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Thesis title:

Understanding the determinants of perceived service quality for travelling by Trans Metro Bandung, Bandung, Indonesia.

Name: Yulia Puspa Sari

Supervisor: Taslim A. Alade

Specialisation: Managing and Financing Urban Infrastructure (MFUI)

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Institute for Housing and Urban Development Studies of Erasmus University Rotterdam

Summary

Bandung city, a capital city of West Java, is facing a problem with traffic jam. One of the main reasons is the vast number of private vehicles that circulated in the city. In response to the congestion problem, the municipality of Bandung introduced Trans Metro Bandung (TMB). It is a Bus Rapid Transit (BRT) with the objectives to serve a safe, comfortable, and affordable public transport. Unfortunately, another problem occurred where users perceived the service quality of TMB is insufficient, which supported by several researchers. If the provider does not improve the service quality of TMB, people might not use TMB, and eventually, the level of use of TMB will be decreasing. It raises a question of which service quality is the most important and will strongly influence the level of use. Thus, it is necessary to understand which determinants of service quality that might influence the level of use of TMB. The service quality attributes that are covered in this study are reliability and scheduling, connectivity, fare, information, safety and security, comfort, and cleanliness. This study will focus on the perception of these service qualities on the level of use of TMB. There are three levels of use of TMB in the study based on how frequent users patronize the service, which consists of seldom user, occasional user, and frequent user.

The primary methodology used in this survey is a mixture of quantitative and qualitative methods. This research collected 156 respondents in total from the combination of face-to-face and an online questionnaire. An interview was conducted with 11 respondents to give more-in-depth insight from the user. The analysis was done through SPSS, with the analysis of descriptive statistics, Manova, and regression analysis.

The research findings concluded three service quality attributes that are the determinant of the level of use of TMB, which are fare, connectivity, and information. The determinants of service quality which has the most substantial influence on the level of use, is fare. It can change the level of use by 40.2%. It is followed by connectivity and information, with a percentage of 38.6% and 35.4%, respectively. The information obtained from the survey could be an input for the government to improve the service quality of TMB and to increase the usage of TMB.

Keywords

Perceived service quality, public transport, Bus Rapid Transit, level of use, frequency of use.

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This thesis will never be finished without God's will. Words from Quran that always help me through my hard times is *'For indeed, with hardship [will be] ease. Indeed, with hardship [will be] ease.'* (QS. Al-Inshirah:5-6)

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Foreword

The thesis is written as completion to the master Urban Management and Development, at Institute for Housing and Urban Development Studies, Erasmus University Rotterdam, Netherlands, for the specialization of Managing and Financing Urban Infrastructure. The purpose of this thesis is to understand the determinants of service quality that influence the level of use of TMB. The aspiration to raise this topic as my thesis started from my dissatisfaction regarding public transport in my city, Bandung, Indonesia. The traffic jam in Bandung worsens each day. One of the fundamental reasons is because private vehicles dominate the city, and the government could not provide good public transportation. I moved to the hinterland of Bandung, since then, it took me two hours from my university to my home on peak hour, when it is supposed to be around 45 minutes. As a planner, I feel like I must do something concerning this issue to develop better public transportation in my city.

Abbreviations

IHS	Institute for Housing and Urban Development
Angkot	Angkutan Kota
BRT	Bus Rapid Transit
CSI	Customer Satisfaction Index
CSR	Corporate Social Responsibility
IPT	Intermediate Public Transport
OTS	Online Transportation Service
TMB	Trans Metro Bandung
Manova	Multivariate analysis of variance

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Chapter 1: Introduction

The study focuses on the determinants of perceived service quality and the level of use from various type of user's point of view.

1.1 Background Information

The fast-growing of mobilization in urban areas around the world is becoming less sustainable and dominated by automobile (Pojani and Stead, 2015). Nowadays, automobile-dependent and motorization are growing extensively everywhere in the world, including in many Asian cities. The phenomenon that is happening in Asian cities is distinct from the motorization in Western cities. Particularly in Southeast Asia, one of the causes of rapid motorization is because the policy in these countries makes it easy to own an automobile, and the tax is rather low. It motivates people to buy a private vehicle.

Moreover, economic growth, urbanization, and industrialization also contribute to the emerging of motorization (Le Loo; Corcoran, et al., 2015). Motorization plays a role in other externality costs, including traffic congestion, pollution, accidents, environmental degradation, and increased carbon footprint. Furthermore, most of the transport in Southeast Asia used a non-renewable resource, such as fossil fuel, which raises concern in the global environment. Thus, transport problems in developing and industrialized countries are getting severe and more extensive than ever (de Dios Ortuzar and Willumsen, 2011).

A change of perspective from the old paradigm to a new paradigm is needed to solve this problem. The old paradigm focuses on mobility or the ease of moving. As a result, the need to increase travel speed is the priority. It would lead to the expansion of roads and will favor the automobile. The new paradigm, instead, focuses on the accessibility or the ease of reaching. Solutions to expand the modes of transport are ranging from walking, cycling, and public transportation, such that people have many options to reach their desired location (Litman, 2016). Therefore, it is crucial to move from automobile to another option that is more sustainable, that is public transportation.

Public transportation has a higher capacity to move more people. Hence, it needs less space to operate, reduces pollution and congestion, and increases the efficiency of the transport system (Litman, 2016). Increasing accessibility will eventually increase the productivity of the city and its citizen. There is a need to invest in the improvement of public transportation to achieve the optimum use of transit. Unfortunately, developing countries find it challenging to provide high-cost public transportation. One of the solutions for a developing country is to invest in road-based public transportation. It offers a more cost-effective mode of transport rather than rail-based public transportation (Dimitriou and Gakenheimer, 2011). One of the examples of road-based transit is Bus Rapid Transit (BRT).

BRT is also one of the critical alternatives to achieve sustainable urban transport in developing countries (Pojani and Stead, (2015). BRT gained its popularity because it offers greater flexibility with lower capital, operational, and maintenance cost (Levinson; Zimmerman, et al., 2002). Indonesia also took advantage of BRT to provide public transportation for its people. Some of the examples are Transjakarta in the capital city of Indonesia, Trans Jogja in Yogyakarta, and Trans Metro Bandung (TMB) in Bandung.

After providing the infrastructure and transport system, the next thing is making sure that people use the service. There is a strong need to understand the transportation that people use and how people perceive it so that transport planning can address the issue in the transit system (Le Loo et al., 2015). Understanding what people perceived and improving public transit to

what passenger expected will keep the loyalty of users and eventually attract more passenger to use BRT.

Therefore, the provider should focus on users and make sure that users have good experience regarding the service quality when they commute. Lierop (2016) agrees that improving the perceived service quality will increase the attractiveness of public transport and will eventually lead to growing patronage. If the provider could not perform well, users might change from using the transit to go back using the four-wheeled or two-wheeled private vehicles (Dimitriou and Gakenheimer, 2011). To avoid frequent user to go back using automobile and to attract potential user, the provider should understand the determinants of perceived service quality to travel by BRT. It is because the user's opinion toward whether or not the provider provides excellent service quality is vital.

1.2 Problem Statement

Bandung City is the capital city of West Java, Indonesia, with 2,497,938 inhabitants (Statistics Indonesia, 2017) and 167.7 km2 coverage area. As a capital city, Bandung is a bustling city with many people living and commuting every day. The number of private automobile and motorcycle in Bandung takes up to 98% of total vehicles, which means only 2% of the road-based transit vehicles that circulate in the city (Statistics Indonesia, 2016). Moreover, the number of automobiles doubled every weekend because many people from Jakarta, the capital city of Indonesia, travel to Bandung for leisure/shopping. People are interested in going to Bandung since the city provides many tourist attractions, and low-priced clothes and foods compared to Jakarta. Consequently, the road in Bandung is even more congested on the weekends.

The traffic congestion in Bandung is getting more severe nowadays. Based on a survey by Asian Development Bank (2019), Bandung is the most congested city in Indonesia and even worse than Jakarta as the capital city of Indonesia. The increasing traffic congestion and the need for public transportation are not in line with the provision of formal public transportation. (Anwar, 2019). People in Bandung prefer to use private automobile or motorcycle. Informal sector dominates most public transportation in Bandung, including *Angkutan Kota (Angkot)* which is the paratransit that operates in the city and Online Transportation System (OTS) such as Gojek and Grab. Regrettably, the informal sector alone would not help to reduce congestion in Bandung. Public transportation which can take many passengers at once with few vehicles could be a great solution.

For that reason, in 2008, the municipality of Bandung introduced Trans Metro Bandung (TMB). TMB is a Bus Rapid Transit (BRT) with a high person-carrying capacity of a medium and large bus with 55 and 85 passengers respectively (Kusuma; Sutandi, et al., 2007). The objectives of TMB is to serve a safe, comfortable, and affordable public transport to attract people in Bandung City to move from private vehicle to public transportation (Department of Transportation Bandung City, 2013). Out of the 16 lines of TMB development plans, only four TMB lines have been operating to date, and one is still in the process to operate soon (Setiawan, 2019). As regards to headway, Ramdhan and Joewono (2015) conducted a study to find the headway of one of the lines in TMB, specifically the corridor of Cicaheum-Cibeureum. It concluded that the headway distribution for one-week observation follows a gamma distribution with an average of 27 minutes. Waiting for almost half an hour is considered a long time for some passengers; this might lead to people not wanting to use TMB because of the low quality of reliability.

Besides, several other service qualities are still lacking in the perception of users. Some of the evidence of this statement can be seen through the study from Dini, Nurwulandari, et al. (2016)

which stated that there are complaints from the commuters regarding several quality attributes of TMB such as, the distance between the bus stations is too far from one another, and the lack of cleanliness of the bus.

According to Listifadah (2015), connectivity to another mode of transport is not well connected, TMB and its feeder even have the same route for several corridors of TMB. Additionally, the fact that TMB does not has its bus lane is causing congestion (Setyabudi, 2016). The result from different authors indicate that there is a need for improvement for several service quality aspects, such as connectivity, cleanliness, and reliability and scheduling. Moreover, as stated previously, the number of private automobile and motorcycle in Bandung takes up to 98% of total vehicles that circulate in the city and only 2% of the road-based transit vehicles, it indicates that in general, people did not utilize the public transportation and rely mostly on the private vehicle. If TMB could not improve its quality, TMB would lose its attractiveness and would not be able to accomplish its purpose as a solution to reduce the congestion in Bandung. People will change their preference from TMB to another mode of transport, and eventually, the level of use of TMB will decrease.

Passenger is the focus of the study because they can determine the success of public transportation. In order to attract more passengers, one should consider service quality because it has an immense influence to affect travel user choice (Eboli and Mazzulla, 2009, Beirão and Cabral, 2007). In line with Bozbura's (2010) findings that the provider needs to meet the customer's expectations to maintain service quality. Otherwise, commuters will not prefer transit as their primary mode of transport unless they must take it due to financial issue. Thus, there is a need to see the determinants of perceived service quality and how it influences the frequency of using public transport, in this study is the TMB. The problem statement is that the poor perception of service quality from users may cause a low level of use of Trans Metro Bandung.

1.2 Research Objective

The study aims to understand the determinants of perceived service quality that influence the level of use of TMB and to see which service quality indicators that have the most considerable influence on the frequency of use of TMB. The result of this study could be a beneficial input to sustain the frequent user and attract the potential user. Also, understanding the determinants of service quality of TMB will eventually be easier for the provider to fix the issue with TMB.

1.2.1 Main Research Question

How does the determinants of perceived service quality influence the level use of TMB?

1.3.2 Research Sub-questions

i. How do users perceive the service quality of Trans Metro Bandung?
ii. To what extent does the perceived service quality influence the level of use of TMB?
iii. How does the relation between the perception of service quality and the level of use of TMB vary in the light of the user characteristics?

1.4 Significance of The Study

1.4.1 Scientific (Theoretical) Relevance

Several studies with regards to TMB that have been conducted only focus on one service quality attribute of TMB but not the combination of several quality attributes. For instance, (Budiman, 2009) studied about the fare of TMB in relation with the willingness to pay of the passengers, (Ramdhan and Joewono, 2015) focused on the travel time or headway in one of the corridors of TMB, and (Gultom and Joewono, 2014) choose the quality of TMB stops as

her topic of research. Even though several researchers have already discussed an aspect of service characteristics of Trans Metro Bandung, no study specifically talks about the combination of the service quality attributes and how it influences the level of use of TMB. This study addresses this deficit by examining the determinants of perceived service quality and its influence on the level of use of TMB in Bandung City, Indonesia.

1.4.2 Societal Relevance

Acknowledging the service quality of TMB is essential, specifically for the provider, the policymaker, and the government to know which improvement is crucial such that more passengers are attracted to use TMB. Additionally, having a good transit will eventually contribute to a more effective public transportation system in Bandung. Further, this research will provide relevant information which will be of contribution to the academic field. Lastly, the study can give an added value to the monitoring and evaluation that has been annually conducted by Bandung Transportation Department.

1.5 Scope and Limitations

This study has a limitation on the number of respondents due to limited time and resources. This research focuses solely on perceived service quality even though there are other factors besides perception such as expected quality, delivered quality, and targeted quality (introduces by AFNOR, a French Organization for Standardization). This study analyzes the perceived service quality by the user because the user is the one who experienced it the first hand. If the users decide to switch their mode of transport from transit to automobile, the transit provider will lose their passengers and will not get any benefit from providing the transit. More importantly, creating more sustainable mobility can never be achieved.

Furthermore, this study only focuses on the determinants of perceived service quality of TMB on the level of use of TMB. Empirically, when people choose one mode of transport over another is not solely because of how they perceived one type of mode (in this case is TMB) but how they perceived other modes as well.

Chapter 2: Theory Review

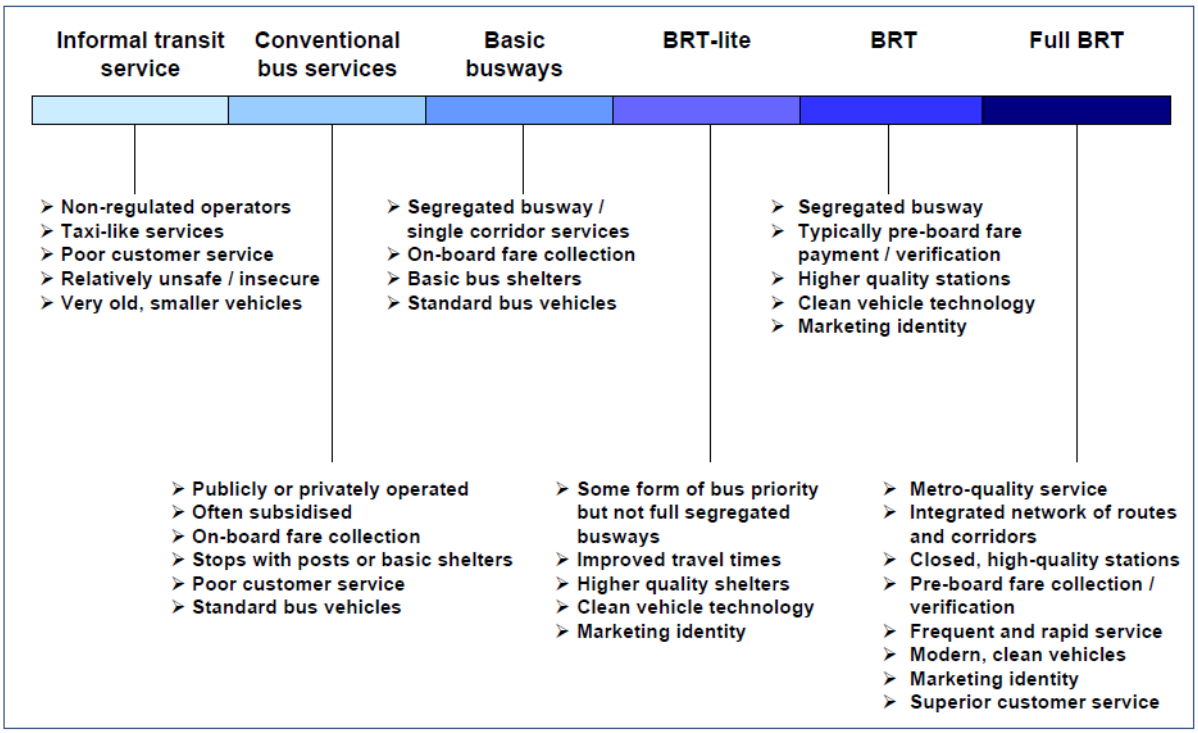
2.1 Introduction

Section two provides a theoretical background of several concepts on this research. It begins with the theory of bus rapid transit and service quality, which also relates to perceived service quality and service quality attributes. Then, it discusses the literature review related to the level of use. It further goes into the relationship between perceived service quality and the level of use of TMB. The end of this chapter is a conclusion with a conceptual framework graph.

