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Study on Costs and Impacts of Economic Losses due to Congestion in Makassar City: A View Towards the Mamminasata Agglomeration

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Abstract **:** The purpose of this study was to analyze and describe the impact of the delay of commuters in Makassar City caused by congestion on commuter consumption. This relationship can occur through delays that affect disincentives of respondents which further affect the consumption of respondents. In this study, it is also assumed that there are differences in consumption between users of public vehicles and private vehicle users due to differences in the use of transportation modes. In this study, delay (X1) has a magnitude of positive influence on the disincentive (Y1) of 944.19. This value indicates that the increase in delay caused by congestion increases the disincentive of Rp. 944.19. However, this does not reduce the consumption of respondents because of the presence of other respondents' income obtained from the income of the second job and the income of the respondent's spouse. Thus, the author recommends increasing late fines on employees to improve employee performance. Furthermore, the Trans-Makassar Bus service scheme needs to be introduced and imporved as an incentive for the use of buses that can reach various classes of society. The bus service program scheme can be found on the Trans-Jakarta Bus under the name "JakLingko" program.

Keyword **:** Commuter, User (Users of public and semi-public vehicles), Non-Users (Users of private vehicles), delays, congestion, Bus Rapid Transportation (Bus Based Transportation), disincentives (fines), premature suburbanization, commutation, economy, urban economics.

I INTRODUCTION

1.1 Research Background

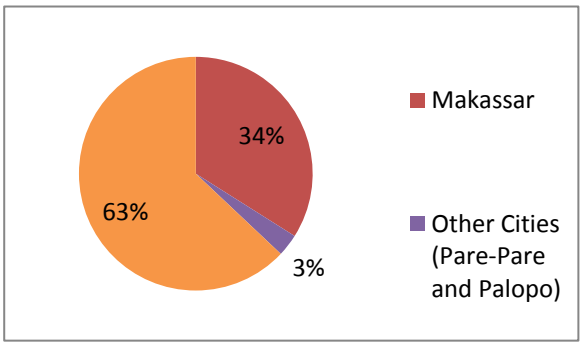
Rapid urban economic growth in urban areas attracts rural residents to live in urban areas because of the large employment opportunities in order to lift their qualities lives. Thus, economic growth in urban areas that is higher than rural areas drives urbanization. Furthermore, urbanization is referred to as a demographic process in which more and more parts of the population live in urban areas (Khan et al. 2016). Hauser and Gardner (1980) added that the requirement to be called urbanization only occurs if urban population growth exceeds rural populations. We can find the definition of urbanization in various texts of urban economic studies, starting from Manning et al. (1996), Fujita (1990), and Hauser et al. (1985) and various other sources. Thus, this indicates that the growth of urban population can occur due to two things, namely:

(i) Natural population growth;
(ii) Population accretion due to migration, both for reasons of education, employment, and economic factors in order to raise the level of life.

Data from the Central Statistics Agency (hereinafter abbreviated as BPS) shows population growth projections in three cities in South Sulawesi (including migrants and natural growth) respectively, 36.7 percent for 2010, 40.6 percent for 2015, 45 percent for 2020 , 49.8 percent for the year 2025, 54.9 percent for the year 2030, and 59.6 percent for the year 2035. Because the large number of urban population growth, it is needed a policy to accommodate population growth in order to to encourage economic growth in the city.

Gross Domestic Product (hereinafter abbreviated as GDP) of Makassar City reaches 34 percent of the total GDP of South Sulawesi Province or its value is equivalent to Rp. 114,171.73 M. The value is far greater than the other two cities in the same province (Pare-Pare and Palopo) with a value IDR 10,378.17 M or only equal to 3 percent of the GDP of South Sulawesi Province. This at least shows that the GDP of Makassar City with two other cities (Pare-Pare City and Palopo City) showns a very wide gap.

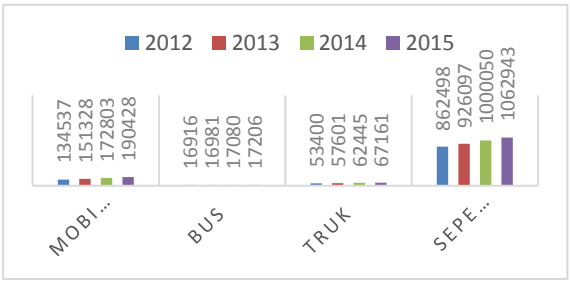
Figure 1.1
Regencies and Cities GDP in South Sulawesi Province



Source: BPS, 2015.

The high GDP of Makassar City provides opportunities and hopes for migrants to lift their lives. However, it should be examined whether the massive human movement and economic growth of Makassar City was accompanied by the presence of various means of transportation as an effort to mitigate congestion problems.

Figure 1.2
Number of Type Vehicles in Makassar City



Source: BPS, 2012-2015.

Further data shows that the ratio of vehicles on the streets of Makassar City to four-wheeled vehicles in 2012 was 12.6 percent (134,537) to the total types of other vehicles in the city of Makassar. While the growth of four-wheeled vehicles in 2015 reached 10.2 percent (190,428).

While for two-wheeled vehicles, the ratio of two-wheeled vehicles to other types of vehicle is 80.8 percent (862,498). Furthermore, even though the number of two-wheeled vehicles has increased, the

ratio of two-wheeled vehicles to other types of vehicles has decreased by 79.4 percent.

For passenger transport public vehicles in 2012 the ratio of vehicles to other vehicles was 1.58 percent (16,916) and decreased in 2015 by 1.28 percent (17,206). The low number of public vehicles compared to private vehicles reflects minimum utilization of public vehicles that are only met by private vehicles. This is inversely proportional to the greater capacity of public vehicles (containing 10 passengers for the pete-pete city public transportation) compared to the load capacity of four-wheeled vehicles (containing 7-8 passengers) and two-wheeled vehicles (2 passengers). Thus, the volume of public vehicles if the load factor maximized is actually able to reduce the number of other vehicles on the road and further away can reduce the density of the highway. The large number of vehicles in the city of Makassar, as shown in Figure 1.2, is estimated to have a large need for transportation modes to support economic activities as shown in Figure 1.1.

In the documen plan "Spatial Planning of the Mamminasata Urban Area (Perpres No. 55 of 2011)", there are several policies including:"Development of the Mamminasata Urban Area as a center of growth and production processing centers for the development of core urban areas and surrounding urban areas (point 2). . . Increasing accessibility between regions and equitable distribution of services (point 4). "

Furthermore, in order to realize this, several strategies are prepared, including:

"Encouraging regional strategic industrial development by utilizing coastal and marine resources; Increasing the linkage of industrial raw material producing areas with the designation area of processing industries in the Mamminasata Urban Area. . . strengthen inter-regional accessibility to support the development of the Sulawesi Economic Corridor; improving the quality and service coverage of a balanced and integrated urban transportation network system to ensure high accessibility between the core urban areas and the surrounding urban areas; develop a network of freeways, management and traffic engineering, as well as the provision and dissemination of integrated mass public transportation service systems. "(Source: Potential of the Three Regions: Understanding the Urban National Strategic Area RTR. No year).

