

## Recent Change and Improvement of Urban Public Transportation in Greater Jakarta

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**Abstract:** Plan and measures to improve public transport performance in Greater Jakarta had long been on the agenda since early 1970's. Yet, changes and improvement are limited and implementations are very slow. As the rate of urbanisation continue to increase, Greater Jakarta now faces a very serious problem, namely insufficient infrastructure to cope with the demanding urban mobility with high number of population and increasing urban sprawl. One of the option is the promotion of public transportation. However, public transportation means has not become the public preferences. To further analyze why changes in public transportation services are so difficult to deliver, an analysis from several literatures and media are conducted. This study gather information regarding Transjakarta Bus Rapid Transit and Greater Jakarta Commuter rail performance from various sources especially printed and online media in the past ten years. These data are then processed to text mining software.

**Keywords :** Public Transportation, Media Analysis, Transjakarta BRT, Greater Jakarta Commuter Rail

### 1. INTRODUCTION

In todays live, media plays a huge role as a source of information and have a big influence in forming public perception. considering the influence media has, it can be used as a basis to know the public perception on certain issue. The issue which will be presented here is regarding transport planning and policy in Greater Jakarta.

Greater Jakarta or known as Jabodetabek is a region in Java, Indonesia which consist of five cities, namely Jakarta, Bogor, Depok, Tangerang, and Bekasi. These five cities form a metropolitan area with Jakarta as its centre. These circumstances make Jakarta plays a very important role for Indonesia and its citizens. Many activities, for instance financial service, trade, manufacturing, and other activities are concentrated here. As a a result huge demand for employee and trigger urbanisation as well as high urban mobility. According to population census in 2010, this metropolitan area is inhabited by approximately 27,957,104 people with density at 4,373.8/km<sup>2</sup>. This demographic characteristic makes Greater Jakarta become the second largest megalopolis in the world. The condition, therefore, pose many challenge to Greater Jakarta and one of the challenge which need to be answered is in the urban mobility problems.

Solutions for urban mobility is related to public transportation and its policy. In Jakarta and its metropolitan cities, a number of public transportation mode has been operating for years, namely Transjakarta BRT and KRL commuter line. However, are these public transport mode attractive to the passenger? and what are passenger perception regarding those two mode? This paper will analyze public perception for those two modes. The analysis will be conducted by using two softwares, namely KH Coder and Lexalytics Salience. From these softwares, issues regarding

Transjakarta BRT and KRL Commuter Line which become main concern for passenger can be known and can become a consideration for future public transport improvement.

## **2. GREATER JAKARTA TRANSPORTATION PROBLEMS**

As stated above, Greater Jakarta now have to provide sufficient infrastructure to fulfill the need of its citizens which is not an easy job to be done. One of which is transportation infrastructure.

With the number of population which stated above, it is estimated that the trip rate of Jakarta and its greater area is approximately 41,935,656 trip every day. Consequently, people need transportation mode to accomodate their need for trip. The lack of adequate transportation facility then encourages people to use private vehicle instead of public transportation. Based on the data from UITP (2001), trips in Jakarta are dominated by passanger car, namely 59 % which followed by bus, namely 36%. Taxi and bus only got 3% and 2% respectively. Furthermore, this condition is compounded by the uncontrolled increase of urban sprawl which lengthen the trip distance and results in heavy traffic congestion and other impact associated with it, for instance the waste of time, energy, environment quality degredation, and threat to business activity. Every year, the estimated loss of Jakarta because of traffic congestion city is around 68 trillion rupiah (US \$ 5.7 millions). The impact also can be seen in the deteriorating average travel time in the city, which is from 16.8 kph in 2010 to 5-8 kph recently.

Measure in terms of constructing new (toll) road infrastructure can be regarded as unsustainable. Past experience from developed country shows that more roads will result in more congestion as it triggers more private vehicle ownership and use. People need to be led by policy maker to change their behaviour and shift their preference from private to public transport, especially through public transport revitalization and network development. However, the existing public transport services in Jakarta, especially Transjakarta bus rapid transit system alone still cannot alleviate the worsen traffic congestion, while renovation to increase commuter rail capacity also very slow in the implementation, not to mention the agenda for MRT development is even a slower moving snail.

## 2.1 Transjakarta Bus Rapid Transit

Transjakarta is a Bus Rapid Transit system operating in Jakarta since 2004. Up until now, Transjakarta has been operating in 12 corridors and regarded as the BRT system with longest route in the world.