2.2 Bus Rapid Transit

Bus Rapid Transit (BRT) is a rubber-tired light rail transit which offers greater flexibility with lower capital and operating cost. It can be said that BRT is an improved version of bus transit in terms of speed, reliability, and identity (Levinson; Zimmerman, et al., 2002). BRT is labeled as an improved version of bus is because it combines the road and rail transport service (Barut, 2014). The purpose of the improvement is to increase the usage of public transport. Wright and Hook (2007) described BRT as a high-quality bus-based transit with a segregated right-of-way, excellence marketing, customer service and more frequent options. He further explained the spectrum of BRT, which described in the figure below;

Figure 1 The quality spectrum of tire-based public transport



Source: Wright and Hook, 2007

The quality spectrum form of BRT is described in a wide variety of systems to provide a more precise definition of BRT. First, informal transit service is the lowest form of BRT, which is closer to the regular bus than to BRT. Second, conventional bus services that have stops with posts but usually has poor customer service. Third, basic busway has a basic bus shelter and a single corridor service. Forth, BRT-lite, which also called enhanced bus service, has a priority lane but not fully segregated. Fifth, BRT has a characteristic of having a segregated busway and two other characteristics of 'full BRT'. Lastly, 'full BRT' is the concept that will reside at the top tier. To achieve a full BRT status, BRT should have a minimum standard. For example,

segregated busways, integrated 'network' of corridors, stop that has level access between vehicle floor and platform, a convenient station that has a weather-protected, and pre-board fare collection. Nikitas and Karlsson (2015) come up with several attributes of BRT from several authors, including:

a. Vehicles: which relates to the image, identity, and measurable performance success of BRT
b. Stops, stations, terminals, and corridors: which is the operation area
c. A wide variety of rights-of-way is a dedicated lane for bus only.
d. Pre-board fare collection: not collecting the ticket on-board.
e. Information and communication technologies: in order to increase user's safety, convenience, reliability, and integration.
f. All-day service: at least 16 hours per day (Levinson; Zimmerman, et al., 2002).
g. Brand identity: qualities that specific to the BRT system visually and in terms of marketing.

BRT has a significant advantage because it offers a solution for a more cost-effective transit rather than rail-based transit (Nikitas and Karlsson, 2015). It gives a considerably lower capital and operating investment than rail-based transit, but with a more effective system than conventional bus service.

2.3 Service Quality

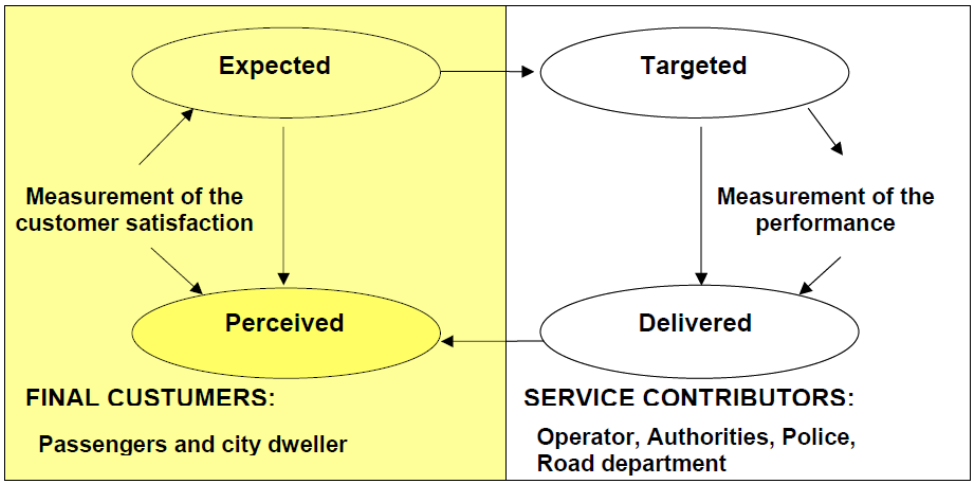
Public transport should be able to attract potential users and retain frequent users to increase the number of passengers because it can determine the success or failure of a transit system (De Oña et al., 2013). In pursuance of that, the Public Transport Companies (PTCs) or the provider shift their attention from supply-side which focuses on the provision of service to demand-side which focuses on the service quality (Barabino and Di Francesco, 2016). Furthermore, excellent service quality will make the provider more assured to compete with other transport agencies because people will choose the best public transport which suits their needs, in which service quality has an immense influence to affect travel user choice (Eboli and Mazzulla, 2009, Beirão and Cabral, 2007).

Transit operator needs to ensure that the customers are having a pleasant experience with the public transportation provided because it will increase the loyalty of the customer, attract potential users, and be able to compete with other companies (Bozbura; Bayraktar, et al., 2010). Focusing on service quality will be beneficial in the long term to decrease the use of private transportation and encourage a sustainable transportation system.

AFNOR, the French Organization for Standardization established a diagram about the connection amongst the targeted, delivered, expected, and perceived service quality. The quality loop describes the interaction between two actors, which is the customer and supplier side. The service is categorized as outstanding when the loop is retained. Explanation about each distinctive benchmark as follows (Barabino and Di Francesco, 2016, Vincent, 2003):

1. The expected quality is customer expectations regarding the public transport service.
2. The targeted quality is the level of quality that is set by the provider.
3. The delivered quality is the quality service of operating conditions on a day-to-day basis by the provider.
4. The perceived quality is the customers' perception regarding the quality of the service.

Figure 2 The quality Loop



Source: Vincent, 2003

The management of the quality of transit service could be assessed by linking the components and observing the gap or difference in each link. Another author, Kittelson and Associates (2003), defined that there is only two part of transportation service quality. First, the subjective aspect and second, the psychological aspect. The subjective aspect, for example, performance measure. As for psychological aspect, it relates to how customers perceive the service (Fujii and Van, 2009).

2.3.1 Perceived Service Quality

According to Barabino (2016), the user is the core of the quality loop concept. It means that customers perspective is an essential input for evaluating the transit service quality since passengers are the one who uses the service first-hand. Thus, they are the most suitable judges for the improvement of the service performance (Eboli and Mazzulla, 2011, Kittelson & Associates; United States. Federal Transit Administration, et al., 2003). Therefore, perception by the user is a crucial input for the provider to improve their public transport quality and become a decent transportation system (Madhuwanthi; Marasinghe, et al., 2015). Knowing the decision process of users for selecting the mode of travel for their trip is essential to be able to develop strategies to influence that decision.

Habib, Kattan, et al., (2011) described perception as a psychological term which plays a prominent role in defining action and governing behavior. Perceived quality pertains to a consumer's assessment about a product's overall excellence (Zeithmal, 1988). According to Vincent (2003), perceived service quality depends on the personal experiences of users regarding the service. In the quality loop, "perceived quality" represents service quality based on the experience of users, it involves subjective parameters (Barabino and Di Francesco, 2016).

2.3.2 Service Quality Attributes

Transport facility has two categories, quantitative and qualitative factors (de Dios Ortuzar and Willumsen, 2011). Quantitative factors are factors that are easy to measure, such as travel time (walking time, waiting time, and in-vehicle time) and monetary cost. Whereas qualitative factors are harder to measure, such as safety, security, comfort, opportunity to do other activities while travelling.

2.3.2.1Connectivity

Connectivity is closely related to the availability of the transit. It is the first step to decide whether public transportation is possible to be an option. Users might choose other options if they think that public transport cannot achieve several factors related to connectivity. The public transport ought to be available near the origin and destination of the users. Ideally, passenger can reach the station within walking distance. If not, at least there should be a park-and-ride lot and a bicycle storage facility (Transport Research Board, 2000). As regards to coverage, it concerns with line path characteristics, the distance between stops, number of stops, and accessibility of stops (Eboli and Mazzulla, 2009).

Connectivity also relates to traveling time. It is the aggregate time in-vehicle and off-vehicle time. As regards to off-vehicle, travel time includes how long it takes from the origin to the transit stop, waiting time, and from the transit stop to the destination (Transport Research Board, 2000). Connectivity indicator will influence the travel time because if the stop is far from one another, it will take more time to reach the transit stop. Moreover, reliability, scheduling, and frequency indicators will also contribute to total trip time. It will give a positive effect on the traveling time if the transit traveling time is promising.

Transfer time concerns with the amount of time that the passenger lost (TRB, 2000; Kieu, 2016). Transfers between transit vehicles will increase the total trip time of users and the complexity of a transit trip. According to Kieu, Bhaskar, et al., (2016), seamless coordination between transit and synchronized timetables could increase the service quality transit. Hence, transit would be a more attractive option.

In contrast, a poorly coordinated transfer is one of the major deciding factors that discourage people from using transit. The mechanism for transferring from one mode to another should be secure and timed carefully with timed transfers (Transport Research Board, 2000). Timed transfer considers a connection between Feeding Vehicle (FV) and Receiving Vehicles (RV). In timed transfer coordination, the operator holds a real-time schedule of RV to wait for an incoming FV for passenger transfers (Kieu; Bhaskar, et al., 2016). The problem is when RV arrives earlier then FV.

2.3.2.2Reliability and Scheduling

Being on time is seen as the crucial factor to attract passengers to use transit (Beirão and Cabral, 2007). Moreover, headway regularity and the consistency of arrival time at the destination also needs to be considered (Transport Research Board, 2000). Beirão and Cabral (2007) argued that frequency is one of the crucial elements of customers' satisfaction. The more frequent the transit, leads to a higher flexibility and option for the people, in case they do not know the exact schedule or missed the public transport (TRB, 2000). Therefore, frequency is a vital factor for transit. Eboli and Mazulla (2009) define service scheduling as service frequency that focuses on the number of runs per day or hour, and service time that focuses on the time which the service is available.

2.3.2.3Fare

Price has an immense effect on the travelling of transit (Gao; Yu, et al., 2016). Potential users will compare the cost and value between using transit or other modes (Transport Research Board, 2000). Public transport will be less attractive if the price for using other modes are lower, for example, if the toll and the parking lot are free then it is more likely for people to stay using automobile rather than using transit as their mode of transport.

2.3.2.4Information

The transit agency should provide information about where and when public transport is available and how it is operating. Useful information is crucial for transit to be considered as an option (Transport Research Board, 2000). Some indicators of information are the information about the ticket price and the schedule about the departure and arrival (Eboli and Mazzulla, 2009).

2.3.2.5Comfort

There are several aspects of ride comfort, such as seat comfort and temperature control, minimization of the severity of vehicle acceleration and deceleration, odors, braking, and vehicle noise (Eboli and Mazzulla, 2009, Transport Research Board, 2000). The transit should also install a shelter, benches, and waiting areas at the stop, and should also install access for handicap (Mahmoud and Hine, 2016). Furthermore, the number of seats available is also essential. As income increases, commuters are more likely to focus on the quality and comfort attributes (Tirachini; Hensher, et al., 2013). Transit would be less attractive if the passenger needs to stand, especially for an extended period time (Transport Research Board, 2000). It is even harder for the elderly to stand. Thus, they will have a higher expectation concerning comfort.

2.3.2.6Safety and Security

Eboli and Mazulla (2009, p.22) stated that "Safety concerns the possibility that users can be involved in an accident and security concerns personal security against crimes". Safety is one of the eight dimensions that Gao, Yu, et al., (2016) considered has an impact on customer satisfaction. There must be a concern about safety and security in public transportation because it carries more people in one vehicle (Joewono and Kubota, 2006). Whereas security is more related to crimes. According to TRB (2000), security can be improved by alarm for an emergency, video camera, and placing a transit stop in a well-lit area.

2.3.2.7Cleanliness

Cleanliness is divided into internal and external cleanliness (Eboli and Mazzulla, 2009). Passengers are more interested in riding a transit that is clean, graffiti-free, and have a decent appearance both for the vehicle and the station (Transport Research Board, 2000). Thus, to increase the attractiveness of public transport, both inside and outside the vehicle, should be clean.

2.4 The level of use of TMB

In the old study, (Lovelock, 1975) indicated that modelling the decision of transportation can be associated with a choice of a product, where a decision is related with the frequency of choosing the product, as for transportation field, the decision of one mode relates with the frequency of using that particular mode. An empirical study conducted by (Reibstein; Lovelock, et al., 1980), which focus on the bus usage, concluded that there is a positive influence on the frequency of bus use if users have a good perception from their experience. In order to increase the usage of a particular mode of transport for future ridership, the provider should focus on the passenger's satisfaction (Tangphaisankun; Nakamura, et al., , 2009). On the other hand, De Vos (2019) argued that not the travel mode itself that influence user's satisfaction, but the positive attitudes towards travel which will lead to a positive effect on travel satisfaction. Their preferred travel mode influences travel satisfaction.

According to De Ona (2013, p.1), *"Nowadays the success of a public transport system depends on the number of passengers which the system is able to attract and retain."*. In other words,

the level of use determines the success of public transportation. Increasing the level of use means that public transport should be able to appeal the interest of individuals to start using the transit. It is necessary to understand the travel behavior of people to get a deeper understanding of the intention of user to use public transit more frequent.

One of the oldest theories but fundamental to explain travel behavior is the Theory of Planned Behavior (TPB). Even though TPB is an old theory back to the 1990s, it is still a vital starting point that commonly used by researchers as the basic knowledge to understand travel behavior (De Vos, 2019). There are three considerations in which TPB explained the underlying assumption of the performed behavior of people (Ajzen, 1991):

1. Attitudes toward the behavior which is individuals' belief of a particular behavior.
2. Subjective norms which relate with the environment around the individual, such as friends, family, and peers.
3. Perceived behavioral control, which is the acknowledgement with regards to his/her ability to perform a certain behavior. Goulias (2008) explained how perceived behavioral control is related to travel behavior with an example of how hard individual perceives to shift from driving their automobile to using transit to commute.

TPB believes that people act in a certain way because of their rational beings. The article of Bamberg, Ajzen, et al., (2003), supported this theory with a study investigated in Germany which concluded that an intervention could influence prior behavior to the later behavior. People always adjust their behavior at some level of cognitive. The better the quality and the more good experience that individuals felt, the more people use the mode. It is based on what they perceived of the experience that they felt while they use the transit. In contrast, Theory of Repeated Behavior (TRB) argues that when people is repeating their behavior continuously, it leads to habits (Ronis; Yates, et al., 1989).

To some extent, the frequency of a behavior can leads to habit. Several researchers measure habit by the number of times the behavior is reinforced or the frequency of performing the same behavior in the past (Lanken; Aarts, et al., 1994). Moreover, the higher the frequency of use, the higher the chance of the behavior become loyalty and habit. Oliver (1996) described loyalty as a commitment to repurchase or re-patronize a product or a service in the future.

The French survey measured the level of use or mobility level by looking at the frequency of using and travelling by a particular mode (Diana and Mokhtarian, 2009). Beirao and Cabral (2008) researched six segments with different behavior and saw their intention to use public transportation. The conclusion is that the targeted market among the six segments supposed to be the one who is the most motivated to increase their frequency of use.

Beside the intention and behavior of individuals, the perception of different type of user is also an essential factor. Users are split into how frequent the individuals patronage the transit, from people who never use the transit, seldom user, occasionally user, and frequent user of public transport. Different categories of user can assess the service quality differently for the same service quality attributes. Not only the perceived service quality that differs but also the level of satisfaction and importance can also vary among different categories of users (Grujičić; Ivanović, et al., 2014). Mahmoud (2016) studied the influence of service quality on the perception of different type of users; current users and potential users (individuals who use the bus occasionally and regularly use their private vehicle). Therefore, the focus of public transport should not only to accommodate the demands of current users, but also the desire of potential users. Thus, the heterogeneity of the frequency of use should be consider to assess the perceived service quality.

The improvement of service quality based on user's perspective from a different category of people (such as frequent users, occasional users, and potential users) are needed to capture the concern of various groups (Beirão and Cabral, 2007). Mahmoud and Hine (2016) stated that public transport should provide not only the demands of current users but also the desires of potential users. Improving the service quality based on what the users from different categories perceive will lead to a more attractive transit for a broader target of users.

2.5 Personal characteristics of users

The movement of people to fulfil their day-to-day life is strongly connected with their characteristics including age, occupation, level of education, gender, family structure, and the purpose of their travel (Maduwanthi, 2015). Personal characteristics can influence longer-term choices of people indirectly, which eventually shape travel mode choice of people (De Vos, 2014).