In terms of urban studies, there are terms of premature suburbanization. This refers to the gap between the development of the city and the reaction of the city administration to the means of demand for urban facilities. The policy regarding the presence of bus-based mass transportation modes and improved management and traffic engineering will be one of the studies in this paper. Thus, this paper will discuss transportation studies and their impact on the consumption of respondents in order to evaluate policies and describe the right solutions.

II LITERATURE REVIEW

2.1 Theoretical Review

Transportation (and commutation activities) play an important role in the economic development of a city. Even long before the area became a city, the city was only a simple residential area, in other cases, the area was only a market or trading area which then continued to grow. Furthermore, Fujita (1990) states that the presence or birth of a city arises due to the following characteristics inherent in a city, including the following:

(1) Having abundances of some resources and transportation advantage;
(2) The existence of economies of scale and specialization;
(3) Diverse consumption and production demands; and others.

This requirement seems to be fulfilled in Makassar City which then grew to become an advanced and prominent city. The unique and distinctive geographical location of Makassar City also supports the rapid growth of Makassar City. The location between the two regions (Maros Regency and Gowa Regency) creates a link between the two regions to travel as destination and

originis between the regencies and the cities, that must pass through the city of Makassar. Furthermore, its unique location makes it an advanced developing city with the presence of port facilities.

Fujita added that the presence of mining commodity deposits would lead to the development of an industry in the region. Although Makassar City did not have the mineral deposits Fujita intended, other districts that close to Makassar City had this advantage, which later made Makassar City a place to store supplies in the Makassar City warehousing area.

From a theoretical perspective, these four relationships that enable economic and transportation relations to occur: (i) changes in transport activities lead to economic growth, meaning that travel is an essential component and helps drive economic growth (and poor access and poor conditions can limit potential economic growth): (ii) changes in economic growth, resulting in changes in transportation activities, this means that demand in travel is influenced by economic growth; (iii) causality has the effect of influencing each other; or (iv) there is no relationship, this means that growth between one and the other does not affect other growth (Ecola & Wachs, 2012). In the case of New Zealand, it tends to state that relationship (ii) is the strongest relationship of the other four relationships. For example, the ANZ Trucks indicator, which is based on large truck movements on the streets of New Zealand, shows the extent of economic activity in New Zealand.

However, if urban economic growth is not accompanied by improvements in transportation facilities, it can lead to congestion of traffic (slowdown in transportation activities). The magnitude of the impact caused by a slowdown can lead to increased vehicle operating costs, that cost the individuals and businesses entities. Thus, the direct impact of transportation investment can reduce transportation time and costs through decreasing travel time, reducing transportation operating costs and increasing access to destinations. Transportation investment can also mitigate many economic losses, such as reducing congestion or possible accidents (New Zealand Ministry of Transport: 2014).

Furthermore, specifically, low costs and high accessibility due to good access to transportation would expanding markets for individuals who use transportation for business activities and increasing their access to suppliers. Increasing access and increasing connectivity creates opportunities for trade, competition and specialization, which can increase long-term productivity improvements. Thus, we can conclude the importance of transportation access to various aspects that can influence the level of commodity prices, service costs, company operational costs, and expenses by individuals.

2.2 Empirical Review

Population growth and consequently the growth in the number of transportation modes in urban areas have created a several problem. As the population moves to urban suburbs, it can create population and vehicle movement from the suburbs to urban centers and consequently create congestion. This happened due to the ineffective and inefficient presence of the rapid transportation bus. In fact, the movement of economic actors and the movement of goods is at the core of an economy that continues to "commute". On the contrary, this is not a non-solitary problem in the city of Jakarta. Problems stemming from traffic jams that inhibit commutation activities have been overcome by the presence of Mass Rapid Transportation and Bus Rapid Transportation.

Commutation is a "round-trip" activity exercised by population. Likewise with commodity activities, goods that travel in and out of an area. In this case, Makassar City which became the capital of the province became a place where many goods came from other districts to be sent and exited through the port of Makassar City.

The large amount of trade, commutation and population activities increases the burden on the streets of Makassar. Where, at many points and places, the movement and activity in Makassar City has exceeded its capacity.

This then creates a slowdown in commutation activity. In various aspects, this event is not only detrimental to business and commercial activities as well as freight forwarding services, it also harms individual economic actors in ways that many parties never take into account. This is taken into account in Sugiyanto (2012). Sugiyanto formulated several variables in the cost of travel. Three of them are as follows: vehicle operating costs; pollution costs; and the cost of travel time.

Figure 2.1
Overview of Travel Costs

No.	Kondisi dan pendekatan nilai waktu	BOK (Rp)	BP (Rp)	BWP (Rp)	Biaya Gabungan (Rp)
1.	Kondisi Kecepatan Sebenarnya				
	a. Nilai waktu PDRB	3.450,30	543,61	1.621,92	5.615,83
	b. Nilai waktu WTP ke Malioboro	3.450,30	543,61	3.001,33	6.995,24
	c. Nilai waktu WTP arus menerus	3.450,30	543,61	3.288,00	7.281,91
2.	Kondisi kecepatan arus bebas				
	a. Nilai waktu PDRB	1.941,56	295,7	404,67	2.641,93
	b. Nilai waktu WTP ke Malioboro	1.941,56	295,7	748,83	2.986,09
	c. Nilai waktu WTP arus menerus	1.941,56	295,7	820,36	3.057,62

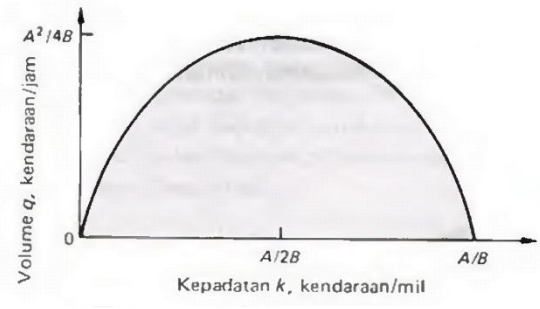
Source: Sugiyanto, 2012.

Sugiyanto (2012) research found that vehicle operating costs were accrued by fuel costs of Rp. 3,450.3 with actual speed (which corresponds to events in the field) and Rp. 1,941.56 on jam-free roads (assumed without congestion) with a distance of 1,414 km each. While pollution costs are costs that should be borne due to pollution issued by vehicles, which is Rp. 543.61 on roads that have congested and amounting to Rp. 295 on jam-free roads. Meanwhile, the cost of travel time is the cost that is willing to be issued by road users in order to avoid congestion. Data for this variable are obtained based on the results of the interview. The amount of willingness to pay to avoid congestion is around Rp. 1,621.92 - Rp. 3,288 for those experiencing a slowdown condition and Rp. 404.67 - Rp. 820.36 for those that are free from congestion flows (Source: Sugiyanto, 2012).

For the author, this illustration is important to explain, considering that the greater the costs incurred by individuals in using vehicles, the greater the individual expenses that have an impact on other expenses and their consumption. This will be explored further in other parts of this section. This research is also similar to the picture presented by Morlok (1988) by displaying vehicle speed and road capacity.

