwhile, per kWh, electricity used for e buses is around Rp 1.400 and can drive until 5 km. So it is a big difference in saving, and we thought it is worth it. We understand it is expensive, but it is a long-term investment to gain more profit from it, especially in terms of operating age. Technically, with conventional buses, the operating age is 5+2, which means five years of optimal performance with standard maintenance, and in the next 6th and 7th years, it decreases. And this year is the 6th year of today's conventional buses working. Since the start of my period, I saw some of the buses' performances are coming down, so I tried to maintain them. Compared to that, e-buses have 8+2 years of performance where we should do a lot of care after eight years. But if we maintain the buses from the start, I think there would not be much work in the last few years. So that is all the reasons why we choose to use e-buses. We are also considering a long-term plan to make Aceh better (in terms of environment).</p>
6	<p>How is the feeder bus system pick up passengers?</p>	<p>We still use pick point to pick up the passenger (shelter/station). So it's not just a plan, but this is already in progress; we already have the feeder buses, the routes, ride predictions, the stations, kilometers prediction, ride per minute, and even the prediction of load factors, because we already did the trial for one month. We</p>

		<p>also already have the prototype of the stations, and hopefully, we will build one or two of them this year, maybe around September. The model is minimalist with Aceh's traditional ornament. Even though it would not be not so many because of the limited budget, one or two, we will make it because one station will take around Rp 56 million, and there is a re-focusing budget due to the Covid-19. Hence, the budget is now is mainly focused on solving this pandemic problem first. But we will still make it happen, so the citizen will know that this feeder service has a station. We will only use signage at some pick-up points and mark the road as the bus stop. So the feeder still has a specific place to stop.</p>
7	<p>What is the status of labi-labi? Is it under DISHUB?</p>	<p>Labi-labi is a city's public transportation, where its city or district gives the licensing.</p> <p>So a little bit about public transportation system: there is AngKot (city's public transportation), AKDP (Angkutan Kota Dalam Provinsi) In-Province public transport, AKAP (Angkutan Kota Antar Provinsi) Inter Province public transport, ALBN (Angkutan Lintas Batas Negara) Inter Country's border public transportation. So, labi-labi as AngKot is under the city department of transportation. If the transport drives through either the province's cities or districts, the licensing is given by us, the province-level transportation department. The ministry of transportation issues AKAP's license, but now a representative from Aceh called Balai Pengelola Transportasi Darat (BPTD) Aceh. ALBN is also under the ministry, for example, public transport for the border of Indonesia-Malaysia. So the permission is given by different agents.</p>
8	<p>Based on my questionnaire, 67% of respondents say they would like to have labi2 as feeder buses. I thought that Labi2 is under Dishub. That is why I brought that question.</p> <p>Is there any plan for Trans <i>Koetaradja</i> to make this fleet its feeders?</p>	<p>Not under the DISHUB. It means that the operation of labi2 is under each operator, but DISHUB works as the controller of the procedure and permission.</p> <p>Then related to the feeder system, we will launch the e-buses feeder. We also got some ideas from academic colleagues, especially from PII (Persatuan Insinyur Indonesia/Indonesian Engineer Community). We already met; they even want to make</p>

		<p>an innovation of the feeder system for Trans <i>Koetaradja</i>. For instance, they want to make a pedicab as the feeder. I said that there should be further research about it. The initiation is good to empower pedicab drivers, but we do not want to create a new problem. So Trans <i>Koetaradja</i> is open to new ideas, but we need research about the plus and minus of the innovation. Technically, it should not be a problem. Socially, it is a problem. (There might be) A crash between their circles, there would be "dry" and "wet" corridors of the feeder. So, there should be research about it, I said. And maybe right now, the PII from UNSYIAH is still in the middle of researching it, and later they will present the result to us.</p>
<p><b>9</b></p>	<p>Is there any up-to-date survey of the passenger? since I only got the 2018 report from CDIA and I also read from Dishub's website, there are 4 million passengers for the past four years, but I could not get the exact number?</p> <p>Is there any decline over the years?</p>	<p>There is a survey about it, but I forgot the exact number to give it to you if you want. Ys, it is indeed already more than 4 million passengers, but in 2020 we once stopped working due to the Covid in March. But in October 2020, we started to operate again. So the number in 2020 might not be perfect, so if we want to see the standard number of passengers per corridor, we can see the data from 2019.</p>
<p><b>10</b></p>	<p>Is there any government support to improve the quality of Trans <i>Koetaradja</i>? For instance, before you said the e-buses are a government project, is there anything else? So is there any regulation in Aceh Green that aims to reduce private motorized vehicles so the passenger will shift to Trans <i>Koetaradja</i>?</p>	<p>So it's such a regulation that pushes people, right?. From what I know, there is no such thing yet in Aceh. Although, I had some discussions with some lecturers from UNSYIAH about this. They support the idea of pushing college students to no use private motorized vehicles but must use public transport. If the students do not want to use it, there will be some penalty. But they (the lecturers) also ask TK to guarantee that the public transport system should always be on time and the feeder buses are provided. For now, as I said before, we will have the feeder buses for this area, and there is the main corridor for UNSYIAH. So for this idea, the lecturers are supported.</p> <p>But for the government side, as long as I know, there is no regulation to push the citizen to use public transport. But we, as the department of transportation of Aceh Province, always do the socialization to Acehnese to use Trans <i>Koetaradja</i> and added</p>