Regarding age, the elderly and young are the categories that patronize public transport more than automobile. The reason being is because elders have limited ability to drive. In contrast, younger cannot legally drive because they do not have a driving license until a specific age (Le Loo, 2015). Another author mentioned several factors influencing the choice of mode. According to de Dios Ortuzar and Willumsen (2011), the categories are:

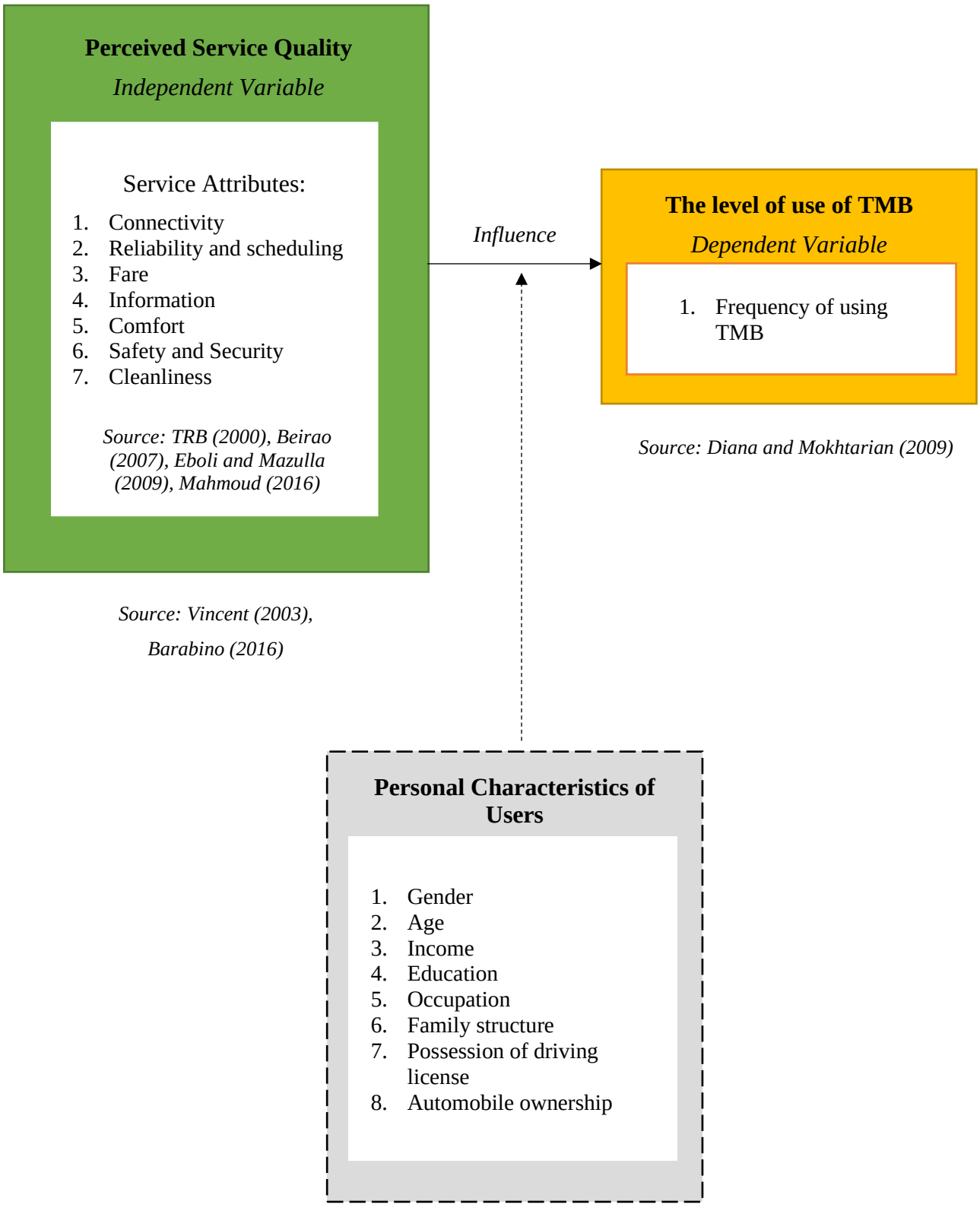
1. Trip maker characteristics; individual travel behavior is dependent on the personal characteristics, which is classified into income level, car ownership, and household size and structure. Higher-income earners usually have a higher tendency to drive compared to those with a lower income (Le Loo, 2015).
2. Journey characteristics; features generally believed to be crucial is the trip purpose (work, school, leisure, shopping), time of the day (early/late trips, off-peak/peak hours), and whether people are travelling alone or with others.
3. Transport facility characteristics; this category is the service quality of the transit, which already been discussed in the service quality attributes.

2.6 Relationship between perceived service quality and the level of use of TMB

The findings from Beirao and Cabral (2007) concluded that to influence people to use transit more often, the service quality of the transit should improve in a way that it will meet people's need. Lai and Chen (2011) also come up with the same conclusion that perceived value has a substantial impact on the behavioral intentions of commuter. When an individual's behavioral intention is increasing, it will enhance the probability to choose a specific mode of transport, and it will eventually increase the frequency of use of that specific mode, in this case, TMB.

A positive experience will strengthen the possibility of choosing the same alternatives in the future (De Vos, 2019), in terms of public transportation, this will increase the loyalty of the customer. On the other hand, a negative experience will also influence future ridership and the satisfaction of passengers (Tanghaisankun et al., 2009). Wright and Hook (2007) gave several typical reasons for negative perception based on user's experience that leads them to switch to private vehicles. For example, inconvenient location, fear of crime, unsafe feeling for drivers handling and roadworthiness, slow service, overcrowding, poor infrastructure quality, and unorganized system. According to Lindström Olsson (2003), people choose a mode of transportat based on how huge they perceived the benefit of that choice. He also divided factors that affect the choice of travel mode into hard and soft factors. Hard factors based on maximization utility which can be seen through traveling time, waiting time, and ticket price. Whereas soft factors are more related to comfort and services. Both hard and soft elements are inside the level of service of a transit.

2.7 Conceptual Framework



Chapter 3: Research Design and Methods

3.1 Introduction

The following section presents a methodology of this research. It commences with the operationalization of variables and indicators, then, data collection methods explanation, including sample size and sampling techniques. Furthermore, this chapter provides a brief description of the study area and the methods used for data analysis. Finally, the explanation of the validity and reliability of this research.

3.2 Operationalization

Operationalization is a transition from theory to empirical research in the direction of making the concept "measurable" (Van Thiel, 2014). The study aims to explain the most suitable concept to understand the determinants of perceived service quality and how it influences the level of use of Trans Metro Bandung, Bandung City, Indonesia.

3.2.1 Definition of Concepts

The first step in the process of operationalization is defining the concepts of the study. This step helps to demarcate what will be studied in the research (Van Thiel, 2014). There are two main concepts of this study, Perceived Service Quality and the Level of Use. Perceived service quality *"represents service quality as experienced by users"* (Barabino, 2016, p.830) is a suitable definition for the study. As regards the level of use, it is measured by looking at the frequency of using a particular mode of transport (Diana, 2009), in this study, the frequency of using TMB.

3.2.2 Variables and Indicators

The second step of the operationalization process continues with the variables. The independent variable for the study is the service quality which includes connectivity, reliability and scheduling, connectivity, fare, information, comfort, safety and security, and cleanliness (TRB, 2000; Eboli and Mazulla, 2009; Mahmoud, 2016; Goulias, 2008). The dependent variable is the level of use which is divided into three categories; seldom user, occasional user, and frequent user.

Table 1 Operationalization Table

Sub-question	Variables	Sub-Variables	Indicators	Scale	Source	Data Type	Collection Methods	Value
i. How do users perceive the service quality of Trans Metro Bandung?	***Service Quality*** (Independent variables) Represents service quality as experienced by users (Barabino, 2016)	***Connectivity*** The coverage area of transit	Distance to the stop	Ratio	TRB,2000	Quantitative	Observation & Secondary data	Km
			Walking time to reach nearest stop	Ordinal	TRB,2000	Quantitative	Questionnaire	Likert scale (Minute Perception)
			Number of stops	Ratio	Eboli and Mazulla, 2009	Quantitative	Observation & Secondary data	Total stops
			Availability at origin and destination	-	TRB,2000	Qualitative	Semi-structured interview	Perception
			Ease of transfer	Ordinal	TRB,2000	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Likert scale (Minute Perception)
			Transfer time	Ratio	TRB,2000	Quantitative	Questionnaire	Likert scale (minute
			Waiting time at the stop	Ordinal	TRB,2000	Quantitative	Questionnaire	Likert scale (minute perception)
			In-vehicle time	Ordinal	TRB,2000	Quantitative	Questionnaire	Likert scale (percept
		Reliability & Scheduling Arrival time of the bus is consistent with the schedule	Adherence to time schedule	Ordinal	Beirao,2007	Quantitative	Questionnaire	Likert scale (percept
			Frequency of the bus arrive at the stops	Ordinal	Eboli and Mazulla, 2009	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Likert scale (minute Perception
		Fare The fare of using the bus	Cost of fare	Ratio	TRB,2000	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Rupiah (Indonesian currency) & percepti
			Ease of purchasing ticket	Ordinal	Mahmoud, 2016	Quantitative	Questionnaire	Likert scale (percept
		Information About when and where the transit is operating	Online Pre-trip information (apps, online, phone, website)	Nominal & Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire & Secondary data	Likert scale (availab

Sub-question	Variables	Sub-Variables	Indicators	Scale	Source	Data Type	Collection Methods	Value
			Pre-trip information at the stops (schedule and maps)	Nominal & Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Likert scale (availab & perception
			En-route information (information obtained on the bus during the journey)	Nominal & Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Likert scale (availab & perception
		Comfort The comfort of riding the transit	Availability of seats	Ordinal	TRB,2000	Quantitative	Questionnaire	Likert scale (percept
			Temperature control	Ordinal	TRB,2000	Quantitative	Questionnaire	Likert scale (percept
			Drivers handling	Ordinal	TRB,2000	Quantitative	Questionnaire	Likert scale (percept
		Safety & Security Safety from accident	Safety from accident	Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Likert scale (percept
			Security against crime at the bus or at the stop	Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Likert scale (percept
		Cleanliness Internal and external cleanliness of the transit	Cleanliness of vehicles	Ordinal	TRB,2000	Quantitative	Questionnaire	Likert scale (percept
			Cleanliness of stops/waiting area	Ordinal	TRB,2000	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Likert scale (percept
ii. To what extent does the perceived service quality influence the level of use of TMB?	***The level of use of TMB*** (Dependent variables) the level of use can be measured by looking at the frequency of using a particular mode of transport (Diana, 2009)	***The level of use of TMB***	Frequency of using TMB	Nominal	Diana, 2009	Quantitative	Questionnaire	Never, once a week, times a week, 4-6 tin week, everyday
iii. How does the relation between the perception of service quality and the level of use of TMB vary	***Personal characteristics*** (Control Variable)	***Socio-demographic characteristics***	Gender	Nominal	Goulias, 2008	Quantitative	Questionnaire	Male, Female
			Age	Ratio	Goulias, 2008	Quantitative	Questionnaire	years old
			Income	Ordinal	Goulias, 2008	Quantitative	Questionnaire	Likert scale (income
			Education	Ordinal	Goulias, 2008	Quantitative	Questionnaire	Likert scale (educati

Sub-question	Variables	Sub-Variables	Indicators	Scale	Source	Data Type	Collection Methods	Value
in the light of the user characteristics?			Occupation	Nominal	Goulias, 2008	Quantitative	Questionnaire	Likert scale (employ status)
			Family structure	Nominal	Goulias, 2008	Quantitative	Questionnaire	Likert scale (family structure)
		Characteristics of the trip maker Individual characteristics of the commuter	Possession of driving license	Nominal	Goulias, 2008, Ortuzar 2011	Quantitative	Questionnaire	Yes, no
			Automobile / motorcycle / bicycle ownership	Nominal	Goulias, 2008, Ortuzar 2012	Quantitative	Questionnaire	Yes, no

Source: Author, 2019

3.3 Research strategy

3.3.1 Research methods

This study aims to gain information about the perceived service quality of users from various categories of users and see how it influences the level of use. It cannot be done solely through desk research because perceived service quality strongly relates to the subjectivity of people, which can only be understood through empirical research. The survey is a highly efficient method to answer the question in this research mainly because it deals with a high number of units of study. Population in Bandung city is 2.5 million, which consider a large number and suitable for survey approach (Van Thiel, 2014). Moreover, the independent variable of this study which is perceived service quality consist of a sizeable number of variables.

The research is using a mixed-method analysis of quantitative and qualitative to elaborate on findings from each method and to provide a more comprehensive understanding of the study. The primary source of data is from quantitative data method. Quantitative data deals with numbers which make it easier to see the differences of perception from different categories of user. Quantitative data also deals with statistical analysis that could help to see the pattern between the perception of service quality and the level of use. Other advantages of choosing quantitative data, such as the variables are quantifiable, clear-cut and shorter.

On the other hand, the qualitative method is using a semi-structured interview to get a more in-depth answer and to obtain a deeper understanding of the perceived service quality. Respondents for the interview are selected based on the control variable, which consists of gender, age, income, frequency of using TMB to gain a variety of response from different background.

3.3.2 Limitations of the research methods

There is a limitation in each method; in quantitative, some researchers consider that using numbers leads to simplification and decrease the quality of information (Van Thiel, 2014). Besides, the independent variable of this study is the perception of service quality among the users, and it is hard to capture the perception with numbers. Whereas in qualitative, answer from each individual cannot be generalized to all respondents, and it is seen as subjective opinions. Therefore, this study conducted quantitative and qualitative methods. Beside, this study also use triangulation gained from observation and secondary data to get more comprehensive information to cope with the limitation.

3.4 Data collection methods

3.4.1 Sampling techniques and sample size selection

According to Statistics Indonesia (2017), the population of Bandung is 2.5 million. Unfortunately, there is no data regarding the number of people who use TMB. Therefore, the study is using the population of Bandung city. The study is using Slovin's formula to determine the sample size (Israel, 1992). The margin of error for the study is 8% with a confidence level of 92%. The sample size (n) is calculated below:

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{2{,}500{,}000}{1 + 2{,}500{,}000(0.08)^2}$$

$$n = 156{,}240235$$

Using Slovin's formula with the calculation above, the sample size for the study is 156 respondents. Among 100% of targeted respondents, some of them might refuse to answer or not finishing all questions. Hence, with the assumption of a 20% response rate, the number of questionnaires is 781 units.

The sampling methods for this research is probability sampling because the unit of study is selected by chance or probability, not based on theoretical criteria. Stratified random sampling is chosen to get the representative of each group. The pre-defined strata are gender and age group. Trans Metro Bandung has four routes that are regularly operating in Bandung City. The study covered all routes of Trans Metro Bandung.

3.4.2 Data collection methods and instruments

The primary data collection for this research is primarily quantitative data. This study is analyzing perceived service quality with a Likert scale from 1 to 5. The reason being is that people more accustomed to express their opinion on numbers rather than in purely qualitative format. The first part of the questionnaire is bordering on the socio-demographic aspects. The second part covers the perceived service quality, and the last part relates to the level of use.

A questionnaire with the combination of open and closed-ended questions is the type of questionnaire to collect the perception from users. The questionnaire was written in vernacular (Bahasa Indonesia) because most of the respondents do not understand English. The survey conducted in an off-peak hour and peak hour to see the difference in both periods. Two types of the questionnaire in this study are direct interviews and an online questionnaire. A face to face questionnaire is the primary source of data for this research. The questionnaire would be equally distributed for all routes. The researcher would randomly enter the bus and ask respondents inside the bus by chance. An online questionnaire is the supporting data in case the face to face questionnaire is not enough to cover the whole sample due to the limited time constraints. The questions for the online questionnaire and face to face questionnaire are the same because it has the same purpose to answer the research question of the study.

The online questionnaire distributed through several platforms of social media, including LinkedIn, Facebook, Instagram, WhatsApp and Twitter. Some people in the network of different backgrounds also being asked to spread the link. Nevertheless, a striking result is still found in the personal characteristics of respondents, in which 63.9 % of the respondents hold a bachelor's degree and white-collar worker with 50.3 % of the total employment status. The total data collected from an online questionnaire is 45 % of the sample. Hence, there might be a biased with the result of the study.

A semi-structured interview is conducted to gain a deeper understanding of the perceived service quality. The researcher asked some respondents who are willing to be interviewed further. Moreover, the survey used secondary data from Department of Transportation Bandung City documents, and academic journals and observation to support the reliability and validity of the research.

3.5 Data analysis techniques

The inferential statistical technique is chosen in this research to see whether the relation between variables is systematic (Van Thiel, 2014). The suitable test statistics for this study is regression analysis and multivariate analysis of variance (Manova) to see whether there are differences in the mean score of two groups on the variable in the research (Van Thiel, 2014).

The assumption is that a significant difference in the mean score of variables in perceived service quality by users (independent variable) or family structure (control variable) can be used to explain the contrast found in the dependent variables. If the difference between the two

measuring is statistically significant, then the alternative is valid because the null hypothesis is rejected. The tools to code, edit, and analyze the result from the survey is through the Statistical Package for Social Science (SPSS).

3.6 Validity and Reliability

Triangulation is vital to increase the validity and reliability of the study by using other methods to check the data gained from the survey, one of them is through secondary data. Several secondary data sources are from the monitoring and evaluation of the Department of transportation Bandung City, academic journals and websites which relates to the perception of the service quality. The other used method was through observation. The researcher observed the service quality by using TMB in an off-peak hour and a peak hour. A prove of the service quality captured with a camera and analyzed in chapter four.

Several indicators are used to measure one variable to ensure the reliability of the study. The study used Cronbach's Alpha test to assess the consistency of these indicators to measure the variable; hence, proved that the study is reliable. Moreover, to guarantee the internal validity, the questionnaire tested in a pilot survey before doing a real survey. Pilot-survey done in two phases, the first phase was a peer evaluation from other researcher and the second phase of the pilot-survey was with the customer of TMB. The pilot-survey was given to five respondents. The improvement from pilot-survey provided an additional validity of the research. Moreover, the data collection and data input are managed simultaneously to ensure the completeness of the data. Finally, the external validity of the study is to get a result that can be generalized. Compared to other research strategies, the result gained from a survey can be generalized. Moreover, the target of a large number of sample size was the strategy to enhance external validity.