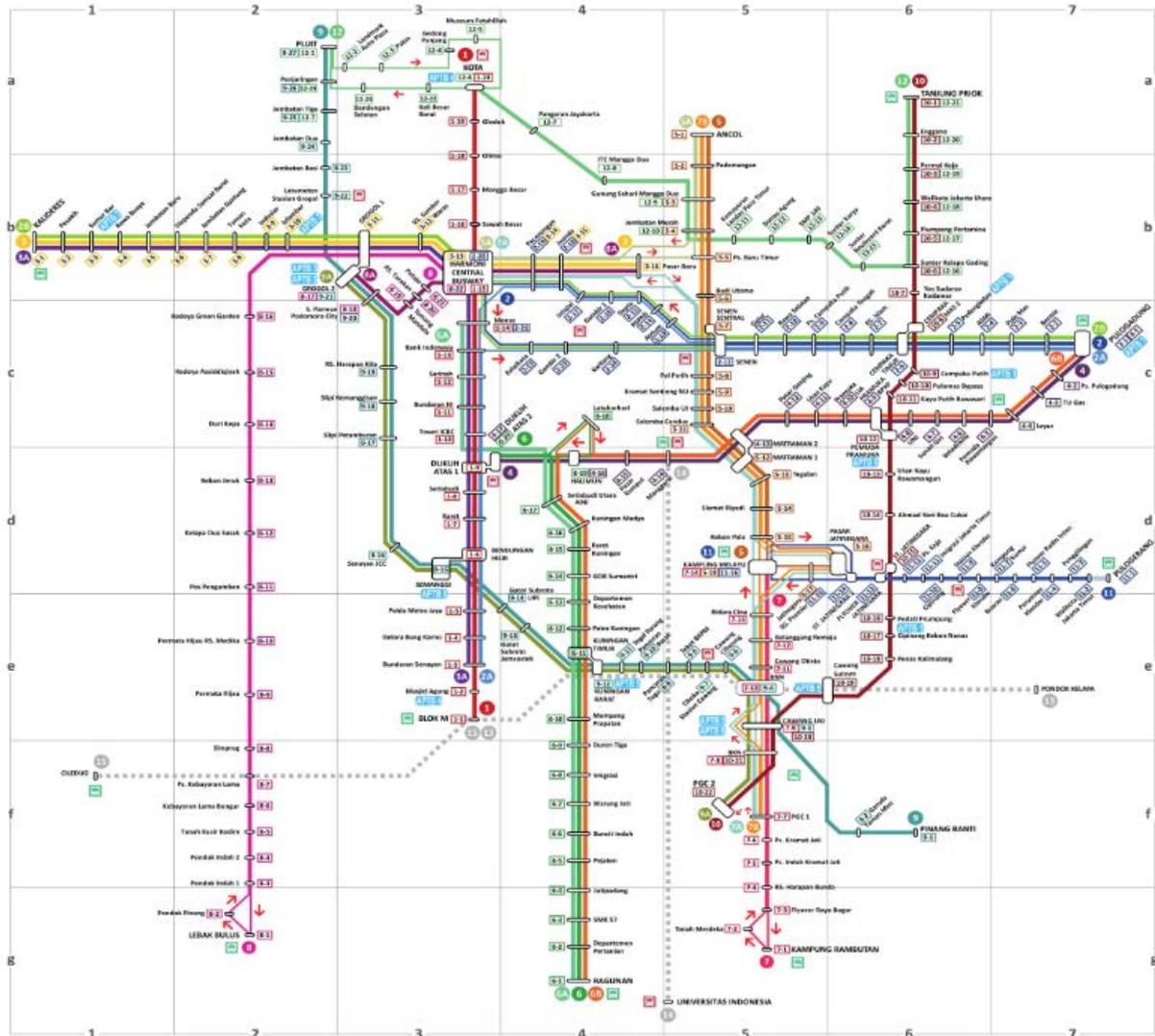


Figure 1. Transjakarta BRT Route Map  
(Source : transjakarta.co.id)

until 2014, daily ridership of Transjakarta is more than 350,000 passengers per day and expected to rise to 1 million daily ridership on 2017. Despite of the record, there are some issues regarding Transjakarta which need to be highlighted.

Based on the “Terminal Evaluation of the UNEP / GEF Project, Bus Rapid and Pedestrian Improvement Project in Jakarta” study by United Nation Environmental Program, a survey was conducted in January 2014. BRT Transjakarta passengers were posed a question regarding passenger preferred mode of transport if BRT Transjakarta does not exist. It is interesting to note the answers that most Transjakarta passengers i.e.71.9 % will ride the former conventional public transport they used to ride, and will use cars and motorcycle around 5.3% and 8.9% respectively. Also noted that these private motorists can be either drivers or passengers, see Figure 2.