		<p>some facilities improvements on it. The added facilities aim to control Trans <i>Koetaradja</i>'s operational activities to minimize the headway time (the time between one fleet to other fleets. The budget for this year and last year is the same, but this year's operational time is longer, so does the headway. For now, we want to have 15 minutes or a maximum 20 minutes gap of headway, but we still have 30 minutes of it. It might feel a little bit too long for waiting. Thus, we tried to modify the operating system because the budget is very minimum.</p>
<b>Sub Question</b>	(continue from the last question) Is that NVR?	<p>Yes, NVR is one of them, and then there is PCR (People Counting Report). We want to do it this year because there is such a display put in front windows of the bus to see how many seats are left. This idea was born because there was a time where the bus conductor did not permit the passenger to ride the bus. After all, all the seats were taken. So we want to put this to get the actual situation report on the bus, so passengers can know how many seats are left there.</p> <p>One more thing, we will put a time display on the stations even though, to be honest, we can not put it to all stations (by now) because we all have 91 stations and the budget is limited. So we will put it on the most-used stations so that the passengers can see the waiting and ETA time for the bus directly on the time display.</p> <p>Then there are other facilities, including the improvement of Trans <i>Koetaradja</i> applications. We only have animation on the application, but later we will have a complete map showing stations locations and bus positions.</p>
<b>11</b>	Where is the most crowded station?	<p>The most crowded station, for now, is Mesjid Raya Baiturrahman, as the center point for the bus to transfer (so this station has buses from every corridor). But if we look further, the station in Mesjid Jami' UNSYIAH is also crowded, and this station is much more crowded than the city center because it only has one corridor. Still, it's already loaded, maybe because this is a school and university area. Then, the station in Mata le</p>

		is always crowded because it is of tourism place. The last one is in Keudah.
12	The improvements that you said was a great idea because some passengers might feel today's Trans <i>Koetaradja</i> is not reliable in term of time management and they found that the driver always stops longer in one station.	Yes, we always hear the passengers' opinions, and we are open to criticism because that can be our evaluation to make TK a reliable public transport for Acehnese.
13	In your opinion, what is the biggest problem faced in continuing to increase the use of public transportation in Banda Aceh?	<p>I already guessed this question from you.</p> <p>So here is the fact that Trans <i>Koetaradja</i> was a part of LLAJ, and then it is separated from LLAJ, where I was the one in charge of writing the academic report for the separation. The idea because LLAJ had so much on the plate. Thus, we want Trans <i>Koetaradja</i> to be separated from this UPTD. So even before I entered this department, I already know the problem in Trans <i>Koetaradja</i> in terms of operational service. So in my view, the biggest problem is the waiting room. Because, in terms of service, the buses of TK have excellent condition. Regarding infrastructure, TK also has good quality stations, signages, all of it. Human resources (buses' conductors and drivers) in general has good attitudes toward the passenger, even though there are 1-2 people who don't have a good attitude, but in my opinion that is normal, within 162 drivers there might be 1-2 people who have problem with that.</p> <p>So the only problem is, like I said, the waiting period. You also said that earlier. So if I put myself as a passenger, I will be confused and angry because there is no exact estimated time of waiting.</p> <p>When I entered the TK department, I asked the staff in charge of fieldwork to do a survey. To be honest, we already have the timetable of TK buses since the beginning. But I question the correctness of this timetable. The result of the survey was there are many unmatched ETA between the timeline and actual condition. So if you ask me what the biggest problem is, that is</p>