Morlok (see Figure 2.2) in his explanation further explained that the road has a load capacity (capacity), where at its peak, the vehicle can pass more and more densely. However, the marginal addition of one vehicle will reduce the speed of the vehicle because it has exceeded the road load limit. Roads can generally contain around 500-1,000 vehicles per hour, and provincial roads can contain around 1,800-2,300 vehicles per hour. Congestion occurs when the volume of a vehicle approaches this threshold. As the number of vehicles grows and fills the road, it slowly increases congestion which, to a certain extent, will create severe congestion and slowdown.

Figure 2.2
Volume and Vehicle Density on Road



Source: Morlok, 1988.

Furthermore, Litman's research states that the reduction in vehicle volume from 90 percent to 85 percent of road capacity can reduce the slowdown of traffic congestion by 20 percent or more (Litman: 2009). Other research shows that a 5 percent decrease in travel time in all business trips on the streets of the United Kingdom can save costs of £ 2.5 billion, or a value equivalent to 0.2 percent of UK GDP. This shows the benefits of solving congestion problems.

The research that was conducted by Sweet (2013), which in some other research results was quite counter-intuitive, said that the higher the level of congestion associated with the higher level of economic growth. Specifically, he said, congestion can slow job growth when congestion becomes more severe at a point of 35 to 37 hours of commutation

slowdown per year. Furthermore, above this threshold, the quality of life of commuters began to decline.

Furthermore, he said, domestic and international trade could be increased through reduced trade costs. Where, transportation costs are the costs inherent in the factors of production. In this research, transportation costs can reduce all other expenses and consumption. The same study by the Ministry of Transportation of New Zealand (2014) states that the decline in transportation costs has increased international commodity trade by 10 percent - 17.5 percent which further drives the GDP of the United Kingdom to 2.5 percent - 4 percent. This happens through a decrease in transportation costs which makes the price of goods more affordable due to declining production costs.

In McCann's study on 2010 (in Miranda and Rodrigues: 2010), it was mentioned that household families that use a lot of public transportation services can save an average of US $ 3,000 per year for transportation costs. Litman's study in 2004 (ibid.) found that households were able to save annual transportation costs of US $ 1,300 in cities where there were rail transportation service systems compared to cities that did not have adequate transportation facilities. This is important to review, considering that transportation is a facility that is used as a means of activity for economic actors as well as commodity goods which are used by economic actors for consumption purposes.

Furthermore, another research finding found by Crampton is that access to tram stations can change the character of a region. The area can be an attraction for the tertiary sector, entertainment and cultural activities. When an activity is located in that place, other economic activities will follow, although later the presence of activity in the area cannot be concluded whether it occurs due to the presence of one previous activity or due to the presence of tram train access (may be both).

Hartgen and Fields research (in Sweet: 2014) further emphasizes the effect of congestion on the stagnation of regional growth. It was found that congestion hampered travel capacity and was therefore associated with a slowdown in growth of regional employment. Furthermore, higher levels of congestion are associated with slower productivity growth per worker with figures of -0.022 and -0.033 (Sweet: 2014). Congestion can also reduce the quality of service provision and increase travel time. In addition, congestion increases the average trip per highway.

Data also shows that from 2001 to 2004 alone, congestion resulted in losses of up to 5.5 trillion rupiah (covering 2.5 trillion for travel time and 3 trillion rupiah for financing vehicle operations). The growth of private vehicles per day in Jakarta alone reaches 1600 units for four-wheeled vehicles and reaches 4500 units for two-wheeled vehicles. As comparative data, data released by Koran Sindo in an online release states that in DKI Jakarta itself shows the number of private vehicles filling the road by 98 percent of street volume with 45 percent of road users, while public transportation meets the road volume by 2 percent, where users who use public roads alone reach 55 percent. We can draw conclusions, that the volume of private vehicles creates traffic congestion on the streets of the capital city of Jakarta.

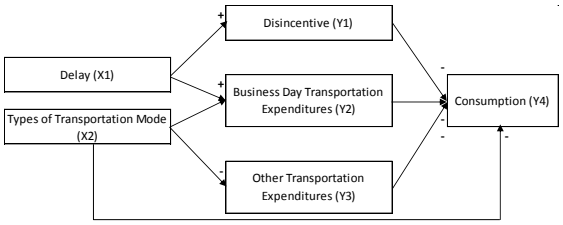
III THEORITICAL FRAMEWORK AND HYPOTHESIS

3.1 Theoritical Framework

Economic activity is the starting point of this paper. This creates movement and commutation. Thus, various entities who use the road, as a result, experience delays when many residents use vehicles simultaneously on roads that have limited capacity. When this happens, it creates congestion during certain hours. On the one hand, slowdown and congestion in extreme conditions affect "travel time", thus affecting the expenditure of both users and non-users and ultimately consumption of the population. Various assumptions taken by the author are built based on research that was demonstrated by Sugiyanto (2012), Sweet (2014), Crampton (2003), and Slutzer and Frey

(2004). Then based on this paper, the authors further develop the questionnaire to obtain the desired data, also assisted by a questionnaire built by Olsson et. al. (2011).

Figure 3.1
Theoritical Framework



In this study, the indicator of delay was measured using parametric and non-parametric variables. The delay experienced by respondents was measured by the minutes experienced in one month. This indicator is taken because the number is assessed by the delay with that amount, so that, the length of the delay the respondent will influence the respondents' consumption significantly through disincentive variable.

In the framework above, the authors describe the following factors: Commuters who experience delays (X1) will positively influence the disincentive rate of respondents (Y1); positively affects transportation expenditure (Y2). While the use of transportation modes (X2) negatively affects total transportation expenditure (Y2) and other transportation expenditures (Y3). Whereas consumption (Y4) is negatively affected by disincentives (Y1), transportation expenditure during working days (Y2), and other transportation expenditures (Y3); and has a greater value for variable X2 (use of transportation modes).

3.2 Hipotesis

3.3 With the theoritical framework that the writer built, the writer draws the following conlusions:

1) Delays are thought to indirectly have a negative effect on the consumption on respondents, through the costs and impacts they have caused;
2) It is assumed that consumption of public vehicle users is higher than the consumption of private vehicle users.

IV RESEARCH METHODS

4.1 Research Design

The design of this study exercised by conducting survey-correlational and descriptive research. This is carried out using the basis of a literature review that investigates the impact caused by delays in respondents' consumption. In this study, it was investigated how delays can affect consumption through a number of variables, including disincentives or salary cuts, working day transportation expenses, and other transportation expenditures.

4.2 Withdrawing Samples Methods

This study uses a descriptive non-parametric descriptive qualitative-quantitative research approach. Sampling is done based on non-probability sampling, with purposive sampling and drawing snowball samples. This is done because of the lack of data in the field, private and public vehicle users recommend other vehicle users based on the researcher's objectives. Thus, there were 65 respondents drawn from several places with 34 each for public vehicle users (online two-wheeled, four-wheeled online, public transportation or pete-pete, and office bus services) and 31 respondents for private vehicle users (two-wheeled and four-wheeled vehicles).