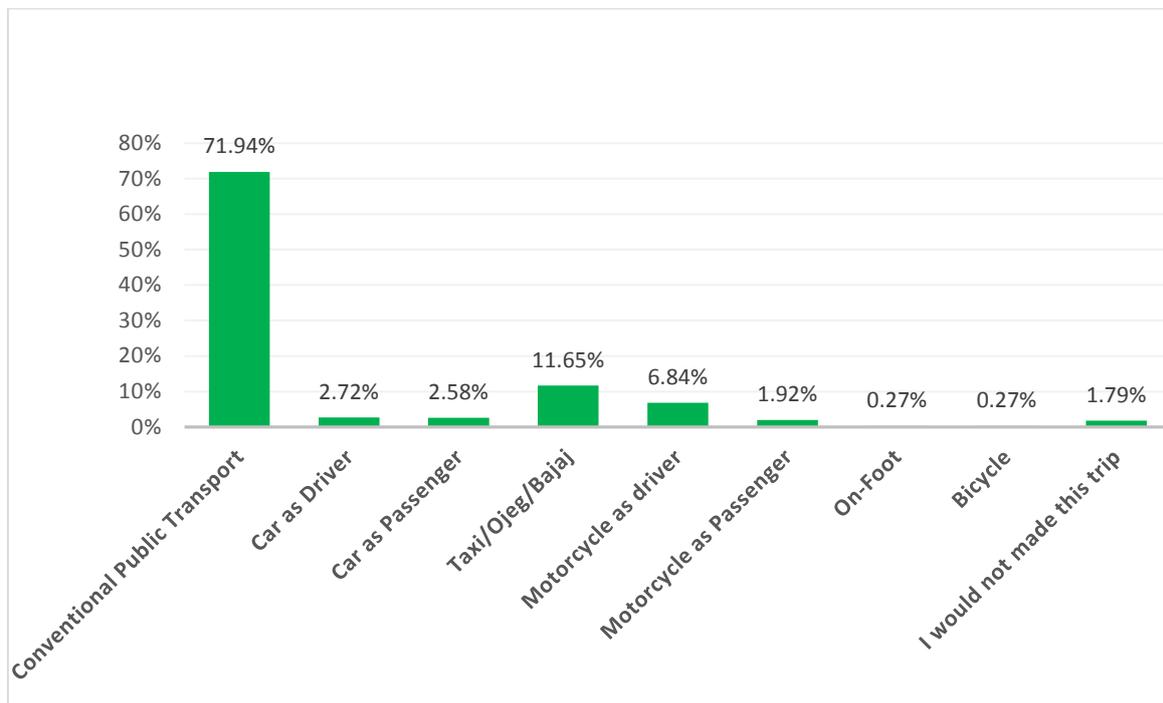


Figure 2. BRT Transjakarta Users Mode Choice if Transjakarta Does Not Exist

In terms of passenger income, the data is shown by figures below

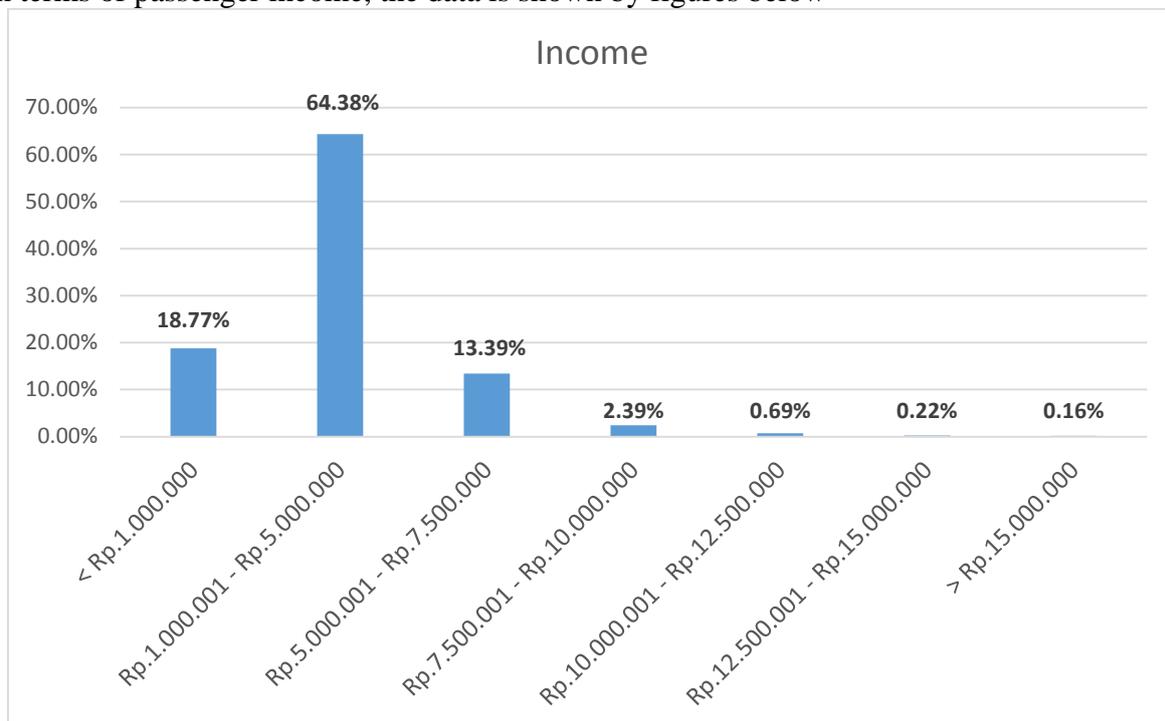


Figure 3. BRT Transjakarta Users Income

This means that Transjakarta bus rapid system has not given significant contribution yet to alleviate traffic congestion because it does not divert many private vehicle users to public transport. This justification can be seen by the high number of public transport user if

transjakarta does not exist and the high number of transjakarta passengers which have low income (income between Rp.1.000.001 – Rp.5.000.000).

Moreover, there are another issues of Transjakarta which need to be addressed, namely:

1. Irregular or unpredicted headway as Transjakarta bus lane is still disturbed by congestion and still unsterile from private car or motorcycle.
2. The technical feasibility of Transjakarta bus fleet as 9 fire accident occurred on Transjakarta buses from January to September 2014.
3. Refuelling of Transjakarta buses only conducted on certain gas station and no mobile gas station available in every corridor. This condition then causes the absence of Transjakarta bus fleet during peak hour.

In terms of consumer satisfaction, a survey was conducted on January 2014. Consumer satisfaction were known by asking to passengers their satisfaction level on Transjakarta service. The satisfaction level was divided into five categories, namely: very unsatisfied, unsatisfied, adequate, satisfied and very satisfied. Passengers were asked to choose on of the categories based on their perception. The data is shown by the graph below

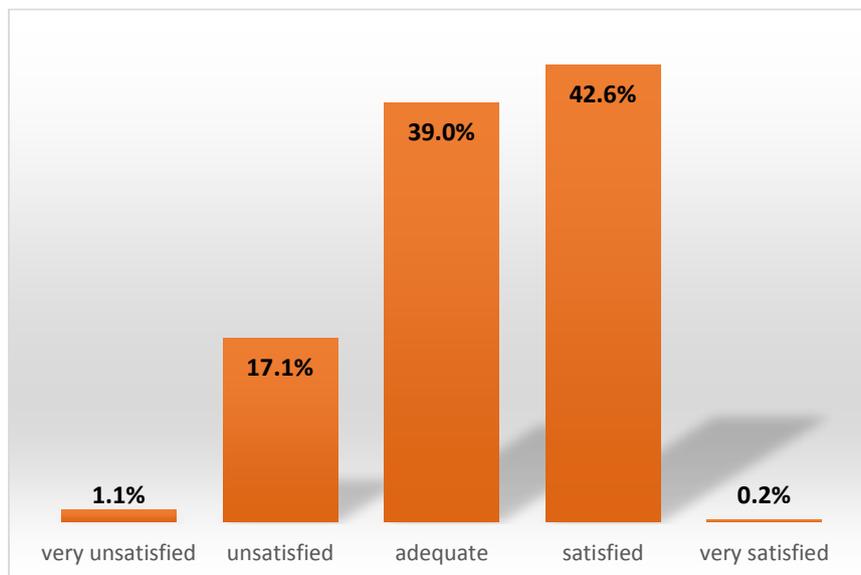


Figure 4 Transjakarta Consumer Satisfaction

From the graph, it can be seen that most of Transjakarta passenger are satisfied by Transjakarta Service. However, it should be noted that satisfaction is a matter of perspective. The service may satisfy the current Transjakarta passenger but may be not satisfy enough other people who decide not to use Transjakarta yet.

## 2.2 Greater Jakarta Commuter Rail

KRL Commuter Jabodetabek or Jabodetabek electrified rail is a mass rapid transportation system which become a mode for commuters in Jakarta, Bogor, Depok, Tangerang, and Bekasi. Currently, the system consists of six integrated lines which connects Jakarta and its greater area. The railway line began its operation on 6th april 1925 as Dutch Colonial Railways. On year 2000, the railway line started the commuter system and operated under PT KA and from 2008 until now, the commuter line operates under PT KAI Commuter Jabodetabek. Until 2014, the

ridership of Jabodetabek Commuter rail is around 631.617 passengers per day and expected to increase to 1.2 million daily ridership in 2019.