Chapter 4: Research Findings

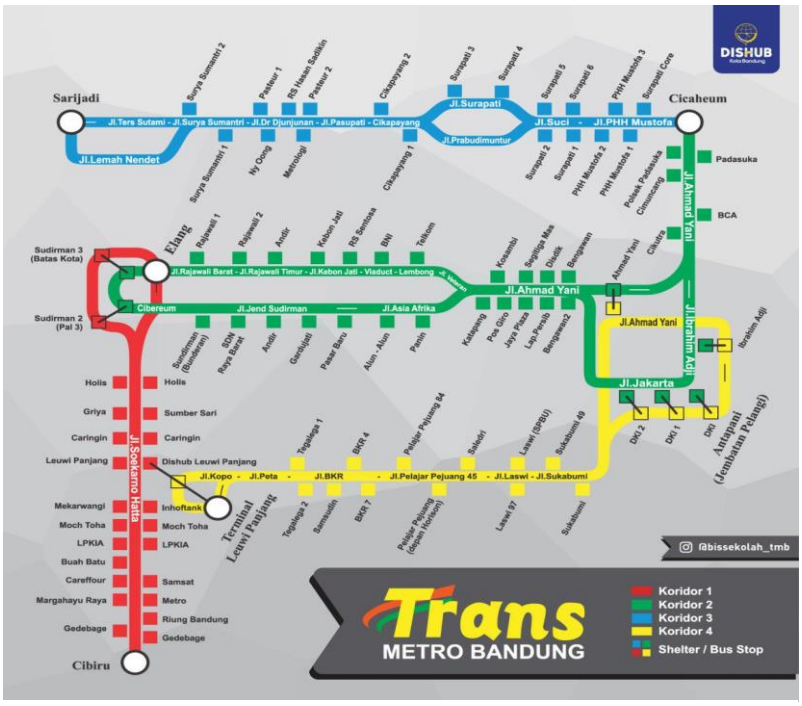
4.1 Introduction

This chapter presents the major findings resulting from the data collection period. It begins with a brief overview of TMB. Followed with the personal characteristics of respondents and trip characteristics of respondents. Further, it discusses the descriptive analysis of the perceived service quality. This chapter also provides an inferential analysis to see whether the perceived service quality influences the level of use of TMB and to what extent does it affect the usage of TMB. Lastly, this section also explains the relationship between the dependent and independent variable in the light of user characteristics.,

4.2 Overview of Trans Metro Bandung

Bandung City is located in the region of West Java and constitutes the capital of West Java. As the capital city of West Java region, activities are concentrated in the city. Hence, transportation is becoming one of the vital sectors in Bandung to accommodate the movement of people. The total number of units that circulated in the city is 1.8 million units with 73.3% accounted for motorcycle. In 2016, public transportation that circulated in the city was Angkot (minivan) with 5,521 units, 1,856 units of a taxi, and 16,341 intercity bus which also accounted for busses that only passes through Bandung (Central Bureau of Statistics of Bandung, 2017). Activities that are concentrated in the city contribute to the traffic jam from time to time. In 2008, the government of Bandung introduced TMB as one of the options that people can access. There are five routes of TMB with a slight difference in operating hour and fares for each route. Regarding the ticket price, the fare is depending on the coverage area of each route. The detail information for each route from Moovit Apps (www.moovitapp.com) as follows:

Figure 3 Trans Metro Bandung route



Source: Bandung Regional Public Transportation Agency official Instagram (@bissekolah_tmb)

1. TMB Route 1 (Elang – Cibiru) has 29 stops. It operates from 06.00 am – 06.00 pm.
2. TMB Route 2 (Cibeureum – Cicaheum) has 17 stops. It operates from 05.00 am – 07.00 pm.
3. TMB Route 3 (Cicaheum – Sarijadi) has 16 stops. It operates from 05.00 am – 07.00 pm.
4. TMB Route 4 (Leuwipanjang – Antapani) has 12 stops. It operates from 05.30 am – 06.00 pm.

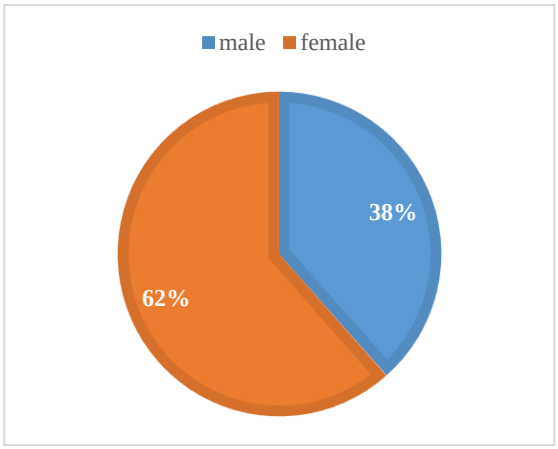
Based on the result from the questionnaire, each route has a slightly different fare depending on how long the route is. The fare for route one is Rp. 5,000, route two and three have the same price, which is Rp 4,000, and route four as the shortest route has the cheapest price for Rp 3,000.

4.3 Personal characteristics of users

The total number of respondents is 156 unit for the quantitative survey. At the end of the survey period, 87 responses from face to face questionnaire and 69 responses from an online questionnaire were collected and treated for this study. For the qualitative survey, 11 interviews were collected to gain more insight into the study. Prior to the study, a pilot survey was conducted to five people with a combination of face to face and an online survey. The improvement of the questionnaire has been incorporated into the final questionnaire. Simple random sampling is chosen for the face to face survey. Regarding the online survey, the link was distributed to several platforms of social media.

4.3.1 Socio-demographic characteristics of respondents

Chart 1 Gender of the Respondents



Out of 156 respondents were sampled for the questionnaire; the number of female users was more than male with a total number of 96 and 60, respectively. It can be seen from Photograph 1 below which states it is accurate that the proportion of female users are more dominant than male.

Explanation about the education level, employment status, and monthly income of respondents was made up of frequent users, occasional users, and seldom users to see the socio-demographic characteristics among each group of users that have a various frequency of use.

Frequent users are passengers who patronized TMB every day, 4-6 times a week, and 2-3 times a week. Frequent user is the highest level of usage of TMB, which is desired in the study. Beside frequent users, occasional users and seldom users are also the category of user that is also examined. Occasional users were described as commuters who used TMB once a week and once a month. Seldom users, on the other hand, were defined as users who used TMB once a year. Respondents who never use TMB is not a sample for this study because this study only applies to the respondent who has tried TMB at least once a year as the lowest level of usage. Thus, even though ‘never’ is also an option in the questionnaire, there are no single respondents that choose this answer for TMB.

Photograph 1 Female TMB users

On the point of other socio-demographic characteristics, the analysis splits the data between face to face questionnaire and an online questionnaire. The reason being is because the result shows more comprehensive information on the assumption that the distribution of socio-demographic characteristics of respondents is not only assessed from how frequent respondents use TMB, but also from how the questionnaire had been distributed throughout the survey.

Graph 1 Percentage of frequency

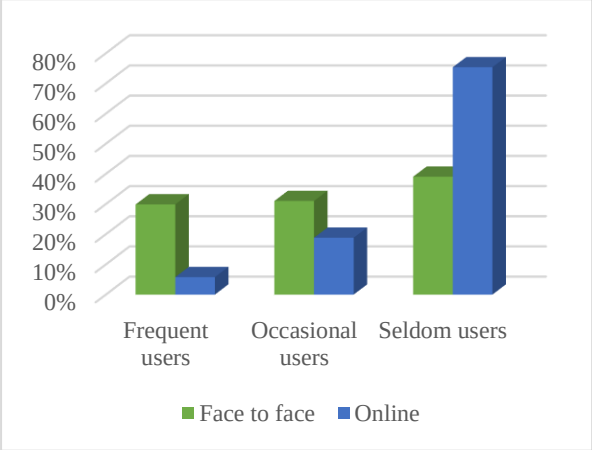


Table 2 Frequency of using TMB

Frequency	Face to face		Online	
	Count	%	Count	%
Frequent users	26	30%	4	6%
Occasional users	27	31%	13	19%
Seldom users	34	39%	52	75%
Total	87	100%	69	100%

Data obtained from face to face questionnaire have an even distribution regarding the frequency of use of TMB, each category has a percentage of around 30% out of all respondents. Whereas, data from the online questionnaire have a different result where an astonishing number of 75% of respondents are seldom users. The result shows that one of the reasons why seldom users are the highest percentage of the total respondents is because most of the respondents from the online questionnaire rarely use TMB. Meanwhile, frequent TMB users have the lowest percentage for both face to face and an online questionnaire. Out of 156 respondents, only 30 people are a frequent user of TMB.

Table 3 Employment status of respondents

Employment status	Face to face					Online				
	Seldom users	Occasional users	Frequent users	Total count	Total %	Seldom users	Occasional users	Frequent users	Total count	Total %
Unemployed	0	2	0	**2**	**2%**	1	0	0	**1**	**1%**
Housewife	2	6	3	**11**	**13%**	2	1	0	**3**	**4%**
Student	9	4	9	**22**	**27%**	13	2	0	**15**	**22%**
Private sector employee	10	13	10	**33**	**40%**	22	6	3	**31**	**46%**
Government employee	3	0	1	**4**	**5%**	8	1	1	**10**	**15%**

Employment status	Face to face					Online				
	Seldom users	**Occasional users**	**Frequent users**	**Total count**	**Total %**	**Seldom users**	**Occasional users**	**Frequent users**	**Total count**	**Total %**
Self-employed	7	2	1	**10**	**12%**	5	3	0	**8**	**12%**
Total	31	27	24	**82**	**100%**	51	13	4	**68**	**100%**

White-collar workers dominate the employment status of respondents, specifically from private sector employee. It has the highest percentage for each category of users, from the result of both face to face (40%) and online questionnaire (46%). It is further observed that student also has a relatively high percentage for both research methods. As for the data gained from the online questionnaire, the student is not a frequent user of TMB, while from face to face questionnaire, the student has a moderately even distribution among the frequency of use, which accounted for 38% of the student (count= 9) are a frequent user of TMB. Moreover, for the total count, the result from face to face questionnaire indicates that housewife is ranked as the third most category to use TMB (13%). Based on the observation, it is true that a moderate number of housewives are using TMB. Unfortunately, some of them did not want to be the respondent for this study because they were busy with their kids or they felt like they could not give a right answer because they have a lower level of education.

Table 4 Education level of respondents

Education level	Face to face					Online				
	Seldom users	Occasional users	Frequent users	**Total count**	**Total %**	Seldom users	Occasional users	Frequent users	**Total count**	**Total %**
Elementary school	1	4	2	**7**	**8%**	0	0	0	**0**	**0%**
Middle school	0	0	2	**2**	**2%**	0	0	0	**0**	**0%**
High school	5	15	9	**29**	**33%**	5	2	0	**7**	**10%**
Bachelor's degree	26	7	13	**46**	**53%**	39	10	4	**53**	**77%**
Master's degree or higher	2	1	0	**3**	**3%**	8	1	0	**9**	**13%**
Total	34	27	26	**87**	**100%**	52	13	4	**69**	**100%**

Respondent’s education level is dominated by a bachelor’s degree holder, particularly from the online questionnaire with a striking 77% of total online respondents. Bachelor is also the highest percentage for face to face questionnaire (53%). The fact that bachelor is the highest percentage is in line with the fact that white-collar workers dominate the sample of the study. As for the second-highest result, there is a different outcome between the data collection methods, in which high school is the second-highest education level (33%) for face to face method. In contrast, the second highest is a master’s degree (13%) for an online method.

Table 5 Monthly income of respondents

Monthly Income	Face to face					Online				
	Seldom users	**Occasional users**	**Frequent users**	Total count	Total %	**Seldom users**	**Occasional users**	**Frequent users**	Total count	Total %
Less than Rp. 3,5 mil	10	17	14	**41**	**48%**	13	4	0	**17**	**25%**
Rp. 3,5 mil - 5,5 mil	10	7	6	**23**	**27%**	13	6	4	**23**	**33%**
Rp. 5,6 mil - 6,5 mil	4	1	3	**8**	**9%**	12	2	0	**14**	**20%**
More than 7,5 mil	10	2	2	**14**	**16%**	14	1	0	**15**	**22%**

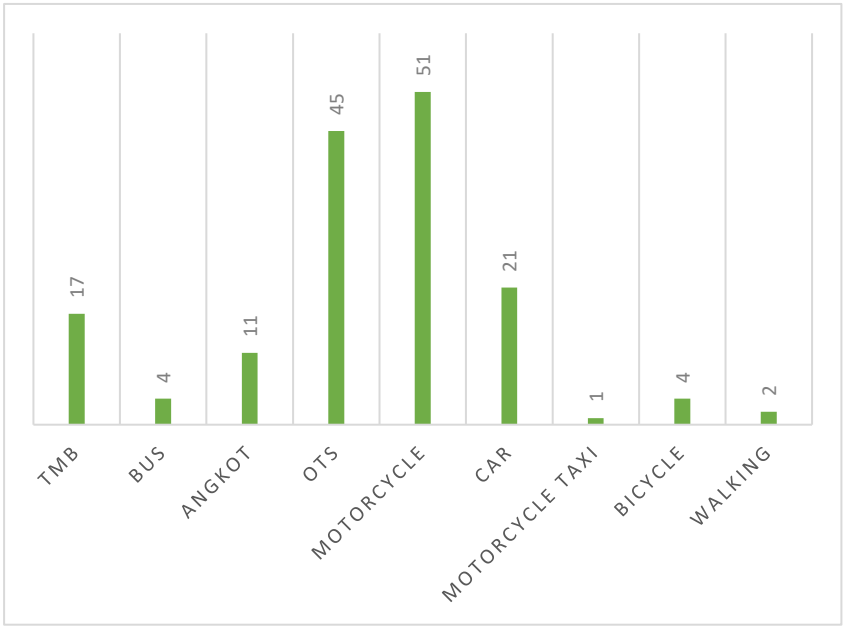
Monthly Income	Face to face					Online				
	Seldom users	**Occasional users**	**Frequent users**	Total count	Total %	**Seldom users**	**Occasional users**	**Frequent users**	Total count	Total %
Total	34	27	25	**86**	**100%**	52	13	4	**69**	**100%**

There is a high number of low-income earners among the respondents from face to face survey with almost half (48%) of the total face to face respondents. Low-income earners are indeed the goal of TMB that the government wants to achieve. Different from that, result from the online questionnaire shows a relatively even distribution with the highest respondents come from middle-income earner with 33% of the total.

4.3.2 Trip characteristics of respondents

4.3.2.1Main mode of transport

Graph 2 Main mode of transport of respondents



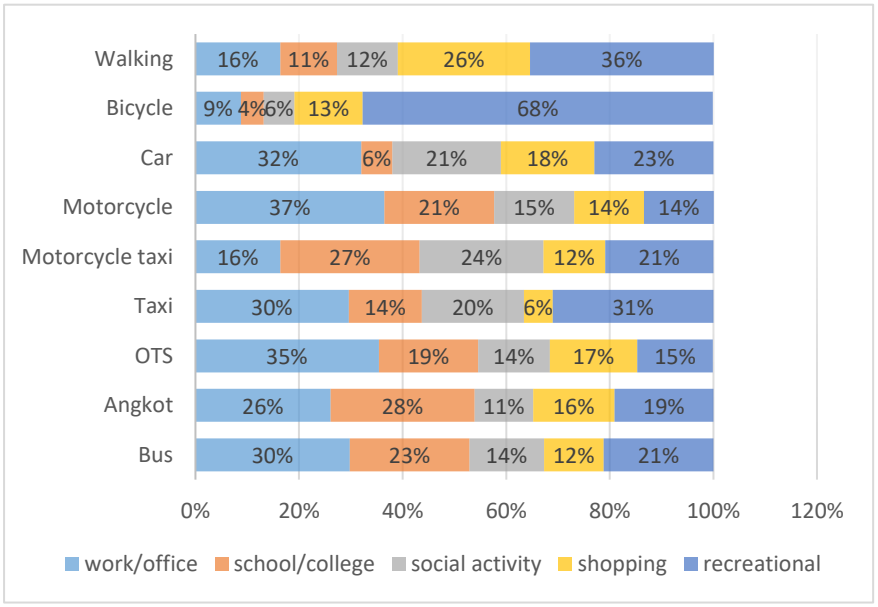
An analysis regarding the primary mode of transport shows that motorcycle is the most common mode of transport which is used by respondents (51 respondents). This result is aligned with the study from (Barter, 1999) which stated that the most notable motorization in Asian cities is the dramatic surge in a motorcycle. The second highest mode of transportation that people choose is OTS, with 45 % of the respondents. Motorcycle based vehicle (OTS and private motorcycle) gained its popularity in Bandung because a motorcycle has a small body, which makes it easier to overtake a car when there is a traffic jam. So, it can reach the destination within a shorter travel time. Another benefit of the small body of a motorcycle is that it covers a narrow road.