4.3 Research Variables and Operational Definitions

Operational definitions explain certain ways used by researchers in measuring a variable that will be used. The limits of the variables used in this study to prevent the extent of the discussion, namely as follows:

1) X1 is delay variable that experienced by respondents measured in minutes;
2) X2 is the use of the respondent's transportation mode. Respondents who use public vehicles are given a number (1) and respondents who use private vehicles are given a number (0);
3) Y1 is a disincentive or salary deduction experienced by respondents due to delay in the month. The measurement of this disincentive is measured using rupiah;
4) Y2 is the respondent's transportation expenditure during the working day in the last month measured using the rupiah indicator;
5) Y3 is transportation expenses outside work days;
6) Y4 is the consumption of respondents measured using rupiah.

4.3 Analysis Methods

The model built in the study was approved on the model built by Sugiyanto (2012) and Morlok (1988). Based on the model, the author manipulated (modified) the formulation so that it was found:

$Y1 = \alpha_0 + \alpha_1 X1 + \mu_1$
$Y2 = \beta_0 + \beta_1 X1 + \beta_2 X2 + \mu_2$
$Y3 = \gamma_0 + \gamma_1 X2 + \mu_3$
$Y4 = \delta_0 + \delta_1 X2 + \delta_2 Y1 + \delta_3 Y2 + \delta_4 Y3 + \mu_4$

Given the method used is a method of simultaneous equations with reduced form, then

$Y4 = \delta_0 + \delta_1 X2 + \delta_2 Y1 + \delta_3 Y2 + \delta_4 Y3 + \mu_4$
$= \delta_0 + \delta_1 X2 + \delta_2(\alpha_0 + \alpha_1 X1 + \mu_1) + \delta_3(\beta_0 + \beta_1 X1 + \beta_2 X2 + \mu_2) + \delta_4(\gamma_0 + \gamma_1 X2 + \mu_3) + \mu_4$
$= (\delta_0 + \delta_2\alpha_0 + \delta_3\beta_0 + \delta_4\gamma_0) + (\delta_2\alpha_1 + \delta_3\beta_1)X1 + (\delta_3\beta_2 + \delta_4\gamma_1)X2 + (\delta_2\mu_1 + \delta_3\mu_2 + \gamma_1\mu_3 + \mu_4)$
$= \Delta_0 + \Delta_1 X2 + \varepsilon_0$

Where :
X1 = Delay (Minute);
X2 = Vehicle Usage;
Y1 = Disincentive;
Y2 = Transportation expenses on weekdays;
Y3 = Transportation expenses outside of working days;
Y4 = Consumption.

V RESEARCH RESULT

Research exercised by the author was carried out in several places, including: State-Owned Enterprise of State, Kalla Tower, STIA LAN, Office of Governor of South Sulawesi Province, and several private companies. The criteria of respondents in this study were limited to workers who passed Alauddin and Perintis Kemerdekaan roads to their workplaces and jobs that imposed fines / penalties for respondents who were late for work. The respondents included in this study were 65 respondents, consisting of private workers, BUMN employees, and civil servants.

5.1 Description of Data

5.1.1 Profile of Respondents and Data Mix

Of these 65 participants, researchers also divided the research respondents into 34 public vehicle users and 31 private vehicle users to look for the effect of spending on transportation factor use (and vehicle ownership). In addition, this study also examined how the magnitude of the impact of congestion affects the income of respondents who are late. Furthermore, respondents are called "often late" when in one month the respondent experiences delays in entering the office work hour due to traffic jams (and late in setting the time of departure then involved in traffic jam) more than four times (5 and above). This indicator is taken because the figure is considered to have been large enough to influence penalties and fines on respondents' salaries or benefits. While respondents

are called "rarely late" when in one month the respondent experiences delays in entering the office for less than five times (4 and les).

Table 5.1
Cross Tabulation Based on Delay and User Type of Mode

Transportation			
Rarely Experiencing Delay	18 (27,69)	15 (23,07)	33 (50,77)
Often Experiencing Delay	16 (24,62)	16 (24,61)	32 (49,23)
Total	34 (52,31)	31 (47,69)	65 (100)

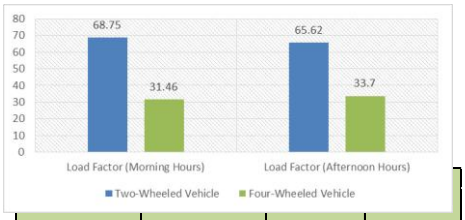
18 out of 34 public vehicle users or 27.69 percent of respondents in the category rarely experiencing delays (consisting of 4 male respondents and 14 female respondents), and or 16 people 24.62 percent (all women) included in the category often experienced delays.

While from 31 private vehicle users, there were 15 people or 26.07 percent of respondents rarely experiencing delays (consisting of 10 male respondents and 6 female respondents) and 16 or the remaining 24.61 percent (consisting of 9 male respondents and 6 female respondents) often experiencing delays. Data shows that public vehicle users (52.31 percent) are more disciplined than private vehicle users (47.69 percent).

5.1.2 Vehicle Load-Factors

Furthermore, in private vehicle users, there are 16 users of two-wheeled vehicles, where there is a passenger capacity of 32 passengers (including drivers). From the total passenger capacity, the capacity utilization of private users of two-wheeled vehicle users in the morning reached 68.75 percent (22 passengers from 32 passenger capacities) in the morning and 65.625 percent in the afternoon (21 passengers from 32 passenger capacities). The lower capacity utilization in the afternoon is because some respondents use the space for passengers for friends or wives to be delivered in the morning but have different home schedules in the afternoon.

Graph 5.1
Vehicle Load Factor



Meanwhile, for four-wheeled vehicle users, out of 15 users of four-wheeled vehicles, there are 89 passenger capacities. Of the total capacity, the capacity utilization of four-wheeled private vehicle users in the morning hours reached only 31.46 percent (28 passengers from 89 passenger capacity) and 33.708 percent (30 passengers from 89 passenger capacity) in the afternoon hours. Different numbers in the afternoon hours due to some of four-wheeled vehicles users of escorting several friends or partners to the home with the same work schedule. Nevertheless, the low level of capacity utilization of four-wheeled passengers shows the inefficiency of the use of four-wheeled vehicles on roads that consume road bodies by 1 unit of road volume compared to two-wheelers which use the road body by 0.25 units of road volume.

5.1.3 Histogram Departure Time Range

The author then attempts to describe the departure time based on vehicle use (public vehicle users versus private vehicle users). This is done to explain the variability of data that is more diverse and to explore whether there is a significant time difference between the time span departure between users of public vehicles (users) compared to private vehicles (non-users).

Table 5.2

Departure Time Range (*User*)

Before moving further, the author describes the departure time table according to the time of departure for respondents who often experience delays and respondents who rarely experience delays. Table 5.2 describes the range of departure times of public vehicle users. The histogram table clearly shows that respondents who often experience late due to true congestion have a longer departure time than respondents who rarely experience delays. Of the 18 people who rarely experiencing delays counted from 34 respondents using public vehicles, there were 4 respondents departing from 6:01 - 6:30 am, 11 respondents who rarely experiencing delays departed at 6:31 - 7:00, there were 3 respondents who departed at 7:01 - 7:30.