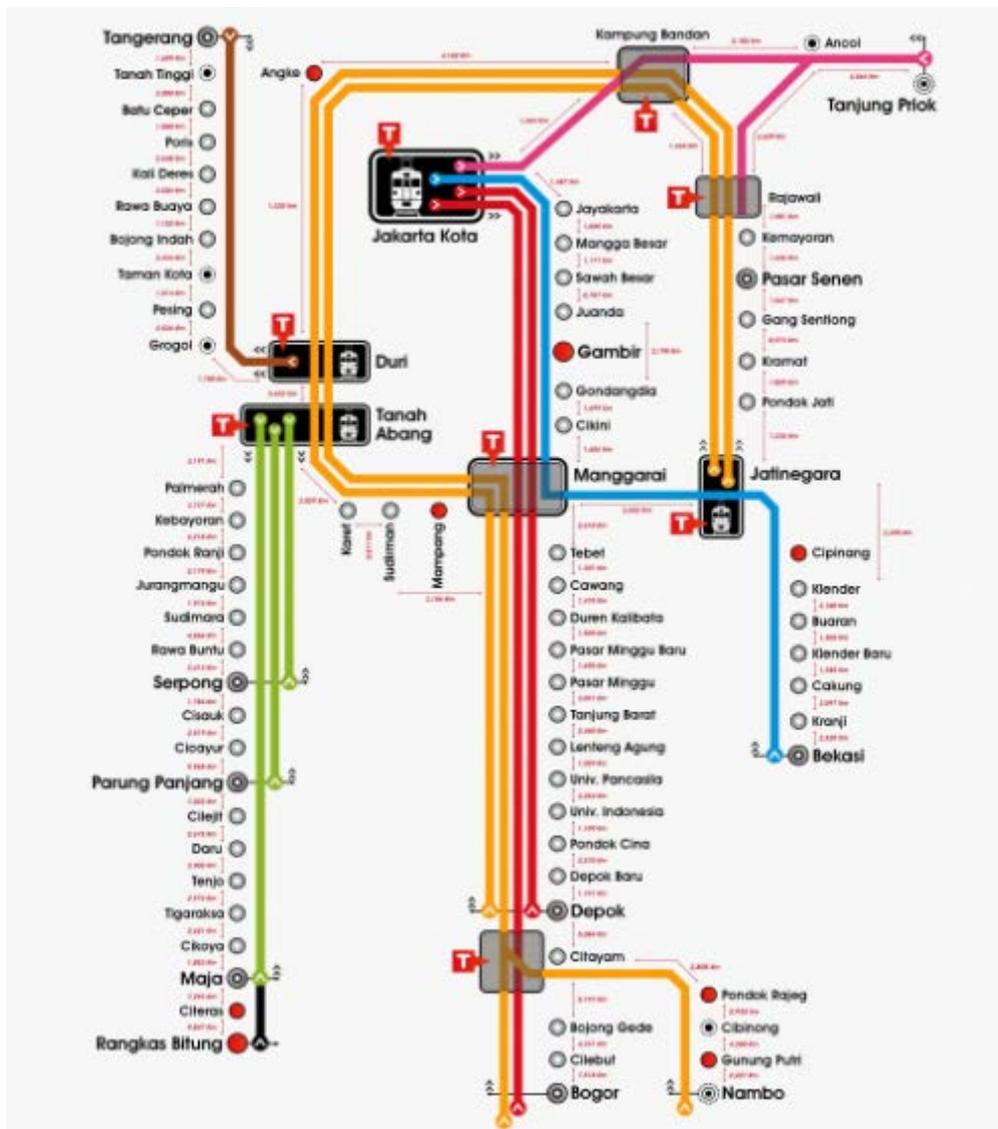


Figure 5. KRL Commuter Line Route Map  
(Source : krl.co.id)

The commuter rail today faces some technical challenge which need to be adressed in order to improve public transportation mode in Greater Jakarta. One of the main issues is the insufficient capacity of the train as the number of passenger continue to grow. The other issues are the service which regarded not optimal yet, deteriorating supporting infrastructure, and pure tickets without the Public Service Obligation.

Based on “Passenger Satisfaction Analysis of Jabodetabek Pakuan Express Service Quality” by Faculty of Management and Economic – Institut Pertanian Bogor year 2011, Regarding KRL commuter line consumer satisfaction for Pakuan Bogor – Jakarta line, the rating is shown by Consumer Satisfaction Index (CSI). The CSI rating can be seen as follows:

- a. 0.81 - 1.00 Very Satisfied
- b. 0.66 - 0.89 Satisfied
- c. 0.51 - 0.65 Moderately Satisfied
- d. 0.35 - 0.50 Less Satisfied

e. 0.00 - 0.34 Not Satisfied

Based on calculations, the CSI for Jabodetabek Commuter rail is 0.476. This result shows that the passenger of Jabodetabek Commuter rail is less satisfied. This low achievement of Jabodetabek Commuter rail is due to:

- a. Gap between passenger expectation and management perception. The management does not understand clearly what passenger want
- b. Gap between management perception and service quality specification. The management perception about passenger expectation might be right, but it does not reflect the services sandard published by the government.
- c. Gap between service quality specification with the realization of service. The commuter rail management staffs are not well trained to fulfill and implement the standard.

### **3. MEDIA ANALYSIS STUDY**

One of method which can be used to monitor the development of public transportation is by analyzing the media. For service sector, two factors play a very important role. One is the quality of the service itself and the other is the public perception of the service quality. This means that public perspective cannot be neglected and must be taken into account in terms of improving public preference to certain product. Nowadays, media give big influence in shaping people perception on many things one of which is service sector. This concept also apply for public transportation service. To know further about people perception on Greater Jakarta public transportation caused by the media, a qualitative research is conducted. The study can also give information about the development of Greater Jakarta public transportation overtime. This study will highlight news from the media which are related to Jabodetabek Rail Commuter and Transjakarta BRT. Media news for this analysis are choosen from different national and local newspaper which the writer regard as reliable media. Those media are Kompas, Tempo, Detik, Jakarta Post, etc.