		<p>one. But, we already tried to solve the problem by using the NVR to control the buses' positions. I also need to emphasize that we now have 52 units, but only 23 are using NVR. Hopefully, this year there will be ten more units with NVR. That is why I said to the head of DISHUB. I want to put NVR on all the buses so there will be no more excuses if the bus was late because we can know their exact position. For now, we can still control the buses without NVR through the CCTV in each station and field supervisor. But I still want all the control is by the system, so there will be no excuses.</p>
<p><b>Sub Question</b></p>	<p>(continue from the previous question) so in your opinion, what makes the waiting period becomes longer?</p>	<p>So last year, we have Rp 13 billion budget for 52 units to serve six corridors where the operational time was not 12 months last year due to the pandemic. We have the same budget and spending this year, but the working time should be 12 months. After I calculated, with 13 billion for 52 units to serve six corridors, the ride (back and forth journey ( a &gt; b &gt; a)) will be small because it should operate for 12 months. So with the same amount of budget they need to run longer, automatically, the operational will be smaller. In the end, I should be able to accommodate the budget with the time. I can improve the service, with a note that I should cut around 18 bus staff (9 drivers and nine conductors) off. With this cut-off, I can save the budget and spend it on the ride operational cost. But socially, I and the head of DISHUB do not want to do that. Although the implication is, the headway is added up to 30 minutes, where before, it was only 15 minutes.</p> <p>So that is the cause of this problem, not because of the congestion nor the drivers. Because this year, we already made two types of timetables; peak hour and off-peak hour timetable. So there will not be any problem with the unmatched schedule because we already calculated every situation (congestion, traffic light, peak/off-peak). Then the main issue is the budget. TK will be evaluated once it becomes a BLUD, where we handle all the management independently. So DISHUB and government will be only controlling, but we still need to coordinate our finances with them since the financial status is still 50:50.</p>

14	Will Trans <i>Koetaradja</i> be digitalized?	<p>Yes, as I said before, we already have the application. You can download it (ETA) on the play store (Android only), and hopefully, this year, we can improve the application. Where in July, we will update the interfaces. Also, the 23 units of the NVR that I said before were built in the buses back in 2019, and there was no maintenance since then. When I entered the department, some of them are not working correctly; sometimes, it is on-off from our control screens. So we asked the vendor of NVR, and they said some of the connections and wires are not in good condition anymore. So now there is some budget to fix the NVR, to make it work properly and 24-hour on screen.</p>
15	If later Trans <i>Koetaradja</i> has become a paid service, can payment be made via an application or e-Money, or is it still a conventional ticket?	<p>Actually, we already did many trials for that. For the e-ticketing system, we already tried several approaches; there are tap (e-money) and manual printing machines and manual payment for those who do not understand the electric system, such as the elderly. On the first days of TK launching, we subsidized the passenger through BRIZZI e-money, sponsored by BRI, where they also provide us with the tap machine. "Only Rp 1 to ride TK" was the tagline. But that did not happen. So until now, everything did not happen--I do not know why--everything is free. All the facilities that the sponsor gave were left unused. When I joined the department, I think that the tap machine does not only for payment but also for the passenger counter. So, for example, in my plan, I already put 1000 Brizzi cards and a tapping machine in next year's budget plan. Next year, we can work with other stakeholders to share the 1000 cards with all Banda Aceh and surrounding citizens. After that, we can evaluate the problem of using an e-ticketing system, but I, myself, tend to choose this tapping system.</p> <p>About the pricing system, I prefer to start the paid ride with the ticket price range between Rp 2000-5000 where I choose to use 3000-4000 price.</p>
<b>Sub Question</b>	Is that per ride or per network, or per day?	<p>We are still using per ride payment because we still do not have such a connected network; for example, the bus can go from Darussalam - Mesjid Raya - Mata le, not yet. But just last week,</p>