Meanwhile, TMB is in the fourth position for modes of transport (17 respondents) that the respondents prefer after car. The study revealed that TMB is apparently not the primary mode of transport by users who experienced the service yet, even though the research is conducted inside TMB and at the TMB stops. Commuters are still prefer to use their private vehicle or OTS. Regrettably, the most used vehicles in Bandung are the less sustainable vehicle. The more sustainable one like TMB does not catches people's attention.

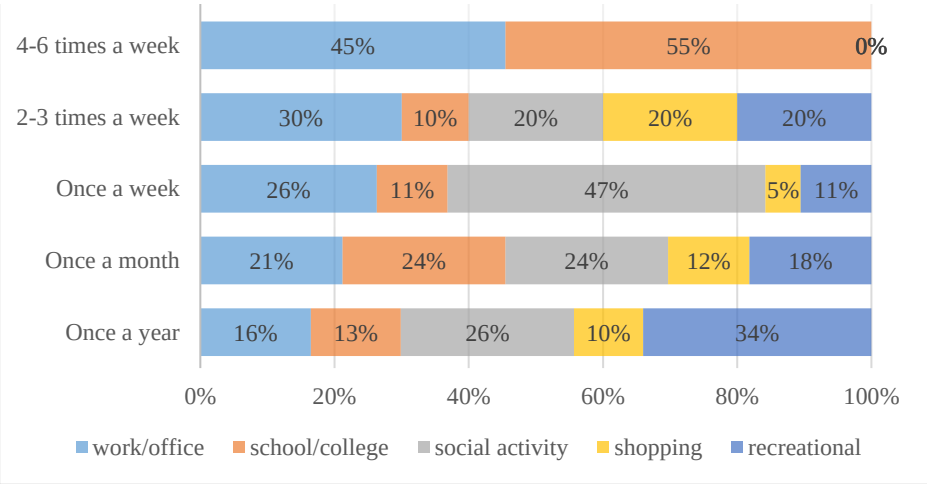
4.3.2.3Purpose of travel by type of mode

In terms of travelling by all type mode of transport that is circulated in Bandung City, respondents choose a car, motorcycle, OTS, and bus mostly for work/office purpose with the percentage of around 30% for each mode. When respondents wanted to go on a recreational event, they mostly choose walking, bicycle, and taxi. As for going to school/college, respondents mostly choose motorcycle taxi and Angkot.

Graph 3 Purpose of travel by type of mode



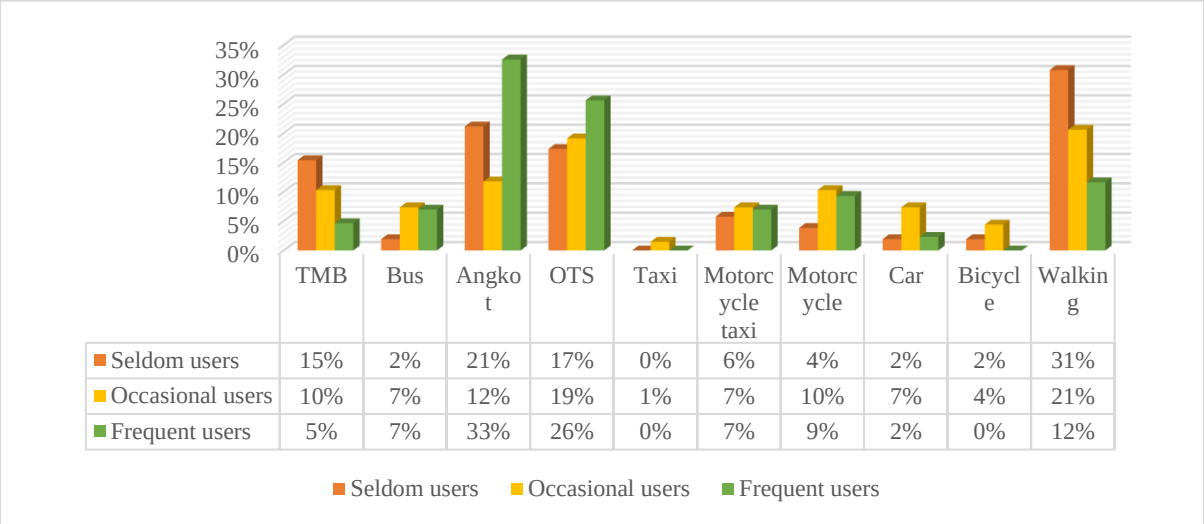
Graph 4 Cross-tabulation between the frequency of using TMB and the purpose of travel



As regards to the purpose of using TMB, frequent users, precisely every day and 4-6 times a week user patronized the TMB services for work and school, but not for other purposes. Among everyday users, 83% used TMB for work/office. Regarding 4-6 times a week user, the answer is almost equally distributed between work/office (45%) and school/college (55%). For occasional respondents, TMB is used mainly for purposes of visiting family and friends. Seldom users choose to use TMB mostly for recreational (34%) purpose.

4.3.2.4Combination of modes using TMB

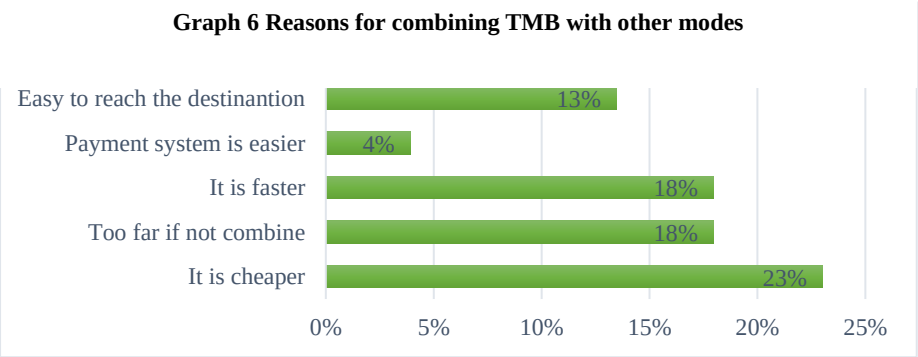
Graph 5 Cross-tabulation between frequency and combination when using TMB



	TMB	Bus	Angkot	OTS	Taxi	Motorcycle taxi	Motorcycle	Car	Bicycle	Walking
Seldom users	15%	2%	21%	17%	0%	6%	4%	2%	2%	31%
Occasional users	10%	7%	12%	19%	1%	7%	10%	7%	4%	21%
Frequent users	5%	7%	33%	26%	0%	7%	9%	2%	0%	12%

Respondents from all categories mostly combine modes with Angkot, OTS, and walking. Angkot is a minivan, which is paratransit or sometimes called Intermediate Public Transit (IPT) that people usually use for filling in the gap that public transport could not cover. Most of seldom users and occasional users walk to reach the nearest TMB stops with the percentage of 31% and 21%, respectively. Whereas frequent users combine TMB with Angkot (33%) or OTS (26%). Indeed, the purpose of Angkot and OTS is to be the feeder and to connect commuters to reach the main public transport.

Graph 6 Reasons for combining TMB with other modes



The highest percentage of respondents choose to combine modes because there is no other choice available (24%). Having no other choice is a prove that Bandung needs to give a better accessibility by providing more options of transportation mode for the citizen. It would give people a range of options for them to travel. Other reasons for combining modes are; it is more affordable to combine modes, the destination is too far to reach without combining modes, it is faster to combine, and it is easier to reach the destination.

4.4 Descriptive Analysis

Compare means and frequency analysis are the methods used for the study because it is able to analyze how is the perception of service quality provided by TMB, which answer the first sub-research question; *'how do users perceive the service quality of Trans Metro Bandung?'*.

4.4.1 Perception of Service Quality of Trans Metro Bandung

The result shows that for all indicators of perceived service quality, the highest response for the Likert scale is the middle answer. The consequence of using a 5 Likert scale is a tendency for people to choose the middle answer. Therefore, this section mostly focusses on the answer, that is not in the middle. Moreover, to support the answer for each sub-variables of perceived

service quality, triangulation through different sources are discussed to give more insight about the real service quality of TMB using observations, interviews, evaluation documents from Bandung Transportation Department, and other secondary data.

4.4.1.1Perception of connectivity

Table 6 Perception of connectivity

How often people use TMB	Mean of Connectivity		
	Time to the nearest stop	Ease of transfer	Waiting time
Once a year	2.41	2.56	2.13
Once a month	2.91	2.74	2.78
Once a week	2.82	2.88	2.47
2-3 times a week	3.00	2.69	2.46
4-6 times a week	2.82	3.00	2.73
Everyday	3.33	3.00	2.83
Total	2.88	2.81	2.57

Sub-variable connectivity has several indicators which time are consumed to the nearest TMB stop, ease of transfer, waiting time and in-vehicle time. Seldom user with the frequency of use of TMB once a year has the lowest mean score of 2.41, which means that they considered the time consumed to get to the nearest TMB stop is long. Everyday users have the highest average of 3.33, where it means that the time consumed is relatively short. Further, none of the respondents who use TMB every day thinks that the time consumed is very long and long; the minimum answer for everyday users are not long nor short (see Annex 6). The fact that there are only four routes available, while the planned is to install 16 lines is one of the reasons TMB needs to improve their connectivity.

Moreover, connectivity also relates to the easiness of transfer to a different type of transit. Indicator of transport is essential, knowing that several passengers combine TMB with other modes of transport (see sub-section of 4.3.2.4). For a frequent and occasional user who combine modes, the perception of the ease of transferring from the TMB stop to another mode is relatively easy (M= 3.00). There is a slightly lower score for opinion in the eye of seldom users who use TMB once a year with a mean score of 2.56

Connectivity in this study also relates to traveling time. Frequent users perceived a relatively short time needed (M= 2.83) to wait for the TMB bus to come. There is no significant difference between frequent users and occasional users regarding the waiting time at the TMB stop. The lowest mean comes from seldom users who consider that the waiting time is relatively long (M=2.13). In regards with travel time inside the TMB, there is no significant difference between the group with the lowest mean score of 2.64 from the frequent users and the highest average score of 2.92 from the occasional users. Both perceptions are considered relatively fair for the time that respondents need to spend traveling inside TMB.

4.4.1.2Perception of reliability and scheduling

Regarding the perception of whether TMB is adherence to the schedule or not, everyday users perceived that the TMB relatively provide a fair service (M= 3.00). The standard deviation is 0.000, meaning that the score clustered at the median or in other words, all respondents consider the adherence to the schedule as fair. This perception differs compared to seldom users and occasional users with a relatively lower mean score where they feel the adherence to the schedule to be poor (M= 2.42).

Table 7 Perception of reliability and scheduling

How often people use TMB	Mean of Reliability & Scheduling	
	Adherence to the time schedule	Arrival time
Once a year	2.42	2.39
Once a month	2.83	2.87
Once a week	2.76	2.71
2-3 times a week	2.31	2.38
4-6 times a week	2.82	2.82
Everyday	3.00	2.83
Total	2.69	2.67

Reliability and scheduling sub-variables relate to the frequency of the bus to arrive at the stops as well. TMB performed a better frequency of arrival time according to frequent and occasional users except for respondents who use TMB 2-3 times a week (M= 2.38). This result is in line with the interview.

"I think it is enough because TMB always departs on schedule, unlike the Angkot where it departs after it is full of passengers" (Frequent TMB user, Female, 14, Student)

In contrast, seldom user who uses TMB once a year give a low average score of 2.30. The interview supports this result.

"I think it is not enough. The bus should come every 10 minutes" (Seldom user of TMB, Frequent motorcycle user, Male, 20, Student).

4.4.1.3Perception of fare

Table 8 Fare of TMB

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
How much do you spend on TMB	156	2000	20000	7711.54	4230.473
Valid N (listwise)	156				

TMB has a flat fare. No matter how short or far the distance is, the fare stays the same. Some route has a different fare with a range of Rp. 3,000 – 5,000. The average fare of TMB is Rp. 7,711. Some respondents counted back and forth for the use of TMB, which is why the median of the fare is Rp. 8,000, which means that the price of the ticket is Rp. 4,000. Several respondents choose Rp. 2,000 as the minimum fare because the government-subsidized the fare ticket for a student from elementary school until high school student. Giving a subsidy for a particular group is in line with the concept of vertical economic equity of the outcome from Geurs and Ritsema van Eck, Jan R, (2001), to target economically disadvantaged group to be able to have the same opportunity to use public transport by giving travel concessions and subsidies to reduce financial exclusion.

As for the perception of the fare of TMB, there are no significant difference. All respondents considered the price to be affordable with 3.83 mean scores. A good perception of the fare is in line with the Bandung Transportation Department where the fare of TMB has the highest Customer Satisfaction Index (CSI) among the attributes that Bandung Transportation Department evaluated. It means that users are the most satisfied with the fare of TMB.

Photograph 2 Card reader for purchasing the ticket

Photograph 3 Assistant driver collecting the money

In terms of the procedure of purchasing the ticket, the assistant driver collects the money from passengers. Even though there is a card reader for e-money inside the bus, no one uses it. One of the reasons why no one uses the e-ticket machine is because not all passenger has the public transportation e-card, and it is hard to tell which one already taps or not because there is no scanner for people who already tap to the machine. A printed ticket connected with the card reader machine could be a solution for this problem. So, whenever users tap, the ticket will be printed. It will be easier for the assistant driver to check which users already pay for the ticket.

4.4.1.4Perception of comfort

Table 9 Perception of comfort

How often people use TMB	Mean of Comfort	
	Access to seat	Driver handling
Once a year	2.97	2.98
Once a month	2.87	3.00
Once a week	3.29	3.18
2-3 times a week	3.00	3.31
4-6 times a week	3.18	3.36
Everyday	3.00	3.00
Total	3.05	3.14

All respondents of the frequent users identified the access to seat as fair with the highest mean of 3.18 among frequent user respondents. On the other hand, a lower average score is given from the frequent user with an average of 2.97. Based on the observation, there is a significant difference between an off-peak hour and peak hour regarding the access to the seat.

Photograph 4 Off-peak hour inside TMB

Photograph 5 Peak hour inside TMB

In general, drivers handling is considered fair, and there is no significant difference in the perception of drivers handling. The highest average comes from respondents who patronized TMB 4-6 times week (M= 3.36). Meanwhile, the lowest score is from the seldom users, with an average score of 2.98.

Two staffs from TMB help the operation of TMB, one of them is the driver, and the other is the assistant driver. The assistant driver helps some respondents who have difficulties to enter and exit the TMB such as elderly or disabled person. The assistant driver is also the one who open and close the TMB front door. The front door of TMB is used for people who enter and exit TMB not at the TMB stops.

Photograph 6 Middle door to stop at the TMB stop

Photograph 7 Front door to stop on the side of the road

Based on the observation, TMB mostly stops at the side of the street and not at the designated stop. It stops whenever there is a possible passenger who is waiting at the side of the road. The only TMB route that stops at the designated stop is Route 3 Cicaheum – Sarijadi. Photograph 6 is the picture taken inside TMB Route 3. An interview was conducted to understand more about user's opinion regarding the fact that TMB did not stop at the designated stop. Several users said that they are fine with it.

"I don't mind if TMB bus stops everywhere, just don't take too long to stop" (Occasional TMB user, frequent motorcycle user, male, 42, private sector employee).

Meanwhile, other users said that they were disagree when the bus stops not at the designated stop. The interview result stated below.

"TMB bus should stop only at the bus stop. I like how my route (route 3: Cicaheum – Sarijadi) stops only at the TMB stop, unlike route 2 (Cicaheum – Cibeureum), it stops wherever it pleases. I don't think it's good" (Occasional TMB user, Frequent OTS user, Female, 31, Housewife).

"I think it's undisciplined, what is the purpose of the stop if people don't use it? TMB provider should focus on fixing this issue, and provider should inform and educate passengers that they need to stop only at the designated stops" (Frequent TMB user, Female, 37, Private sector employee)

Another comfort indicator is temperature control. There is also no significant difference between each group. Most of the respondents perceived TMB as fair related to the temperature control with a range of mean score from 2.91 (by seldom users) to 3.29 (by occasional users).

4.4.1.5Perception of information

Chart 2 Access to online pre-travel information

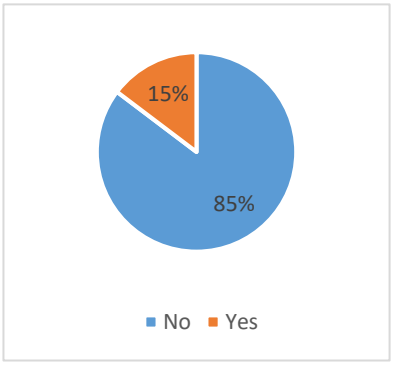


Chart 3 Access to pre-travel information at the stop

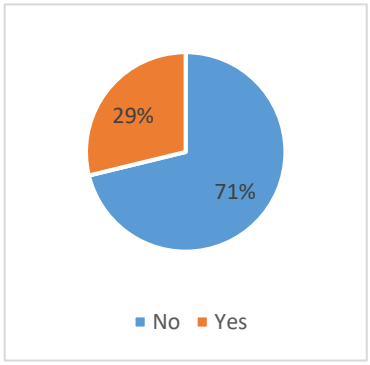
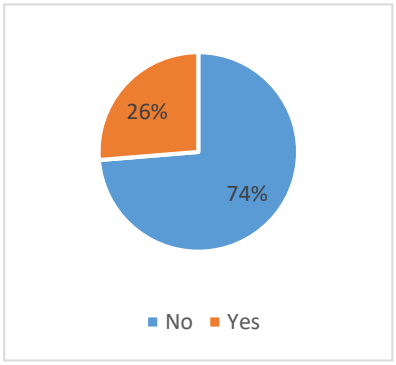


Chart 4 Access to en-route information



Information is split into three types of information. First, online pre-travel information where the respondent gets the information they needed before traveling with TMB through surfing on an online source. Second, obtaining the pre-travel information at the TMB stop while waiting at the bus to arrive. Third, information inside TMB while traveling to see where they are and where will they stop. From the survey data, more than 70% of respondents do not get access to any information. They do not get information before traveling, nor they get it while traveling with TMB. They do not even get information through an online source. Most of the respondents usually wait at the stop until one of the TMB buses appears.