### **4. METHODOLOGY**

The media analysis of KRL Commuter Line and Transjakarta BRT began with data gathering from Indonesia local newspaper. Those local newspaper are The Jakarta Post, Kompas, Detik, and other online newspaper. The data gathered then will be processed by text mining tools / software , namely KH coder and lexalytics salience. KH coder can be used to analyze and interpret the general content of articles as well as its sentiment, while Lexalytics Salience can be used to interpret articles sentiment in a more detailed analysis. Based on analysis result from both tools / softwares, the media view on both Jabodetabek Commuter rail and Transjakarta will be concluded. The process can be seen on the following picture:

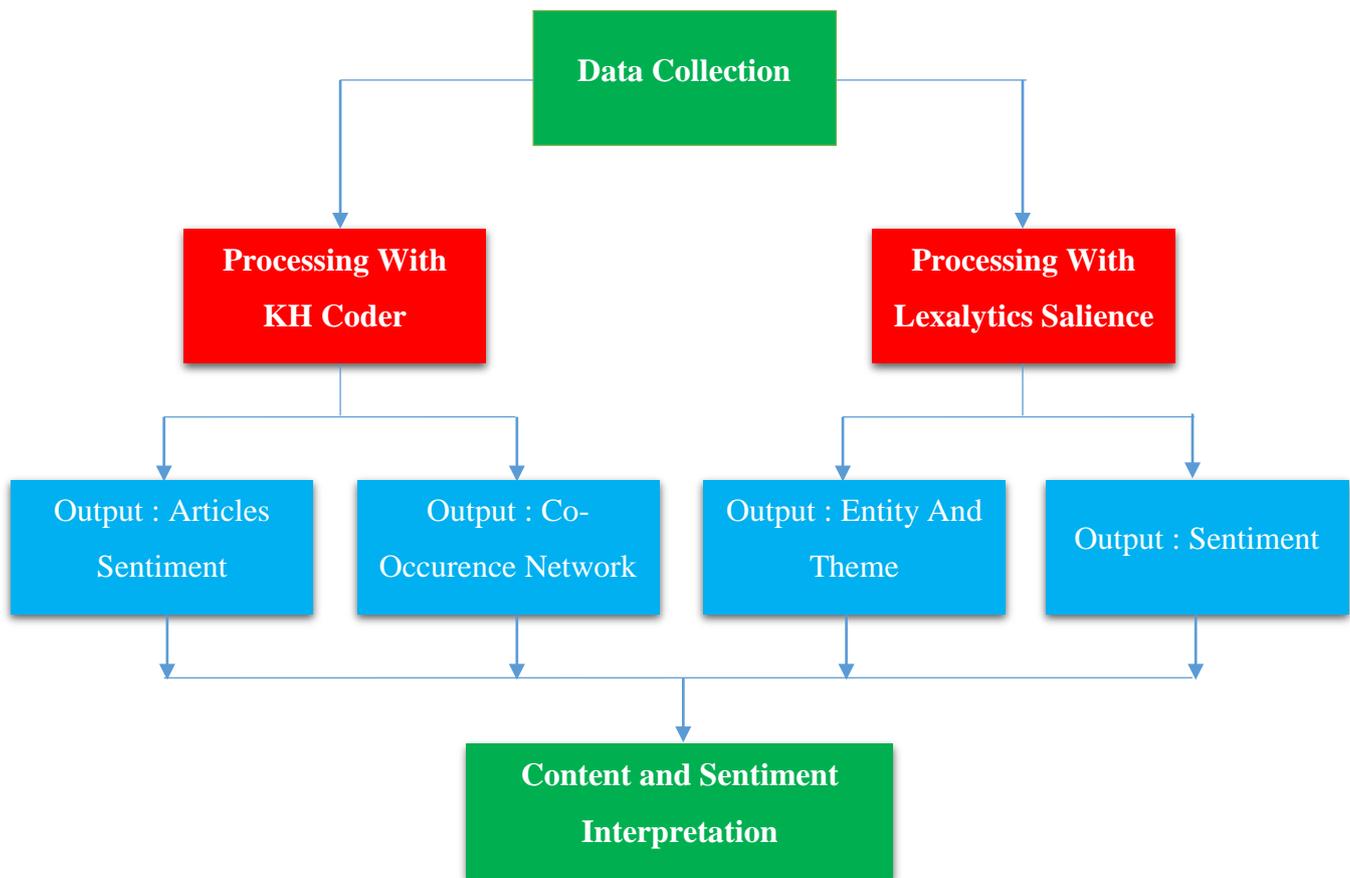


Figure 6. Methodology

From the picture above, it can be seen that the output from KH coder software is co-occurrence network and sentiment or emotion of the articles. The co-occurrence network is a network diagram which shows the relation between words, which have higher number of appearance than the minimum word frequency in the articles, as well as the strength of their relation. The minimum number of word frequency can be adjusted in the software so that words with low appearance frequency will not appear. Words will be shown in several nodes with different colour which represent the centrality index (from blue (low frequency) to pink (high frequency)). The strength of relationship between words will be shown by the thickness of the lines connecting them.

The Co-occurrence network consists of two types. One is the words-words co-occurrence network and the other is words-variables co-occurrence network. In this study, the words-words co-occurrence network will be used to analyze the content of articles each year and the words-variables co-occurrence network will be used to know the trend of article content from 2004 to 2014.

For constructing the co-occurrence network, several variables must be setted up. Those variables are the minimum term frequency and the filter edges. For the words-words network, the term frequency was set on 10 and the value of filter edges was set to top 60, while for words-variables network, the term frequency was set on 40 and the value of filter edges was set to top 70.

In terms of emotion or sentiment generated by KH coder, the software generates the result based on positive or negative words which defined beforehand. The result then will be

shown in form of graph with x-axis showing the year when the word appear while y-axis shows the percentage of positive and negative words.

The sentiment will also be generated by Lexalytics salience. The difference from the result generated by KH Coder is that the Lexalytics gives more detailed sentiment analysis which includes the value of sentiment and the entity or theme which refer to the sentiment. The output will be generated in form of table which contains entity, theme, and sentiment ratings. In this study, lexalytics salience analysis tool will be used to analyze the sentiment of annual media articles. Note that lexalytics salience does not give particular range to interpret the degree of positive or negative sentiment. However, the lexalytics technical document recommends a boundary between -0.2 and 0.2 for neutral document. Therefore, the recommendation will be used as a reference for this study.

**5. ANALYSIS**

The data for media analysis consist of data dated back from year 2004 to 2014. However, to simplify the explanation, only years with distinguished output will be shown on the result section.