In addition, histogram images show respondents who often experiencing delays due to traffic jams or fail to set the departure time seen in the table having a longer departure time schedule. Out of 34 respondents using public transport, there were 16 public transport users who often experiencing delays. Of these account, even though there was one respondent who experienced an earlier departure delay (i.e. at 5:31 - 6:00), the data showed that the respondent experiencing more than four times late so that fines or penalties significantly affected their income. Furthermore, each of the 7 respondents departed at 6:31 - 7:00 and 7:01 - 7:30, and 1 other respondent departed at 7:31 - 8:00. This shows that respondents who often experiencing delays in moving over a longer period of time than respondents who rarely experiencing delays in the category of public vehicle users. In addition, respondents who often experiencing delays and respondents departed longer as shown in the picture experience daily congestion on the road for an average of 12.37 minutes compared to those who rarely experiencing delays accounting for 8.05 minutes per day.

The histogram table 5.3 shows that of the 31 respondents of private vehicle users, there were 15 respondents who rarely experiencing delays compared to 16 respondents who often experiencing

Departure Time Range	Rarely Experiencing Delay (User)	Often Experiencing Delay (User)	Total
5:01 - 5:30	0	0	0
5:31 - 6:00	0	1 (1,54)	1 (1,54)
6:01 - 6:30	4 (6,15)	0	4 (6,15)
6:31 - 7:00	11 (16,92)	7 (10,77)	8 (27,69
7:01 - 7:30	3 (4,62)	7 (10,77)	(15,38)
7:31 - 8:00	0	1 (1,54)	1 (1,54)
8:01 - 8:30	0	0	0
Total	18 (27,69)	16 (24,62)	(52,31)

delays due to traffic jams or failed to set their departure time. Out of 15 people who rarely experience delays, there is 1 person who departs at 5:31 - 6:00, there are 2 respondents who depart at 6:01 - 6:30, there are 6 respondents who depart at 6:31 - 7:00, and the remaining 6 respondents (from those who rarely experience delays) depart at 7:01 - 7:30.

Table 5.3
Departure Time Range (Non-User)

Departure Time Range	Rarely Experiencing Delay (Non-User)	Often Experiencing Delay (Non-User)	Total
5:01 - 5:30	0	0	0
5:31 - 6:00	1 (1,54)	0	1 (1,54)
6:01 - 6:30	2 (3,08)	1 (1,54)	3 (4,61)
6:31 - 7:00	6 (9,23)	6 (9,23)	(18,46)
7:01 - 7:30	6 (9,23)	5 (7,29)	(16,92)
7:31 - 8:00	0	3 (4,62)	3 (4,62)
8:01 - 8:30	0	1 (1,54)	1 (1,54)
Total	15 (23,08)	16 (24,62)	(47,69)

Meanwhile, there were 16 people out of 31 private vehicle users who often experiencing delays. Of these, 1 respondent departed at 6:01 - 6:30, there were 6 respondents who departed at 6:31 - 7:00, and 5 respondents departed at 7:01 - 7:30, there were 3 respondents who departed at 7:31 - 8:00, and 1 other respondent departed at 8:01 - 8:30. Although there are variability in office hours, private vehicle users fail to set their departure time to avoid congestion and eventually get a fine due to delays.

Both histogram departure time frames show different data variability. Where users of public vehicles have a tendency to departure times that are more equal or centered or inclined at certain times. The reasion behind this is because

the majority of public vehicle users (12 of 36 respondents using public transport vehicles) use office buses as a vehicle to travel to the office. However, on histograms data of public vehicle users there are public transport users who leave early but often experience delays, this is because "indicators of delay" refer to those who experiencing late more than 4 times so that fines or penalties affect their salary or benefits significant.

Meanwhile, the departure time of private vehicle users has more variability because private vehicle users can "arrange" their departure time. Respondents who departed earlier in the histogram picture of private vehicle users were those who lived outside of Makassar City (Maros and Takalar) so they departed earlier and were able to avoid congestion and not experience delays.

5.1.4 Delay and Its Effect on Revenue according to Delay

In this section, the author describes the delay of commuters based on the frequency of delay, lost income, and the percentage lost due to the delay. This is done by the author to describe how much lost expenditure due to the frequency of delays as proof that delays affect commuters' income.

In this research, one reason why delays occur is caused by several things: for public vehicle users, delays occur because respondents failed to seit their time of departure in morning hour, waiting time for public transportation (pete-pete) longer, and the transition of vehicle use from office bus vehicles that used daily as their vehicle to travel to the office into other public vehicles because buses are sometimes absent from delivery schedules. Meanwhile, private vehicle users who experience delays are mostly caused by the failure of private vehicle users to arrange the departure time so that they are late in entering the office.

Table 5.4
Lost Time based on Delay and Use of Transportation Mode (in minutes)

Minutes Delayed	User	Non-User	Total Time Delayed
Rarely Experiencing Delay	28,83	76,8	105,6333
Often Experiencing Delay	221,5625	185,625	407,1875
Total	250,3958333	262,425	512,8208

On the other hand, respondents who are rarely experiencing late or respondents who rarely experiencing delays in one month (four times and below) lose their respective productivity time for public vehicle users and private vehicle users for an average of 28.83 minutes and 76, 8 minutes. As shown in the histogram picture, those who are rarely late manage to set their departure time early so they rarely experience delays. While respondents of public vehicle users who often experience delays lose an average time of 221,5625 minutes in one month and respondents of private vehicle users lose an average time of 185,625 minutes in one month.

Table 5.5
Lost Income based on Delay and Use of Mode of Transportation (in Rupiah)

Lost Income	User	Non-User
Rarely Experiencing Delay	90000	157466.7
Often Experiencing Delay	285625	334500
Total	375625	491966.7

As a result of the late time, each respondent using public transportation and private vehicle users who often experiencing delays in losing their income is Rp.285,325. for users of public transport and for Rp.334,500. for private vehicle users within one month. While public vehicle users who rarely experiencing delay cost them about Rp. 90,000. and private vehicle users lost their revenue of Rp. 157,466.

Tables 5.6 and 5.7
Consumption and Income (in Rupiah)

Consumption	User	Non-User
Rarely Experiencing Delay	1.463.889	2.080.000
Often Experiencing Delay	1.643.750	2.000.000

Total Income	User	Non-User
Rarely Experiencing Delay	5.861.111	6.590.000
Often Experiencing Delay	5.196.250	5.834.625

In table 5.6 and 5.7 we can see the amount of consumption of respondents who are often experiencing delay late of private vehicle users respondents (Rp. 1,643,750) is greater than respondents who are rarely experiencing late (Rp. 1,463,889). Likewise, the total income of respondents who are often delay is lower

(Rp.5,196,250 and Rp.5,834,625) compared to respondents who are rarely experiencing delay (Rp.5,861,111 and Rp.6,500,000). However, this can be explained by the high income of the respondents who are often late in the second job and the income of their partners (Rp.4,493,750 and Rp.4,750,000) and compared to the income of respondents who are rarely late (Rp.2,772. 222 and Rp.4,466,666, see Table 5.8).