		<p>we had DED (Detail Engineering Design) meeting to create a connected network, so there will be two center points for TK; the first is in Mesjid Raya, and the second one is in Simpang 5. Because in this year there will be evaluation (I think this is okay for you to know) to add some new corridors, so if today we only have six corridors, there will be 4-5 new corridors added; Lampuuk area, Kajhu area, Simpang Kodim (Chik Di Tiro) until Lambaro traffic roundabout, and near to AMD Lhong Raya. So in Simpang 5, we will build a center point because those new corridors are connected with feeders 4 and 5. As for Mesjid Raya, it is already a meeting point for all corridors with plentiful landscape parking. Out of that, we also have a plan to develop our light railways. We already have the study, and I also am a member of the discussion board. But let's talk about it later.</p>
<b>Sub Question</b>	Is that inter-province railways or in-province?	It will only work as a monorail that serves some railways in Banda Aceh and Aceh Besar around B.Aceh. It is kind of tram, but further study is still needed.
<b>16</b>	Is there any TK plan to expand its corridors outside Banda Aceh and the surrounding (to other districts)?	<p>I already submitted the idea, but it all depends on the load factor. As for now, we have not been a BLUD, so we can not choose our scope of service. I already tried to discuss the expansion of TK to Aceh Pidie and Pidie Jaya with the head of DIHUB, and he said that is okay, but there should be a study of load factor in that area first. Because if we open the corridors in there with free rides, there will be new problems, such as conventional public transport. They (AKDP in Aceh Pidie/Pidie Jaya) will lose the free ride compared to us. Then, if we choose to have paid ride, there should be a study about the load factor.</p> <p>So as for now, the corridors only serve Banda Aceh and Aceh Besar.</p>
<b>17</b>	Back to the Aceh Green project, so there is no regulation from the government to minimize the use of the private motorized vehicle? For instance, the government wants to use e-buses because it has zero-	As far as I know, there is no such specific thing as that in Aceh. But we do have motored vehicle testing. I also one of the testers. So every district has UPTD motored vehicle testing, although not all of them are optimally worked; only 6 or 8 work optimally, including B. Aceh. So the test is to detect the standard of motor vehicle exhaust emissions. So if it does not follow the standard,

	<p>emission. Still, contrary to that, we have this fuel subsidy for the private vehicle in Indonesia, which supports emission.</p>	<p>it can not be on the road. In my opinion, this one should be taken care of; because it has precise regulation because it is under UU No. 22 about LLAJ then it follows with PM 133 the year 2015 about motor vehicle trial, it stated clearly that every motorized vehicle on the road should be complete the roadworthy test. So if it does not pass the test, the motorized vehicles can not be on the road; if it still on the road, it will be taken away.</p> <p>But if you ask about regulations related to support public transport use, there is no such thing yet in Aceh. So that is why we keep doing the campaign to use public transport.</p>
<p><b>Sub Question</b></p>	<p>So basically, why I ask this question: In my questionnaire, I ask my respondent whether they have ever ride public transport before TK or not. In general, respondents said yes, and the answer is labi-labi. Maybe because the age range of my respondents mostly in their 20s so labi-labi was the most reliable public transport back then when in school. In the following question, I ask why they do not use that public transport anymore; 70% said they already have private motorized vehicles. So what I want to ask is, is there any regulation that tries to minimize personal motorized vehicles use by not directly pushing people to use public transport?, for instance in Jakarta, there is an odd-even rationing policy.</p>	<p>In my view, I think Aceh has not really toward such regulation. But there is the possibility to do a study about it. I only focus on providing access to our public transport. So in my concept, I want to cover every area with proper public transportation so there will not be any place without public transport accessibility anymore. So, for example, if we have a house in Syiah Kuala. There is no single public transport there, and even the pedicab is rarely found. One more example, in Ujong Batee, Aceh Besar, where there is no transport there. Yes, there is labi-labi, but labi-labi goes in the morning, then it works around Pasar Aceh; finally, it will go back to Ujong Batee in the evening.</p> <p>But maybe later I can have a casual discussion with some friends about creating a regulation or Qanoon to make our public transport more attractive.</p>

## Appendix 4 Public Transport in Banda Aceh

Picture 1 Labi-Labi (left) and Trans *Koetaradja* (right)



Source: Beritagar (2018), *Labi-labi Mati Berdiri* (The Death of Labi-Labi) (left); Aceh Department of Transportation (08/18/20), *Uji Coba Operasi Trans Koetaradja di Masa New Normal* (Trans *Koetaradja* Operation Trial in New Normal Period) (right)

Picture 3 Becak (Pedicab) (left) and DAMRI (right)



Source: Serambi News (07/21/16), *Tarif Baru Becak Mulai Rp 5,000* (New Becak Fare Starting from Rp 5,000) (left); Utama (2019), DAMRI Banda Aceh (right)

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