**5.1 Transjakarta BRT Analysis Result (Co-Occurence Network)**

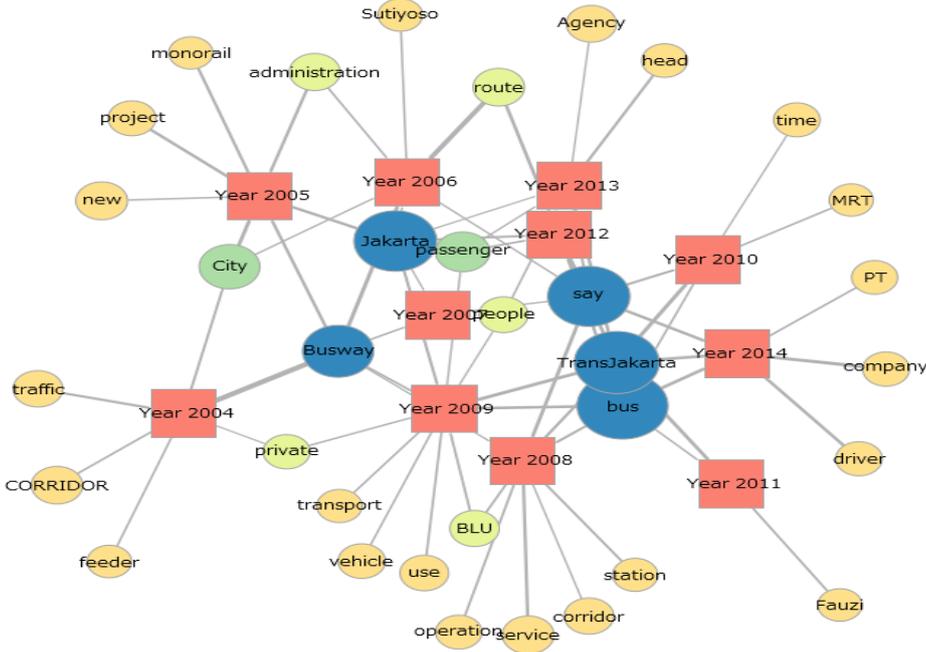


Figure 7. KRL Year 2004 – 2014 (Co-Occurence Network Word – Variables)

Based on the diagram, most frequent words on the media from 2004 until 2014 are “Transjakarta”, “bus”, “Busway”, “say”, and “Jakarta”. Words which appears moderately are “BLU”, “passenger”, “City”, “private” and “people”. More detailed information can be seen on words-words co-occurence network which will be described below.

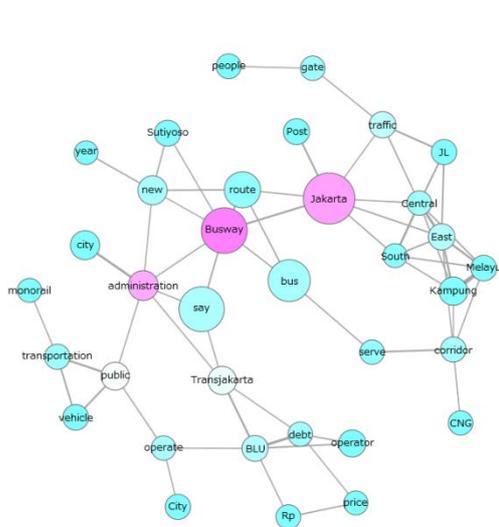


Figure 8. Year 2006

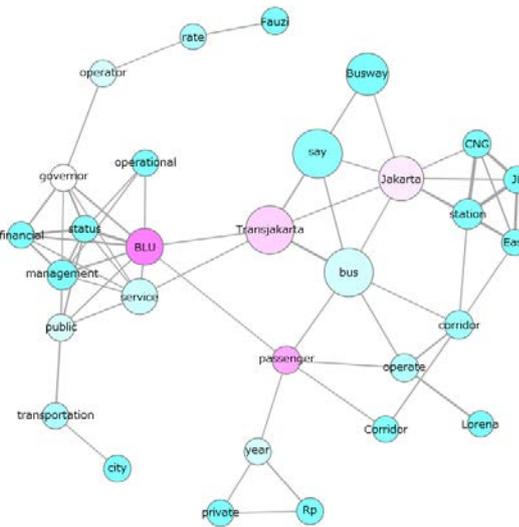


Figure 9. Year 2008

On year 2006, a connection is formed between words “Transjakarta”, “BLU”, and “debt”. This connection tells about Transjakarta BLU’s debt to Transjaakrta operator. Another connection is formed between words “Transjakarta”, “administration”, “city”, “new”, and “busway”. This is about a new busway route initiated by the city administration on year 2008.

Year 2008 talks about Transjakarta management unit (BLU) status change which is shown with a connection of words between “BLU” which has high centrality index, “management”, “financial”, and “operational”. Those connected words also gives information about the key issues related to transjakarta management unit status change, namely issues about management, financial, and operational.

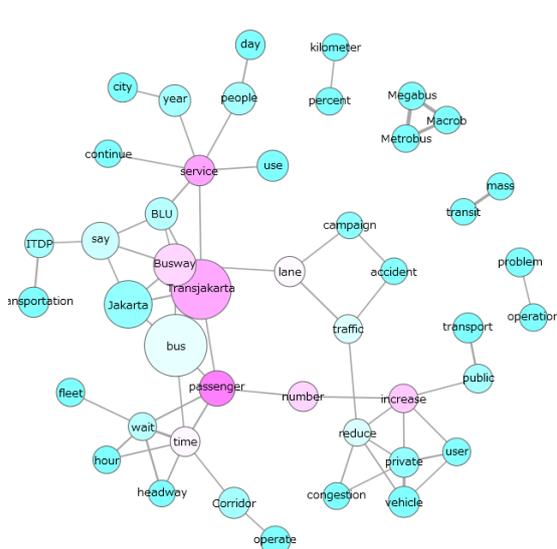


Figure 10. Year 2009

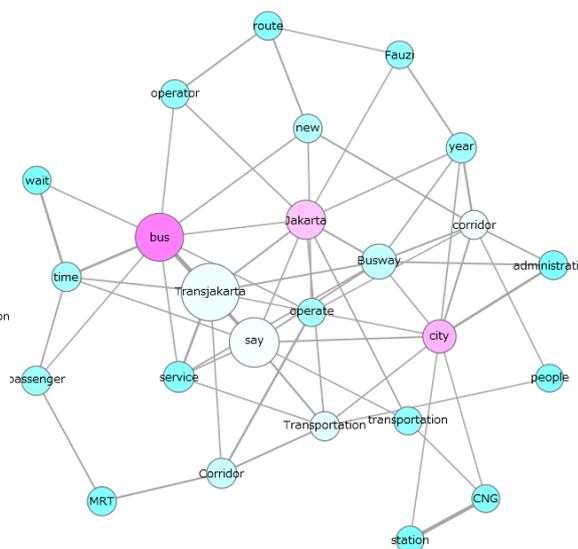


Figure 11. Year 2010

One of interesting feature shown by year 2009 diagram is the relation of the word “Transjakarta” with “passenger”. The word “passenger” then forms a connection between words “time”, “wait”, “headway”, “hour”, and “fleet”. Those are key words for passenger long