Photograph 8 Information is not available for most of the stop

Photograph 9 Information is available at the TMB stop route 4

More people are saying that they do not get any information related to the arrival time of TMB. Through the interview, some people said that they got information attached in the window of the bus, but now there is zero information.

"There was one time where I could see the schedule on the front side of the bus. However, now the provider does not give any information about the schedule of the bus. Thankfully, I took a picture of it. Sometimes I look at it, but the other time I just wait at the TMB stop without knowing when the bus will come" (Occasional TMB user, Frequent OTS user, Female, 31, Housewife)

"The information is not enough. Before, I was able to find information regarding the scheduled departure on the bus, but now the schedule is no longer available" (Seldom user of TMB, Frequent motorcycle user, Male, 20, Student).

Considering how Information and Communication Technologies (ICT) is getting more advanced each day, TMB should be able to provide the information with the help of technology. One of the solutions is to provide better online information. For example, commuters can access all information related to TMB with their smartphone through the website of TMB or TMB apps. The data contains everything that commuters need to know from the routes, operational hour, and even a real-time arrival time of TMB. In the digitalized era, TMB must be able to compete with other companies, such as the OTS company that already maximizes the use of technology.

Table 10 Perception of information

How often people use TMB	Mean of Information		
	Online pre-travel information	Pre-travel information at TMB stop	En-route information
Once a year	2.52	2.28	2.48
Once a month	2.67	2.00	3.00
Once a week	3.00	3.00	2.50
2-3 times a week	2.00	3.00	2.75
4-6 times a week	3.00	3.40	3.00
Everyday	3.00	3.00	3.00

How often people use TMB	Mean of Information		
	Online pre-travel information	Pre-travel information at TMB stop	En-route information
Total	2.70	2.78	2.79

With regards to some respondents that got the information, seldom users give a low score of 2.52, which means that the information that they got is relatively poor. Seldom users perceived the pre-travel and en-route information more unpleasant than the frequent and occasional users perceived. Based on the interview, en-route information was gained from the assistant driver. Every time the TMB about to arrive at each stop, the assistant driver will shout which stop that they are heading. Some respondents considered the information obtained from the assistant driver as useful.

"Several stops have departure schedule, but others do not have any information at the stop. I get the information from the assistant driver for the next stop. He will shout where the next stop is" (Occasional TMB user, Frequent bicycle user, Female, 61, Retired)

"The information that I get before getting inside TMB is inadequate. However, the information that I get inside TMB is enough because the driver assistant always tells us where the next stop is" (Occasional TMB user, Frequent angkot user, Female, 44, Private sector employee).

Unfortunately, they could not see the real-time information of the name of each stop for the route that they ride on. The only information inside the TMB comes from the assistant driver. This service quality needs improvement because the information is an essential aspect for people to use TMB, especially for the user who use TMB for the first time. They need to understand when the bus will arrive, and the bus interval.

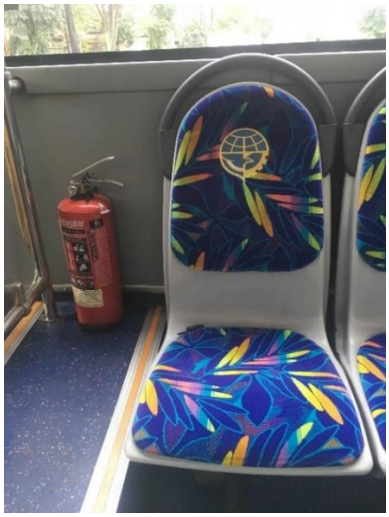
4.4.1.6Perception of safety and security

Table 11 Perception of Safety and Security

How often people use TMB	Mean of Safety & Security	
	Safety	**Security**
Once a year	2.97	2.87
Once a month	3.13	3.04
Once a week	3.06	3.06
2-3 times a week	3.31	3.08
4-6 times a week	3.09	3.36
Everyday	3.33	3.33
Total	3.15	3.12

Everyday users give the highest mean score for safety (M= 3.33). Whereas, the lowest score comes from seldom users, with an average score of 2.97. All interviewee said that they never experience any safety issue, even the elderly said that they like how the assistant driver helps them to get inside of TMB. The frequent users give the same score for the security as well as safety. A slightly lower mean score comes from seldom users (2.87). The same answer from the interviewee applies to the security of TMB. Not a single interviewee ever experienced an unfortunate event regarding the safety issue.

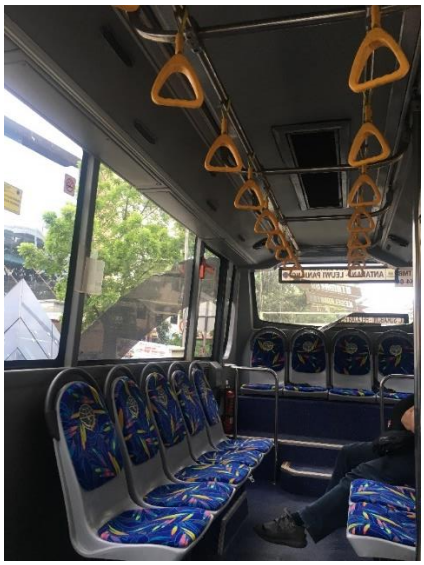
Photograph set 10 Safety facilities inside the TMB (emergency hammer and fire extinguisher)



4.4.1.7Perception of cleanliness

As regard to cleanliness, the more frequent the respondent uses TMB, the higher they perceived the cleanliness inside the TMB bus. The lowest score was given by the seldom users (M= 2.84); then, the occasional users observed the cleanliness higher around the average score of 2.9. Lastly, only the frequent user gave the highest score of more than 3.00. Even though there is a slight difference between the category of user, all categories give a good score for cleanliness inside TMB.

Photograph 11 Physical appearances of TMB



Different from the perception of the cleanliness inside TMB, cleanliness of TMB stops have the lowest means score (M= 1.92) among other perceived service quality aspects. The highest score which comes from the respondents who uses TMB 4-6 times a week still consider as a low score (M=2.64). From the perspective of users, TMB stops were not clean, and users were uncomfortable to wait at the stop.

Photograph 12 Unstandardized quality of the TMB stop


From the observation, TMB stops do not have a standard quality. Each stop has a different facility, quality, and cleanliness. Besides, some of the TMB stops are not working anymore. Some seller took it as an opportunity to sell their commodity at the stop and homeless use it as their shelter at night. This issue has influenced the degradation of the service quality of the TMB stops.

"It's dirty and smelly. The smell of pee is all over the stops. What worse is that on peak hour, my waiting time at the stop is longer. I don't like my experience at the TMB stop. Moreover, some street vendor use TMB to sell their goods. It's a shame, people who are supposed to wait at the stop need to wait somewhere else because the stop is filled with street vendor" (Occasional TMB user, Frequent OTS user, Female, 31, Housewife).

"Dirty and there is no chair inside the stop" (Occasional TMB user, Frequent bicycle user, Female, 61, Retired)

The fact that the TMB stops are not maintained well might be one of the reasons why passengers do not want to use TMB stops and lead to the problem of TMB stopping everywhere, not at the designated stop. TMB stops that receive complaints mostly for route one (Elang – Cibiru). One of the reasons because TMB stops on the route one is constructed through Corporate Social Responsibility (Kurnia, 2019). This third party do not maintain the stops after it was built. This causes the degradation of the quality of TMB stops. The government should take over the responsibility of the TMB stops so that they can maintain the stops.

4.5 Inferential Analysis

Manova and Regression analysis are two inferential analysis methods to answer the second sub-research question; *'to what extent does the perceived service quality influence the level of use of TMB?'*.

4.5.1 Reliability and Validity Analysis

The first thing to do before running a Manova and Regression is to aggregate several indicators for one sub-variables. Indicators acquired from the questionnaire needs to be aggregated first because each sub-variable has more than one indicator. The reliability test between indicators

in one sub-variable should be high to aggregate those indicators. Cronbach's alpha should be higher than 0.7 to aggregate the indicator; in some cases, 0.6 is also acceptable.

Table 12 Reliability analysis matrix for aggregated independent variables

Aggregated Variable	Indicators	Cronbach's Alpha
Connectivity	Walking time to reach nearest stop	0.638
	Ease of transfer	
	Waiting time at the stop	
	In-vehicle time	
Reliability & Scheduling	Adherence to time schedule	0.897
	Frequency of the bus arrive at the stop	
Fare	Cost of fare	0.260
	Ease of purchasing ticket	
Comfort	Availability of seats	0.725
	Temperature control	
	Drivers handling	
Information	Online pre-trip information	0.922
	Pre-trip information at the stop	
	En-route information	
Safety & Security	Safety from accident	0.778
	Security against crime at the bus or at the stop	
Cleanliness	Cleanliness of vehicles	0.286
	Cleanliness of stops/waiting area	

Based on the reliability test, it can be seen that sub-variables connectivity, reliability and scheduling, comfort, safety and security, and information have a high-reliability test with a Cronbach's alpha more than 0.6. Thus, the indicators can be aggregated for these five sub-variables. The other two sub-variables (fare and cleanliness) have a low-reliability test.

Some assumptions should be met before conducting a Manova and Regression analysis. The study explained these assumptions, including Mahalanobis, the test of normality, and Spearman's correlation. First, Mahalanobis test is conducted to see if there is an outlier's response in the study. Mahalanobis distance should be less than 18.47 (Grande, 2015). Based on the table above the 'Mahal. Distance' row shows 25.28 (See Annex 6) as a result, which means that there are some outliers in the study. After removing eight outliers that have a higher number than 18.47, the Mahalanobis value decreased into 18.65, which is near the accepted value of Mahalanobis.

Second, the assumption of the test of normality is to see if the data generated from the survey is normal. If the significance level in the Shapiro-wilk is higher than 0.05, the data is normal. Based on the result, the null hypothesis is rejected because the data does not have a normal distribution (see Annex 6). Although the normality test fails to meet the assumption, the Manova and regression analysis will still be used to answer the main research question in this study. Mooi; Sarstedt, et al., (2018) stated that even if the data does not meet the assumption, the regression model would show an accurate result, but the consequences is it will be more difficult to determine the significance of the result.

Third, there should not be any multicollinearity between each perceived service quality sub-variables because it can cause a problem when estimating the analysis. Spearman's correlation suits the best for this assumption. The reason being is because Spearman's correlation deals with data that does not have a normal distribution based on the result of the second assumption, the test of normality.

Based on the result, there is no multicollinearity in this data set. Hence, the assumption is met. Beside no multicollinearity assumption, there should still be enough correlation between each perceived service quality sub-variables. To interpret the number of the result, a correlation

between 0.1 – 0.29 means that there is a small relationship between sub-variables, a correlation between 0.3 – 0.49 means that there is a medium relationship, and a correlation more than 0.5 considered there is a strong relationship (Grande, 2015). Relationship between comfort and safety is the only combination that has a great relationship. Other combinations have a low to a middle relationship, but the data shows that there is a relationship between each of the variable, and there is no multicollinearity. The analysis of Manova and regression can be conducted after all assumption has been tested.

4.5.2 Manova

Before knowing the extent to which the independent variable influences the level of use, it is essential to know first if the difference in the perception of service quality is indeed influencing the level of use of TMB. Thus, Manova is the accurate analysis because it can compare if there is a different perception of service quality among frequent user, occasional user, and seldom user. Manova compares whether the average value of an independent variable differs across the categories of the dependent variable (Acton; Miller, et al., 2009). If the difference between the group is higher than within-group, it can be concluded that it must be the group that makes the difference, and the result is likely significant. The analysis of Manova focuses on the mean score for each group regardless of the group size. The total sample for each frequency of use of TMB is uneven, in which the proportion of seldom user dominates the sample with 57 respondents, followed by an occasional user and frequent user with 24 and 14 respondents, respectively.

Most service quality aspects (seven out of eight) have the same pattern for each group of users (see Annex 6). Seldom users perceived the lowest score for the quality of TMB, the occasional user gives a higher score than the seldom user, and the frequent user gives the highest score. It can be said that the better people perceived the service quality that TMB provide, the more they use TMB. The seven service quality attributes that have this pattern are connectivity, fare, information, comfort, safe and secure, and cleanliness.

There are several possibilities for why the result showed this pattern. First, having a TMB is already a better option than not having it at all. Second, perception is not only limited to one mode per se, but it can also relate with a comparison with other modes of transport. Before TMB is launched, the frequent user had a hard time finding good public transport to accommodate their activities. Hence, having TMB itself is already a better experience in comparison with the experience which they had before. Second, frequent users get used to the service that has been given to them since TMB starts operating. When people are familiar with a certain condition, sometimes they accustomed to that condition.

The Manova result shows that frequent TMB users perceived a better score for the service quality of TMB compared to seldom users/occasional users. The table gives a more comprehensive analysis when it is combined with the result from the test of between-subjects effects below. Hence, a more in-depth explanation about the mean score in this table is explained below.

Table 13 Test of between-subjects effects

Source	Dependent variable	F	Significance
The level of use	Connectivity	4.799	0.010
	Reliability & Scheduling	1.989	0.143
	Fare	4.968	0.009
	Information	3.757	0.027
	Comfort	0.916	0.404

	Safety & Security	1.764	0.177
	Cleanliness	1.657	0.196

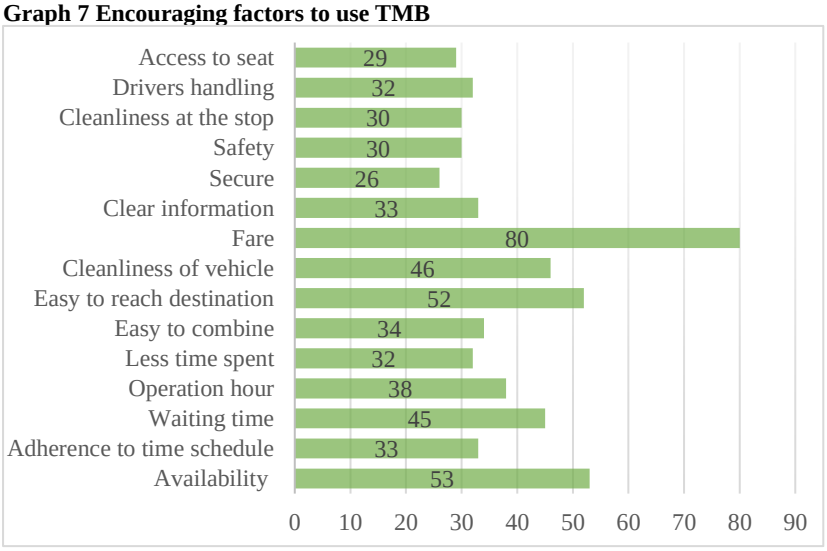
Source: SPSS analysis, 2009

Statistically significant findings are reached if the significant value in the test of between-subjects effect is 0.05 and less. Statistically significant means that the results likely did not happen by chance. Three service quality that shows a statistically significant result are connectivity, fare, and information. It can be concluded that perception about connectivity, fare, and information qualities are the determinants service quality to travel by TMB. The results from the questionnaire shows that 79% of respondents willing to shift their current primary mode of transport to TMB if TMB managed to enhance the service quality. Besides, the result of the interview also strengthens this statement.

"Bandung, as one of the most populous cities in Indonesia, does not have a good and reliable public transport. TMB can surely be the solution if it can improve the quality" (Occasional user of TMB, Frequent motorcycle user, 21, Male, Unemployed)

Based on the Manova, the fare is the most significant service quality with a significance of 0.009 (F= 4.968), it shows that fare has a substantial influence on how frequent users patronage the TMB service. The result from the questionnaire shows that (see Annex 6) 44.6% of respondents voted fare as the most critical service quality determinants for travelling by TMB.

Graph 7 Encouraging factors to use TMB



Based on the questionnaire, the respondents were asked to choose more than one service quality indicators that encourage them to use TMB. The result shows that fare is the main encouraging factors with 80 responses from the users said that fare is the determinants for them to use TMB. The low and flat fare of TMB is probably the main reason why respondents choose to use TMB compared to another mode of transport. It is sequentially followed by availability (53 responses), easy to reach the destination (52 responses), and cleanliness of vehicle (52 responses).