Table 5.8
Respondents' Other Income (in Rupiah)

Others Source of Income	User	Non-User
Rarely Experiencing Delay	2.772.222	4.466.666
Often Experiencing Delay	4.493.750	4.750.000

5.2 Data Analysis: Model Interpretation and Discussion on Results of Cost Regression and the Impact of Economic Losses due to Congestion in Makassar City

The research exercised by the author uses an analysis of cross-section data with a one-time range conducted in March 2019 with simultaneous equation analysis. This study examined 65 respondents (34 public vehicle users and 31 private vehicle users). Based on the results of the simultaneous equation regression using the AMOS application, the estimation results obtained in the following table:

Variable Relation			Coefficient	Probability	Explanation
X1	--->	Y1	944,196	***	Accepted
X2	--->	Y2	-70177,234	,374	Rejected
X2	--->	Y3	-402885,199	***	Accepted
u1	--->	Y1	83069,780	***	Accepted
u2	--->	Y2	222975,044	***	Accepted
u3	--->	Y3	319389,739	***	Accepted
X1	--->	Y2	625,049	,002	Accepted
Y1	--->	Y4	,366	,550	Rejected
Y2	--->	Y4	1,090	,007	Accepted
Y3	--->	Y4	-,396	,166	Rejected
u4	--->	Y4	730302,568	***	Accepted
X2	--->	Y4	-539661,237	,058	Accepted
Y2	--->	Y4	1,125	,004	Accepted

Table 5.9
Regression Results

5.2.1 Path Analysis: Delay (X1) and Its Effect on Consumption (Y4)

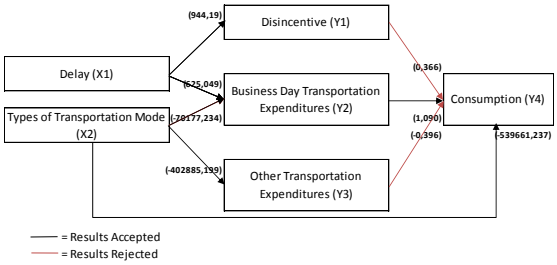
The regression results show that the delay (X1) has a magnitude of positive influence on the disincentive (Y1) of 944.19. The coefficient value of 944.19 shows that a one minute increase in delay will increase the disincentive of Rp.944.19 with a probability (0.00), or the results can be received. However, the results of regression X1 to Y4 through Y1 indicate the probability (0.019), or more than the level of significance (0.1) so that the results are not accepted. So, it is concluded that delay (X1) has no effect on consumption (Y4) through the disincentive path (Y1).

Delay (X1) also affects transportation expenditure on weekdays (Y2) with a magnitude of positive influence of 625,049. This means that, an increase in delay of 1 minute will increase transportation costs by Rp.625,049 with a probability (0,002), or results can be accepted. Furthermore, the regression results of X1 to Y4 through workday transportation expenditure (Y2) are 1.090. This result means that an increase in the cost of transportation on a working day of Rp.1 will increase consumption by Rp.1,090.

The increase in consumption due to the increasing delay in respondents contradicted the hypothesis that was built. However, Sweet (2013) explained that bottlenecks will affect economic growth through productivity growth rates will only occur when congestion crosses the threshold for 35 to 37 hours of travel per year, with other observational data in similar studies showing 85 hours of delay time per year (data on observations in 1993 and 2008). Meanwhile, the time delay experienced by respondents is 23.25 hours per year. This shows that at

the 23.25 hour delay per year, congestion has not negatively affected respondents' consumption in Makassar City. The second factor is the presence of additional income at the household level or other assistance to individual respondents. On average, respondents have additional income outside the main job (as well as from their partners) in the amount of Rp.4,056,923. Thus, congestion that creates delays and disincentives is not enough to influence (reduce) respondents' consumption.

Graph 5.2
Theoritical Framework and Results of Regression



5.2.2 Path Analysis: Types of Transportation Mode (X2) and Consumption Amount (Y4)

The regression results indicate that the type of use of transportation mode (X2) on working day transportation expenditure (Y2) shows results that are not significant with probability (0.374), or the results are rejected. So, it can be concluded that there is no difference in consumption (Y4) based on differences in the types of use of transportation modes (X2) through daily transportation expenditure (Y2).

The use of the type of transportation mode (X2) on other transportation expenditures (Y3) shows a negative difference of -40,2885,199. This means that, public transportation users have other transportation expenditures (vehicle ownership and transportation expenses outside of working days) with Rp. 402885,199 lower. However, with probability (0.166), the effect of other transportation expenditures on consumption is rejected. So, it can be concluded that there is no difference in consumption (Y4) based on the use of the type of transportation mode (X2) through the Y3 variable path.

Respondents who use public transportation also show differences in consumption (Y4) with a difference in magnitude of -539661,237. These results indicate that users of public transportation modes have lower consumption of Rp. 539,661,237 compared to private vehicle users. The lower consumption of respondents of public vehicle users compared to private vehicle users which is inversely proportional to the hypothesis can be explained through the lower level of average income of public vehicle users of Rp.5,548,235,294 compared to the average income level of private vehicle users of Rp. 6,200,129,032.

VI CONCLUSION

6.1 Conclusions

From this study, the authors obtained several conclusions as follows:

1. Delay (X1) has a magnitude of positive influence on the disincentive (Y1) of 944.19. This value indicates that the increase in delay caused by congestion increases the disincentive of Rp. 944.19. However, this does not reduce the consumption of respondents because of the presence of other respondents' income obtained from the income of the second job and the income of the respondent's spouse.
2. There is no significant value from the delay regression (X1) to Y4 (consumption) through the disincentive variable path (Y1).
3. Delay (X1) experienced by respondents increased transportation spending on working days (Y2) with a magnitude of positive influence of 625,049. This means that, an increase in delay of 1 minute will increase transportation

costs by Rp. 625,049. So, it can be concluded that congestion that creates delays can increase the transportation costs of respondents.

4. The result of the delay regression (X1) to Y4 through workday transportation expenditure (Y2) is 1.090. This result means that an increase in the cost of transportation on a working day of Rp.1 will increase consumption by Rp.1,090. This is inversely proportional to the theory that delays reduce consumption. However, this can be explained by the additional income of the respondent (other than the respondent's main job plus the couple's income) with an average value of Rp.4,056,923. Sweet's (2013) study also explained through his research that congestion would only affect economic growth when it crossed the threshold for 35 to 37 hours of travel per year, with other observational data in similar studies showing 85 hours of delay per year (1993 observation data and 2008). Meanwhile, the time delay experienced by respondents in this research is 23.25 hours per year. This shows that at the 23.25 hour delay per year, congestion has not negatively affected respondents' consumption in Makassar City.
5. The regression results indicate that the type of use of transportation mode (X2) on working day transportation expenditure (Y2) shows a non-significant result or the result is rejected. So, it can be concluded that there is no difference in consumption (Y4) based on the use of transportation modes (X2) through the daily transportation expenditure line (Y2).
6. The type of use of transportation mode (X2) for other transportation expenditures (Y3) shows a negative difference of -40,2885,199. This means that, public transportation users have other transportation expenditures (vehicle ownership and transportation expenses outside of working days) of Rp. 402885,199 lower than private vehicle users. These results indicate that the expenditure of public transport users is lower than in outside working days.
7. There is no difference in consumption based on the use of the type of transportation mode through other transportation expenditures (Y3) on consumption (Y4).
8. Respondents who use public transportation also show differences in consumption (Y4) with the amount of difference of -539661,237. These results indicate that users of public transportation modes have lower consumption of Rp. 539,661,237 compared to private vehicle users. This result is inversely proportional to the hypothesis but can be explained through the lower level of income of the average public vehicle user of Rp.5,548,235,294 compared to the average level of income of private vehicle users of Rp. 6,200,129,032.