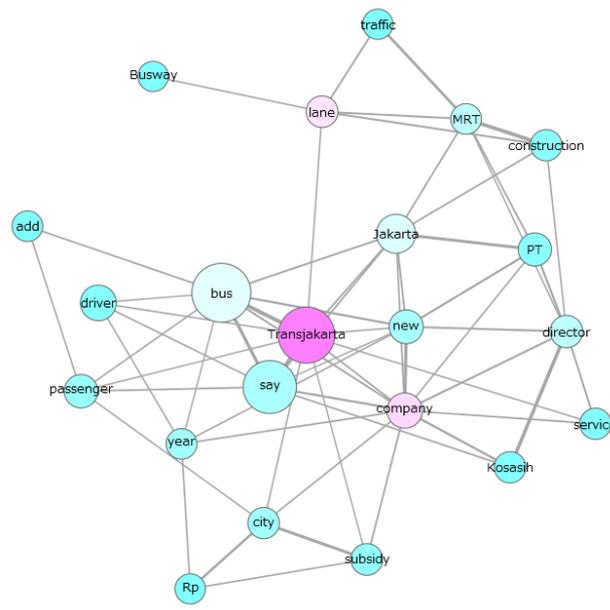


Figure 14. Year 2014

## 5.2 Transjakarta BRT Sentiment Analysis Result

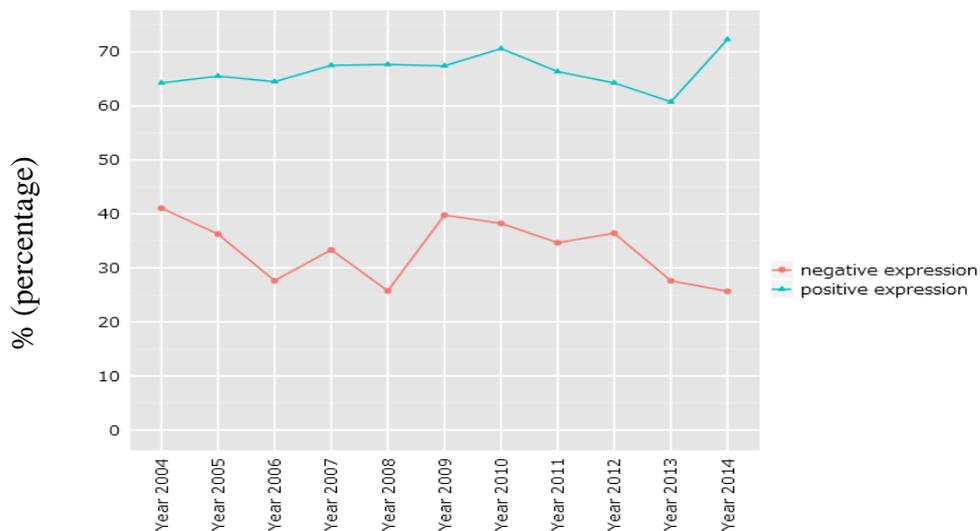


Figure 15. BRT Transjakarta Sentiment Analysis – KH Coder

From the graph above, it can be seen that positive expression words percentage gradually increase from 2004 to 2014 although there are some decline on 2009 and 2013 which is the lowest point for positive expression percentage. Different from positive expression graph, the negative expression percentage graph fluctuates with the lowest point on year 2008 and highest point on 2009. The negative expression percentage then declines from year 2012 to 2014.

On year 2014, positive expression of Transjakarta reached its peak point. The entity “Transjakarta” itself got very positive sentiment, namely 4.39. This is due to many improvement on Transjakarta, for instance its organizational structure, the high number of enthusiasts for Transjakarta driver, transjakarta’s new basic standards, and a new hope for its new status as state owned company.



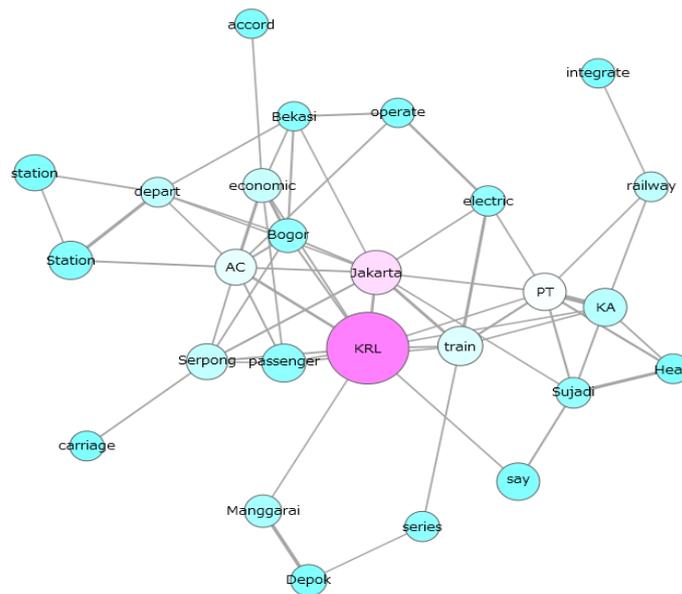


Figure 17. Year 2008

On year 2008, the word “integrate” is connected with railway. This connection refers to a plan in 2008 to integrate KRL station with Busway station. The other prominent feature of year 2008 is the relation between word “economic”, “bogor”, “AC”, and “bogor” relation with “Jakarta”. These relationship shows about Jakarta-Bogor economic KRL with air conditioner facility which will be operated soon on that year.

Year 2009 probably is one of historical moment for Jabodetabek Commuter rail. On the diagram, it can be seen that 4 words, namely “PT”, “KAI”, Jabodetabek”, and “Commuter” have a strong relation each other. This refers to the official announcement of PT KAI Commuter Jabodetabek (PT KCJ) which is a subsidiary of PT KAI. The PT KCJ is an operator for KRL commuter Jabodetabek which is responsible for Jabodetabek Commuter rail stations, fleets, and railroads.