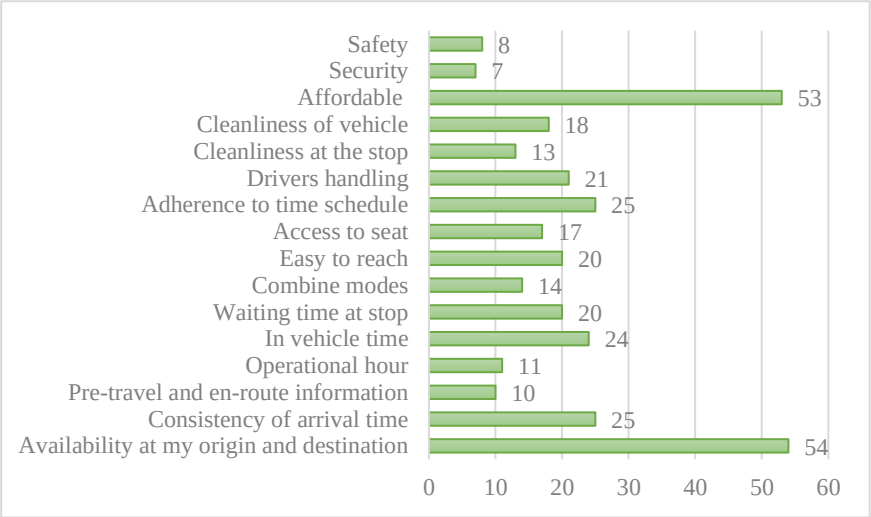
Moreover, there is also a significant result for 'information' with a p-value 0.027 ($p<0.05$, F= 3.757). Users give a low value because they do not get the information, and even if they get information, the quality of the information is low. Based on the survey, the service quality related to the information indeed shows a poor quality based on the user's perception. Not only that, more than 70% of users said that they do not get any information related to TMB.

"There is no single information about the schedule that I could obtain" (Occasional TMB user, Frequent OTS user, Female, 51, Private sector employee)

Lastly, another service quality attribute which influences the level of use of TMB is connectivity (p= 0.01, F= 4.748), in which frequent user has a better perception about the connectivity of TMB (M= 3.00). The result from the questionnaire when respondents were

asked to list which service quality indicators are essential for them, support the result from Manova analysis, specifically for fare and connectivity.

Graph 8 Importance rank by frequent TMB user



TMB should focus on what is essential for the frequent user of TMB to maintain the loyalty of passengers. Based on the result from the questionnaire, for a frequent user, availability of TMB at origin and destination (54) and affordability (53) has a high level of importance rather than the other service qualities. Availability is one of the indicators inside connectivity sub-variables. Each category of the user has a different view on which service quality is more important than others. For a frequent user of TMB, the most important factors are affordability and availability, while for other respondents who are not the frequent user of TMB, consistency of arrival time is also essential besides affordability and availability.

4.5.3 Regression Analysis

After knowing that connectivity, fare, and information are the determinants to the level of use of TMB, it is vital to understand the degree to which these perceived service qualities influence the level of use of TMB. Regression analysis is essential to get a deeper understanding of which service quality has a higher effect on the level of use of TMB. Regression analysis can show the coefficient of how much the perceived service quality (independent variables) affecting the level of use of TMB (dependent variables), which is the frequency of usage.

Table 14 Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.369[a]	.136	.067	1.420	.136	1.962	7	87	.069

a. Predictors: (Constant), Cleanliness, Fare, Connectivity, Comfort, Information, Safe_Secure, Reliability_Schedule

b. Dependent Variable: How often people use TMB

Looking at the R square on the table above, it shows how much movement in the dependent variable is described by the movement in the independent variable (Acton, 2009). R square 0.3 is the target number, but, the result shows 0.136, which indicates that the perceived service quality can explain 13,6 % of the difference in the level of use of TMB. The percentage means that it can only explain a little variance in the independent variable. One of the reasons why the study shows a little result is because service quality might not be the sole reason for choosing one mode. Other additional factors outside the service quality of TMB may influence the frequency of using one mode of transport, for instance, how they perceived other modes of transports outside TMB. The reason for the non-frequent user not using TMB might be because they prefer to use their private vehicle, not only because of how they perceived the service quality of TMB. For example, a motorcycle might be preferable because it is faster than TMB,

and a car is preferred because it gives a sense of privacy (Maduwanthi, 2015). It is in line with a statement from the interview.

"I have a motorcycle, so why not make the most out of it? It will take a longer time if I use TMB compared to using my motorcycle" (Occasional TMB user, Frequent motorcycle user, Male, 42, Private sector employee).

Table 15 Regression analysis about the relationship between perceived service quality and level of use of TMB

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients			Correlations			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-1.101	1.413		-.779	.438					
	Connectivity	.386	.358	.131	1.080	.283	.254	.115	.108	.675	1.481
	Reliability_Schedule	.087	.282	.039	.308	.759	.216	.033	.031	.611	1.637
	Fare	.402	.248	.171	1.624	.108	.243	.171	.162	.898	1.113
	Information	.354	.276	.155	1.286	.202	.272	.137	.128	.683	1.463
	Comfort	-.094	.375	-.031	-.251	.802	.112	-.027	-.025	.668	1.496
	Safe_Secure	.160	.410	.050	.391	.697	.138	.042	.039	.612	1.635
	Cleanliness	.106	.327	.040	.326	.746	.191	.035	.032	.674	1.483

a. Dependent Variable: How often people use TMB

Variance inflation factors (VIF) and tolerance in the collinearity statistics column imply how perceived service quality in the model does not explain much variability for the specific service quality. Tolerance should be above 0.1 and VIF should be less than 10.0. The tolerance in the study is higher than 0.1 for all the independent variables. The VIF value is way less than 10.0, and all independent variables have around 1.0 VIF. Based on the result of VIF and tolerance, it is safe to assume that any other independent variables do not explain all independent variables in the study.

Other important aspects to look at is the unstandardized B coefficient. It describes the amount of change in the dependent variable caused by an improvement of one unit in the independent variable. To be able to use the unstandardized B coefficient value, one should look at the significance first. The table shows that the outcome is not significant, which could happen because most passengers choose the middle answer (fair) on the Likert scale for all indicators related to service quality. This answer generates biased to the significant result because there is no big change in the perceived service quality whether respondent use TMB regularly or not. Consequently, the analysis used the significance from the result of the Manova test with three sub-variables which have a significant result; connectivity, information, and fare.

The way to understand unstandardized B coefficient is that for every unit improve in the perceived service quality (predictor variable), the level of use of TMB (outcome variable) will increase by the beta coefficient value. The value of the beta coefficient can answer the extent of changes in the frequency of use of TMB that resulted from the perception of service quality. There are three service quality attributes have the most substantial influence on the level of use of TMB compared to others. First, the fare is the service quality aspect with the highest possibility to change the usage of TMB with 0.402 unstandardized B coefficient. The meaning of this coefficient is if the respondents give a better score for the fare of TMB by one point, the equation predicts that the frequency of use of TMB will increase by 40.2%.

Second highest is connectivity. In regards with this aspect, when the users have a better experience with the connectivity of TMB by one unit, the equation predicts that the level of use of TMB will increase by 38,6% (B= 0.386). This result is in accordance with the result gathered from the interview as follow.

"If it is easy for me to transfer from TMB for my final destination, just like what Jakarta has done, I think TMB would be a much more exciting choice. I am imagining if TMB is cashless and when I get off from TMB I can see another busway right away without having to pay again and walk that much. The traffic will become much better in Bandung" (Frequent OTS user, Seldom user of TMB, Female, 22, High school student)

"Yes, I will start thinking of shifting from OTS to TMB if the waiting time at the stop can be faster. I choose OTS as my main mode of transport because it is faster than TMB, but if TMB can compete, why not using TMB?" (Seldom user of TMB, Frequent OTS user, 26, Female, Student)

"The route is important for me; the mode choice available should be near my home and my workplace. If TMB can do that, yes, I will move to TMB" (Frequent car user, Seldom user of TMB, Female, 26, Government employee)

As for information indicator, for every increase of one unit of the perception regarding information, the level of use of TMB will increase by 35.4%. Looking at the result from SPSS and the descriptive analysis findings at the sub-section 4.4.17 which concluded that more than 70% of users do not get any information (whether it is online information, information at the TMB stop, and information inside TMB). Even if they get information, it is only about where TMB is available. Transportation Research Board (2000) stated that a good pubic transport should at least have information about where and when the public transport available and how it is operating. It gets prominent that information is one of the vital service qualities and TMB still have some to fix this issue.

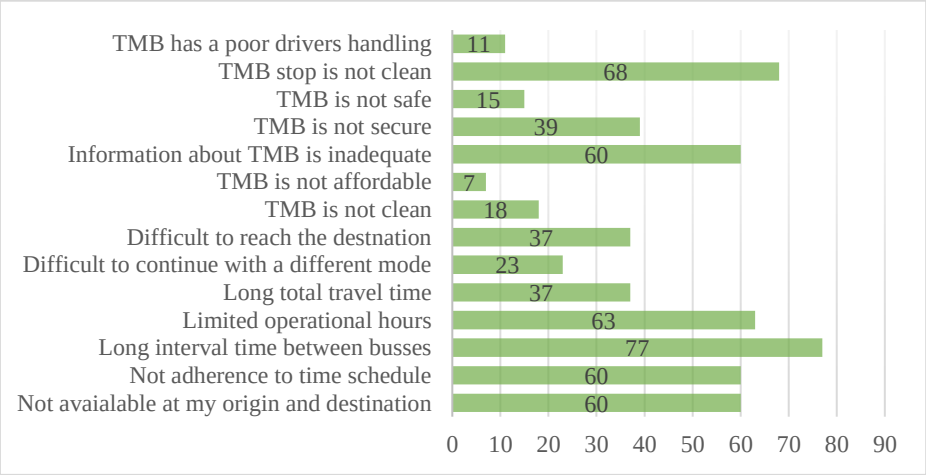
Several interviews support the result of the regression analysis, in which improving the information will make users more willing to use TMB. The respondents were asked whether they will use TMB if TMB can improve their service quality.

"If only TMB is more comfortable and there is clear information about the arrival time, there is a probability that I want to try using TMB more often" (Frequent car user, seldom user of TMB, master student, male, 26 years old)

"If TMB manages to stick with the schedule and be on time, I would love to choose TMB as my main mode of transportation. I am tired riding motorcycle" (Frequent motorcycle user, occasional user of TMB, male, 38, self-employed).

An interesting finding of this study is that there is one service quality indicator that is essential but does not have a significant result on Manova and regression analysis; it is the cleanliness of TMB stops. The possible reason why the cleanliness of TMB stop does not have a significant result on both Manova and Regression analysis is that the indicator is combined with the cleanliness of the vehicle. Cleanliness inside TMB has a good result, but the stop has a poor quality. This indicator categorized as important from the result of the questionnaire, interview, and observation of the researcher (see 4.4.1.7). Respondents were also asked to make a rank of discouraging factors to use TMB as can be seen from the graph below.

Graph 9 Discouraging factors to use TMB



The first discouraging factor is waiting time with 77 responses, and the second factor is TMB stop is not clean with 68 responses. This result supports the statement that indeed cleanliness of TMB stop is also one of the determinants for people to travel by TMB.

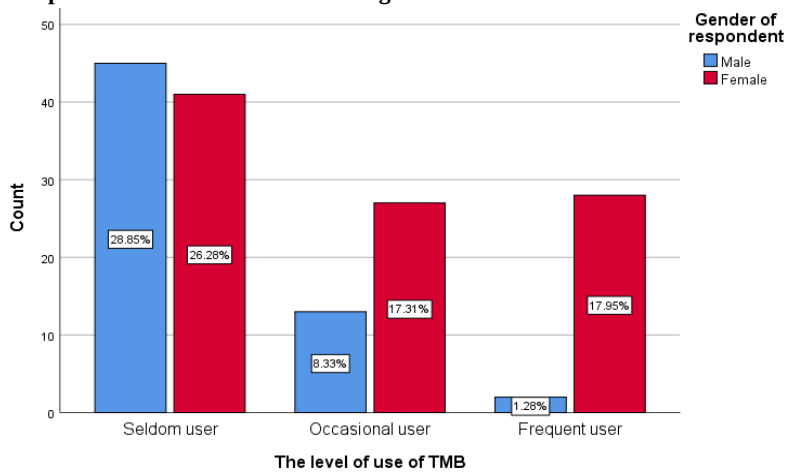
4.6 Relationship between perceived service quality and the level of use based on user personal characteristics

This sub-section is analyzing whether personal characteristics of users could influence the level of use of TMB and how they perceived the service quality of TMB. The personal characteristics which explained in this study are gender, age, income, education, occupation, family structure, possession of a driving license, and automobile ownership. The cross-tabulation analysis is the analysis to see this relationship and answer the third sub-research question of this study; *'how does the relation between the perception of service quality and the level of use of TMB vary in the light of the user characteristics?'*

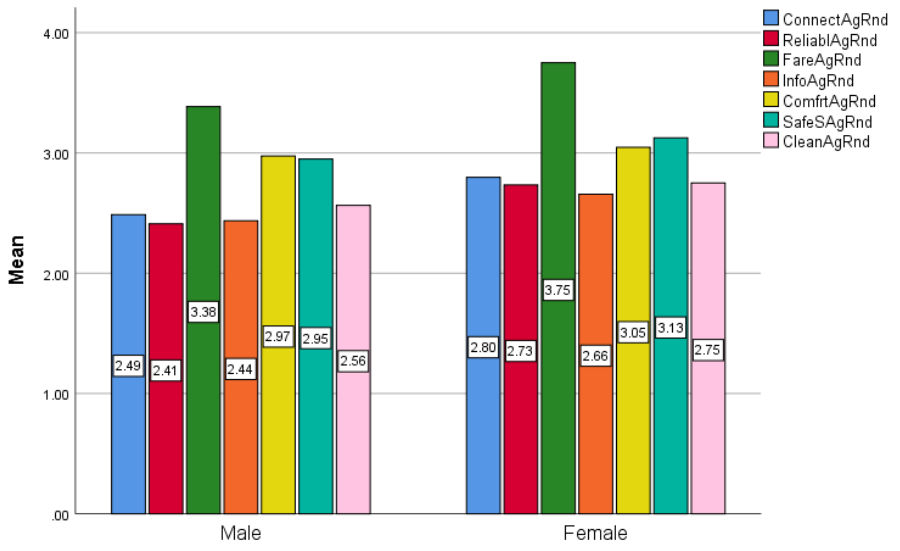
4.6.1 Gender

Both male and female users are mostly seldom user. However, there is an equal distribution for the overall category of frequency for female compared to male. A striking percentage of the male by 1%, uses TMB only once a year. In contrast, 29% of male considered as a seldom user. One of the reasons is because most males have a working schedule that requires them to be on-time at their office. Thus, they want to be confident about the time of arrival. Having a private vehicle is an option for them to be assured on the arrival time compared to TMB. The fact that TMB does not have any information on the departure and arrival time makes people uncertain on when will TMB come to the stop as well as to their destination. This uncertainty could lead to a low level of use of TMB. Additionally, TMB does not have a designated line which means that even though individuals are using public transit, they will still experience traffic jam the same way as when they use their car.

Graph 10 Cross-tabulation between gender and the level of use of TMB

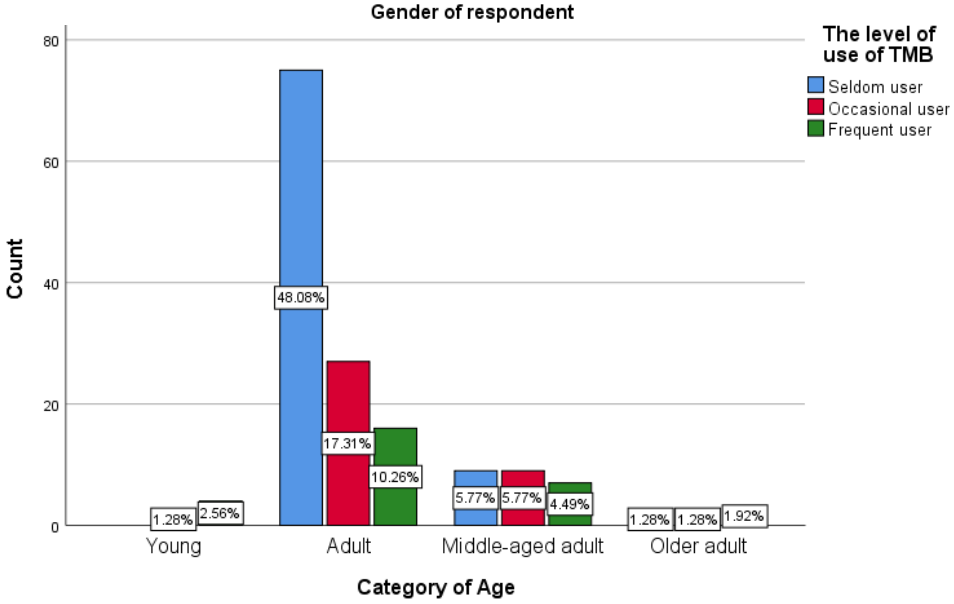


Graph 11 Cross-tabulation between gender and perceived service quality



Regarding the service quality, there is no significant variance between male and female regarding how they perceived the service quality of TMB. Although the highest difference among the perceived service quality is 'safety and security'.