9. As a result of the delay experienced by respondents, each respondent using public transport and private vehicle users who often experience delays in losing their income is Rp.285,625. (5.49 percent of revenue) for public vehicle users and amounting to Rp.334,500. (5.733 percent of revenue) for private vehicle users. On the other hand, those who rarely experience delays lose Rp. 90,000. (1.53 percent) for public vehicle users and amounting to Rp.157,466. (2.38 percent) for private vehicle users.
10. Low level of vehicle capacity utilization on four wheels which reached 31.46 percent (28 passengers from 89 passenger capacity) in the morning and 33,708 percent (30 passengers from 89 passenger capacity) in the afternoon showed the inefficient use of four-wheeled vehicles that swallowed a lot body of the road compared to the Maxi bus which swallowed four bodies of road. At the same level of capacity utilization, the utilization of passenger capacity of 30 percent of the Maxi bus can accommodate 30 passengers by bus which swallows the equivalent of up to four four-wheeled vehicles which at a capacity of 30 percent only hold up to 12 people. This shows the maximization of the Trans-Makassar Bus can reduce the use of four-wheeled vehicles and can further reduce congestion.
11. Both respondents of public vehicle users and users of public vehicles both indicated that respondents who rarely experienced late departures were earlier than respondents who often experienced delays. It can be concluded that those who are late then depart at the peak hour which makes the respondents stuck in traffic jams which makes them often experience delays and increase fines on the respondents.
12. Urban economic growth encourages increasing urban population. This creates demand and encourages the growth of the property sector in the suburbs and in the satellite areas of the city of Makassar. The growth of the property sector is mushrooming both on the outskirts of Makassar and outside the city of Makassar. When this is not immediately responded by improving the quality of Trans-Makassar Bus-transportation services or public transportation measures, there will be a density of vehicles due to congestion which will ultimately hamper Makassar's economic activity.

6.2 Policy Recommendations

From several discussions conducted by the author and through reading the literature, the author describes several policies to reduce various problems caused by congestion.

1. Delays that increase fines on respondents have proven didnt reduce the respondents' consumption. This is because the respondents have a other income sources than their main income. The low level of fines in some companies

also cannot change the habit of late respondents. Thus, the author recommends increasing late fines on employees to improve employee performance. Furthermore, the Trans-Makassar Bus service scheme needs to be introduced and imporved as an incentive for the use of buses that can reach various classes of society. The bus service program scheme can be found on the Trans-Jakarta Bus under the name "JakLingko" program.

2. The delay experienced by respondents increased the transportation expenditure of the respondent's working day. This means that, the increase in delay caused by congestion experienced by respondents influences the transportation expenditure on working days. In order to avoid delays and increase transportation expenses, the author recommends increasing the capacity of bus transportation in offices and improved office bus facilities and infrastructure with better quality and time improvement. Trans-Makassar Bus facilities and infrastructure also needs to be improved in order to increase market demand, especially in the certainty of departure schedules that many respondents complain about and expansion of services to reach more access to services, markets, and potential consumers.
3. Public transportation users have other transportation expenditures (vehicle ownership and out-of-business transportation expenses) lower by Rp. 402885,199. These results indicate that the expenditure of public transport users is lower than working days. This shows that the use of mass transportation modes is far less costly than the use of private transportation modes. Increasing the quality of service for mass transportation modes can encourage the use of these services so that respondents and the wider community can have lower expenditures for transportation expenditures and have greater income to consume, save or invest.
4. The low level of vehicle capacity utilization on four wheels which reached 31.46 percent (28 passengers from 89 passenger capacity) in the morning and 33,708 percent (30 passengers from 89 passenger capacity) in the afternoon showed the inefficient use of four-wheeled vehicles that swallowed a lot the road body compared to the Maxi bus which swallowed four road bodies (with the same capacity can accommodate up to 30 people per bus which is equivalent to four vehicles that only hold 12 passengers). Promoting the use of mass transportation modes can reduce the density of vehicles that fill the streets a lot and break down congestion. This can also be done through increasing vehicle ownership taxes.
5. The growth of the property sector on the outskirts of Makassar as well as in the satellite areas of Makassar City increases the

commutation activities of workers which if not immediately mitigated by improving the quality of TransMakassar Bus-transportation services, will give drive congestion which will eventually hamper the city's economic activities Makassar. The author recommends improving the quality of bus services and infrastructure on Str. Alauddin and Str, Perintis Kemerdekaan which serves as the main road in Makassar City. Furthermore, a separate lane (dedicated lane) for buses is needed to ensure the departure and arrival time for buses so that they can encourage the utilization of Bus Rapid Transportation.

6. Poor management of Bus-based Mass Transportation in Makassar City is caused by poor management and lack of incentives for service users. For example, the absence of a dedicated line or special line makes this service almost no difference with the use of private vehicles or other modes of transportation. In addition, the absence of a fixed schedule makes this service a disincentive for service users due to the lack of a bus fleet monopolized by PT. Damri. Presenting a dedicated line or special line and the departure schedule for each terminal can attract new service users. In addition, the expansion of services can increase the utilization of this mode of transportation.
   Furthermore, a scheme with a more attractive price (with subsidies by the government), which is IDR 3,500 - IDR 4,500 can increase the use of this service. Primarily, the price of the lower limit for students and the upper limit price for workers and employees. PT. Damri South Sulawesi can learn a scheme similar to PT. Trans-Jakarta through its program, JakLingko. In addition, synergy and sense of belonging are needed in the transportation program between elements and stakeholders to achieve mutual interests.
7. The amount of vehicle use in Makassar City for both school workers and students can be reduced by various schemes. The scheme is like prohibiting the carrying of vehicles to schools by various schools. However, these various methods are "tricked" by the students by parking their vehicles elsewhere near the school. Thus, this method is less effective if there is no participation from parents students who are also burdened with the purchase of these vehicles. The next scheme is the expansion of the "Passikola" public transport scheme, which is free public transport services for elementary school students by the Makassar City Transportation Agency (Dinas Perhubungan Kota Makassar). In further research conducted by the Makassar City Transportation Agency, feedback from parents of users of this service felt helped by the reduced intensity of time that had to be spent to traveling their

children to so it also help with reducing their transportation costs for less travel, it could save time at work and reduce work delay. This improved scheme, to at least junior high school, can save various lines of parents' expenditure, increase revenue by reducing delays, improve air quality by reducing private vehicle users on the road, reduce congestion and reduce delays for other road users;

8. There are also other schemes and suggestions. Even though the improvement in the quality of alternative modes of transportation can reduce the intensity and density of highways, this can, in theory, be temporary. And, in the end, the use of the highway will again increase with the use of private vehicles. This happens because, the decrease in traffic density will attract users of other modes of transportation to take advantage of these conditions, so that in the end it gives birth to a density of return traffic which was initially avoided. This cycle is then reversed by the increasing demand for alternative transportation services due to congestion, and continues to be the same cycle. So, a comprehensive scheme is needed so that people are interested in using public transportation. Some of these are as follows, increasing vehicle tax with progressive tax for each additional vehicle owned, holding a three in one scheme to increase vehicle capacity utilization to avoid ineffective vehicle use and limit the number of vehicle ownership. Although restrictions on the number of vehicle ownership sounds irrational and can limit government tax revenues, in fact, monthly losses due to congestion can equal the government tax income for one unit of four-wheeled vehicles. Thus, this limitation can rationally reduce congestion, improve the welfare of employees and workers, by avoiding congestion. In addition, the existence of bus-based mass transportation services must be open or where service users can provide feedback as a way to improve service quality more efficiently and effectively. Of course, bus-free and schedule-based mass transportation services, because the operating costs are relatively cheap, are non-negotiable.