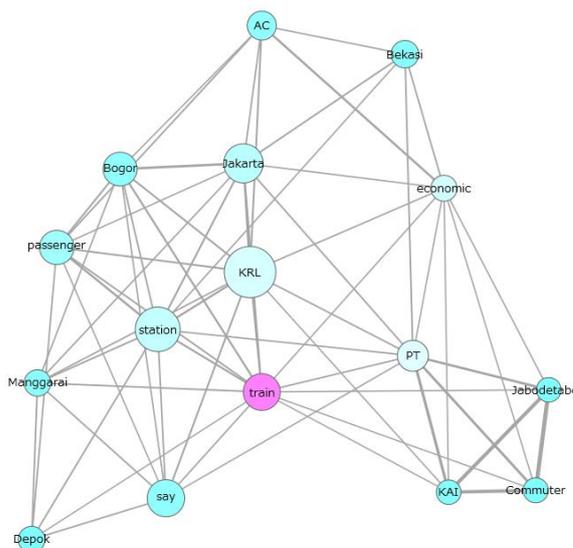


Figure 18. Year 2009

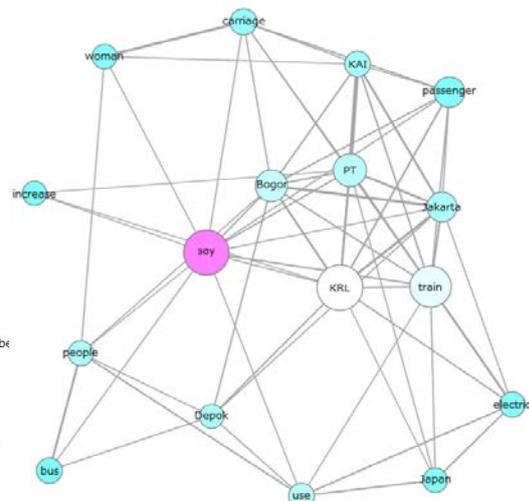


Figure 19. Year 2010



Based on year 2013 diagram, a connection is formed between “break”, “broken”, and “rail”. This connection depicts about an event related to broken rail in KRL lane. Another prominent event happened on this year is the sterilization of street vendors in KRL stations which is shown by the connection of words between “sterilization”, “PT”, and “KAI”.

Finally, on year 2014, connections is formed between words “eva”, “PT”, “KAI”, “Commuter”, “Say”, “Manggarai”, “Station”. This connections is about the KRL signal interference which make trains stucked in manggarai station.

#### 5.4 Jabodetabek Commuter rail Sentiment Analysis Result



Figure 24. KRL Article Sentiment – KH Coder

The graph above gives information about KRL positive and negative expression. Based on the graph, both negative and positive expression percentage wildly fluctuating, representing instability of the system performance overtime. Positive expression reach its highest point on year 2005 and its lowest point on year 2013. For negative expression, the highest percentage is reached on year 2007 and the lowest is on year 2011.

For negative expression, most extreme point occured on 2007. based on lexalytics salience for year 2007, the theme “cause casualties” get -8.19 score which is very negative, this is due to train incident at Kota Station. The incident did not cause casualties but got a very negative perception from the media. Another theme which get negative score is “brake failure”, namely -2.45 as on 2007, there are some incident which was caused by the electric train brake failure. The train then crash kota station perimeter.

Most extreme point for positive expression occured on year 2005. On 2005, the theme “state budget” got 3.75 score. This is about the plan to fund Jabodetabek Commuter rail improvements, for instance the construction of double track, by using state budget (APBN)

## 6. CONCLUSION

To sum up, Greater Jakarta public transportation still need many improvement in many aspects. This statement is reflected from negative sentiment from the media analysis.

For BRT Transjakarta bus rapid transit system, the majority of passanger are mostly captive riders of public transportation mode. This can be concluded that transjakarta has not effectively shift the public preference from using private transport to public transportation. Despite of improvements in BRT Transjakarta system, for instance electronic ticketing, the launcing of feeder services (APTB), new fleets, new corridors, change of the institution status and authority, etc, threere are many aspects still need to be improved. The headway of transjakarta services need to be more frequent and other issues such as Transjakarta fire incident should be addressed so that the public can rely that BRT Transjakarta is a safe, reliable and comfortable transportation mode. The institutional performance of the new PT. Transjakarta is also one issue which need to be addressed.

Regarding Jabodetabek Commuter rail, the system also need many improvement in terms of technical aspects as well as institutional aspects. Based on consumer satisfaction survey, passenger is not yet satisfied with the commuter rail services. Several issues, for instance, gap between public expectation and the management perception regarding service standard, qualified staff are also things which need to be addressed. Other issus which need to be considered are the frequent broken rail and station sterilization. Several broken rail incident occured and this incident will affect public perception on the reliability of the commuter rail service. Therefore, the regulator i.e. the government and the operator should sit together to resolve the maintenance issue of rail replacement, especialy the old ones. Regarding sterilization, this measure is a good step to make all station become more comfortable for passengers.

For BRT Transjakarta, the media sentiment is improving recently while for Jabodetabek Commuter rail the sentiment tend to fluctuate from year to year, representing instablility of the rail system performance overtime. This analysis shows that Greater Jakarta transportation needs improvement, especially Jabodetabek Commuter rail.

To be more effective megacity, Greater Jakarta need to consider more fundamental change at least in four key areas including: (i) integrated urban transport, land use and air quality strategy, (ii) establishment of a regional transport coordination commission, (iii) financing mechanism to ensure long term financial sustainability and (iv) progressive private sector participation in operation and investment with adequate regulatory oversight. The city also needs to provide and train talented staffs to accelerate deliveries, operate and resolve the public transport service backlogs.

In terms of approach used for the analysis, namely text mining, this method can give a contribution to know public perception from the media. Issues which become main concern of public tend to appear more frequent in media news which results in high frequency and centrality index. And issues which appear often tend to become a big consideration from party who use this kind of analysis. Therefore, this method can be used by policy makers to consider policy formulation based on public perception, although its is also suggested that the policy makers also use other approaches as well for the consideration.

This approach also have several limitations. Sometimes big issues appear quite seldom in the media which impact in insignificant result in the media analysis. Therefore, the capabilities of the researcher to choose important issues become necessary. In the future, research about passenger perception to other mode in other metropolitan cities can be conducted and the result hopefully can be a consideration for policy makers to improve public transport.

### **ACKNOWLEDGEMENTS**

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