Daftar Pustaka

Bakri, Reza Fauzi dkk. 2016. Disparitas Pembangunan antar Wilayah Makassar, Maros, Gowa, dan Takalar.

Ballas, Dimitris et.al. 2013. A Spatial Microsimulation Approach For The Analysis Of Commuter Patterns: From Individual To Regional Levels Elsevier: Journal of Transport Geography.

Basiago, A. D. 1999. Economic, Social, and Environmental Sustainability In Development Theory And Urban Planning Practice. Boston: Kluwer Academic Publishers.

Basuki, Imam dan Siswadi. Tanpa tahun. Biaya Kemacetan Ruas Jalan Yogyakarta. Yogyakarta: Universitas Atma Jaya Yogyakarta.

Brotodewo, Nicolas. 2010. Penilaian Indikator Transportasi Berkelanjutan Pada

Kawasan Metropolitan di Indonesia. Jurnal Perencanaan Wilayah dan Kota.
Crampton, Graham R. 2003. Economic Development Impacts of Urban Rail Transport. ERSA Conference.
Duranton, Gilles and Puga, Diego. 2013. The Growth of Cities.
Dwiatmoko, Hermanto. 2018. Development of Railway Urban Transportation: Case Study Jabodetabek.
Eddington, Sir Rod. 2006. The Eddington Transport Study: The Case For Action. Norwich: HM Treasury.
Fujita, Masahisa. 1990. Urban Economic Theory. Canada: Cambridge University Press.
Hartgen, David T., Fields, Gregory. 2009. The Effect of Traffic Congestion on Regional Economic Performance. Reason Foundation.
Hauser, M. Philip, dkk. 1985. Penduduk dan Masa Depan Perkotaan. Jakarta: Yayasan Obor Indonesia.
Ivanovich, Augusta. 2003. Teknik Pengumpulan dan Analisis Data Kualitatif.
Krugman, Paul. 1991. Increasing Returns and Economic Geography. Chicago: University of Chicago.
Litman, Todd. 2018 Evaluating Public Transit Benefits and Costs. Victoria Transport Policy Institute.
Manning, Chris dkk. 1996. Urbanisasi, Pengangguran, dan Sektor Informal di Kota. Jakarta: Yayasan Obor Indonesia.
Marius, Brülharty and Sbergamiz, Federica. 2008. Agglomeration and Growth: Cross-Country Evidence.
Miranda, Hellem De Freitas and Rodrigues Da Silva, Antônio Nélson. 2010. Benchmarking Sustainable Urban Mobility: The Case Of Curitiba, Brazil. Lisbon: WCTR.
Morlok, Edward K. 1988. Pengantar Teknik dan Perencanaan Transportasi. Jakarta: Penerbit Erlangga.
New Zealand Ministry of Transport. 2014. Contribution Of Transport To Economic Development: International Literature Review with New Zealand perspectives. New Zealand: Ministry of Transport.
Olsson, Lars E. et. al. 2011. Relationship Between Satisfaction with Daily Travel and Subjective Well-Being in Three Urban Areas in Sweden. Karlstad University Studies.
Polese, Mario. 2005. Cities and National Economic Growth: A Reappraisal. Urban Studies.
Prayogi, Hari. 2011. Kemacetan pada Pusat-Pusat Keramaian di Kota Jakarta Pusat. Depok: Universitas Indonesia.
Reksohadirprodjo, Sukanto dan Karseno, A.R. 1994. Ekonomi Perkotaan. Yogyakarta: BPFE.
Sarker, Sandip et.al. 2016. Urban Population and Economic Growth: South Asia Perspective. European Journal of Government and Economics.
Saut, Sagala dkk. Tanpa tahun. Ketahanan Energi Perkotaan dan Pembangunan Rendah Karbon di Metropolitan Indonesia.
Stutzer, Alois and Frey, Bruno S. 2004. Stress That Doesn't Pay: The Commuting Paradox. Discussion Paper Series.
Sugiyanto, Gito. 2012. Permodelan Biaya Kemacetan Pengguna Mobil Pribadi Dengan Variasi Nilai Kecepatan Aktual Kendaraan. Jurnal Transportasi.
Sutanudjaya, Elisa dkk. 2011. Kata & Fakta Jakarta. Jakarta: RCUS.
Sweet, Matthias. 2013. Traffic Congestion's Economic Impacts: Evidence from US Metropolitan Regions.
Tamin, Ofyar Z. 2000. Perencanaan dan Permodelan Transportasi. Bandung: Penerbit ITB.
Tripathi, Sabyasachi. 2012. Large Agglomerations and Economic Growth in Urban India: An Application of Panel Data Model. MPRA Paper.
Weisbrod, Glen et. al. 2001. Economic Implications of Congestion. Washington: National Cooperative Highway Research Program.
Yahya, Muhammad Amri. Tanpa tahun. Tata Ruang dan Angkutan Umum di Jabodetabek. Ruang Jakarta Centre for Urban Studies.

Lainnya:
http://tataruang.atr-bpn.go.id/Bulletin/upload/data_artikel/potensi%20tiga%20kawasan.pdf (diakses 27 Desember, 2018)
http://koran-sindo.com/page/news/2016-03-28/0/8
https://issuu.com/rujak/docs/tata_ruang_dan_angkutan_umum_jabode
https://www.citylab.com/transportation/201

3/10/how-traffic-congestion-impacts-economic-growth/7310/
https://www.weforum.org/agenda/2017/06/this-city-found-a-clever-way-to-get-rid-of-cars-and-it-isn-t-a-ban-09e6e018-84d0-4814-9f0e-37085eaa9218/
https://tirto.id/membeli-mobil-hanya-untuk-diparkir-chYg
https://web.facebook.com/JSCLounge/posts/inilah-perbandingan-panjang-jalan-yang/1974704296151136/?_rdc=1&_rdr
https://www.vice.com/id_id/article/ezxxw7/kami-menemui-ahli-memastikan-upaya-mengurai-kemacetan-jakarta-bukan-omong-kosong
https://www.spssindonesia.com/2019/01/cara-membaca-nilai-r-tabel-product-moment.html
https://www.statistikian.com/2012/08/korelasi.html