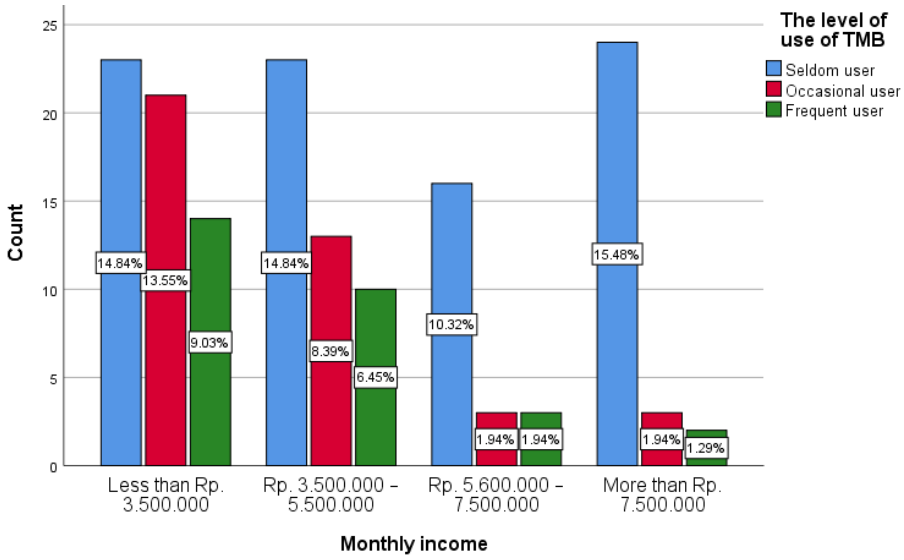
4.6.2 Age



The respondent's age in the study is classified into four categories as Young (13-18 years), Adult (19-35), Middle-aged Adult (36-55 years), and Older Adult (older than 55 years). Most of the user of TMB is adult with a significant difference compared to other categories of age, with an astonishing number of 50% is a seldom user of TMB. Whereas, neither younger nor older category of users patronizes TMB as much. The finding is the opposite of the study from Le Loo (2015) which stated that young and elderly are the category of age that use public transportation more often.

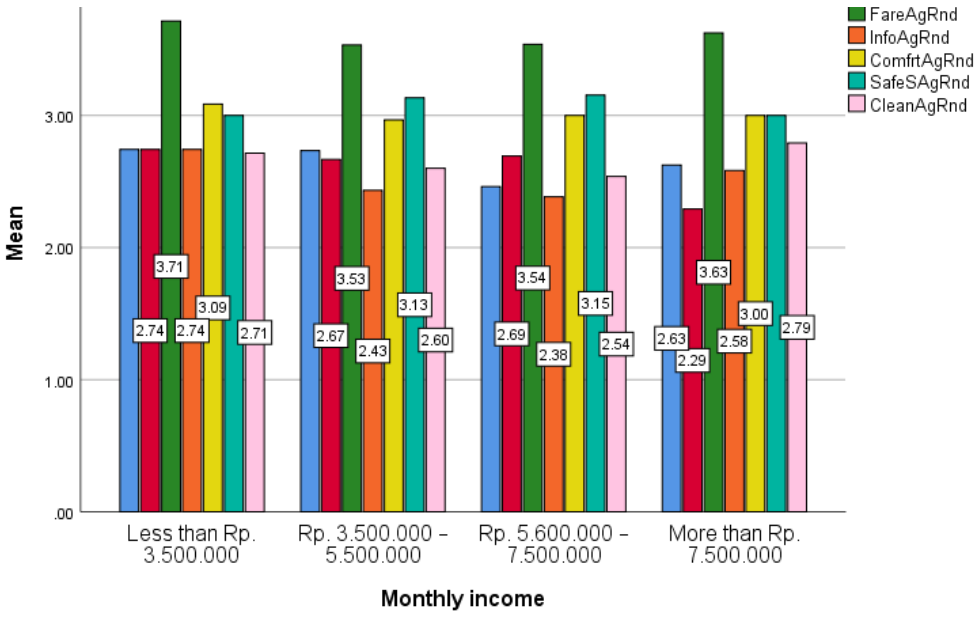
4.6.3 Income

Graph 13 Cross-tabulation between income and the level of use of TMB



There is a declining pattern between income and the level of use of TMB for the frequent user and occasional user. As income is getting higher, the number of respondents who categorized as the frequent and occasional users are getting lower. Furthermore, the highest percentage of seldom user with almost 16% is also respondents with the highest earnings. It is because people who have a better salary could have more variety of choice more than people with a lower salary. Having a high salary is also means that it is easier for them to purchase a private vehicle.

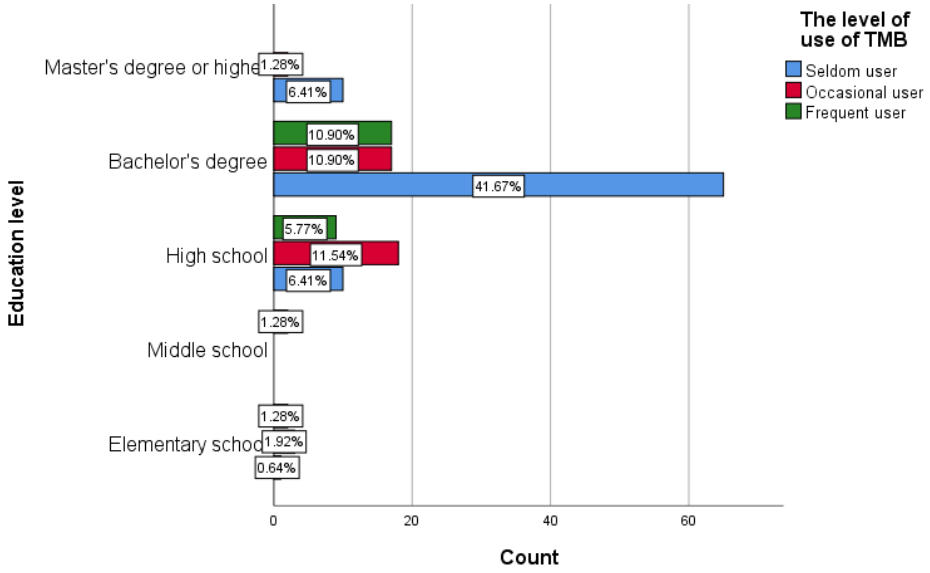
Graph 14 Cross-tabulation between income and perceived service quality



Low-income earners show a better score for the service quality of TMB for overall service quality. One of the reasons is because low-income earner focusses on the price of transit and do not give a high expectation on other aspects besides the fare. The fact that TMB is considered a cheap public transport with a flat fare is making TMB more attractive to people who earn less because their focus is to find the lowest option possible from modes availed.

4.6.4 Education

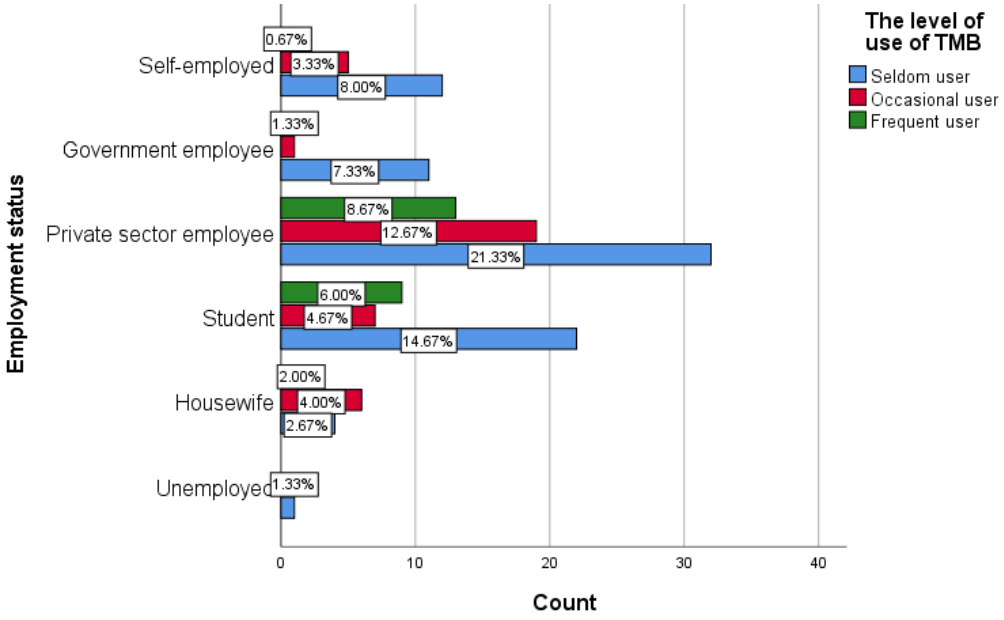
Graph 15 Crosstabs between education and the level of use of TMB



A striking number of around 60% of the total respondents are bachelor's degree holders. They are mostly categorized as seldom user. It is in line with the fact that the white-collar workers are dominant in the study, which can be seen in the next section. The high result of bachelor's degree might also be because of the respondents from an online questionnaire are around the same network. Even though this research approached various groups, the probability that there might be some biased still occur.

4.6.5 Occupation

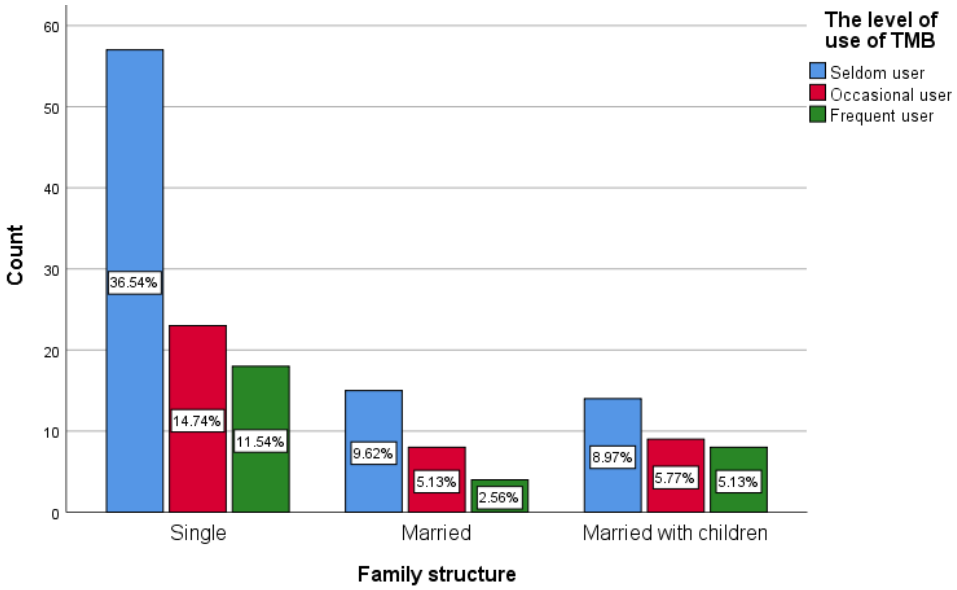
Graph 16 Cross-tabulation between occupation and the level of use of TMB



Private sector employee is the highest percentage for all category of the frequency of usage. Private sector employee who is a frequent user is accounted for almost 9%. Followed by the student as the second highest with 6% and housewife with 2% as a frequent user. As regards to occasional users, the sequence from the highest percentage is the same with the frequent user which is private sector employee, student, and housewife with 21%, 15%, and 3% respectively.

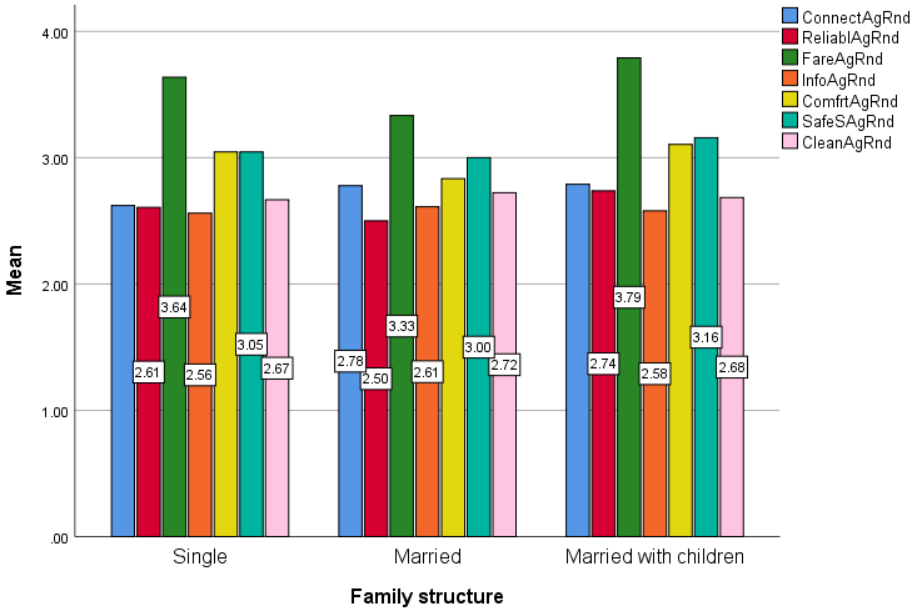
4.6.6 Family structure

Graph 17 Cross-tabulation between family structure and the level of use of TMB



Each family structure has a similar pattern with seldom user as the highest percentage to the frequent user as the lowest percentage. The highest percentage of seldom user is single, with almost 40% of total respondents. Several authors argue that the bigger the family size, the higher the chance for them to own a private vehicle. Single has the highest percentage for all frequency of usage, in comparison with married and married with children.

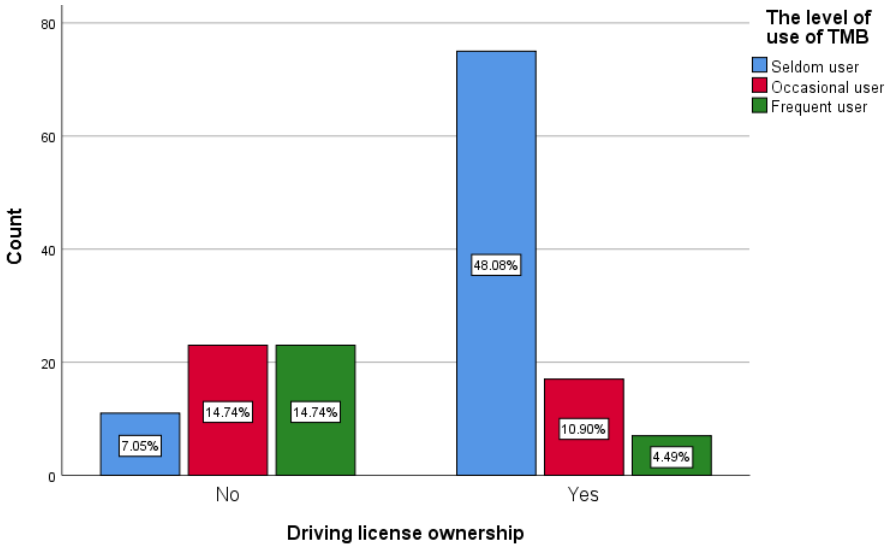
Graph 18 Cross-tabulation between family structure and perceived service quality



Fare is an essential determinant of service quality with the highest percentage among the family structure of the respondents. As for other service quality, the difference between each category of family structure is insignificant.

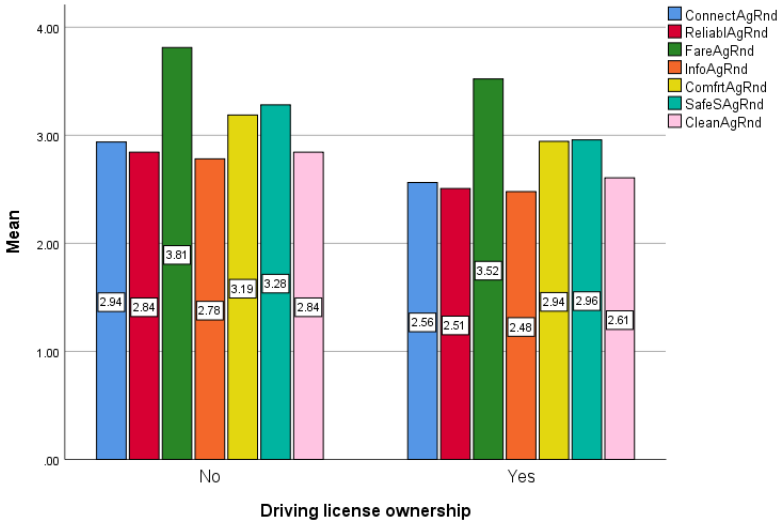
4.6.7 Possession of a driving license

Graph 19 Cross-tabulation between driving license ownership and the level of use of TMB



There is an opposite pattern between having a driving license and not having it with regards to the level of use of TMB. Respondents who are more inclined to use TMB are those who do not have a driving license. The percentage of the occasional and frequent user is higher for those who do not own a driving license. Whereas, almost half of all respondents are seldom users who own a license.

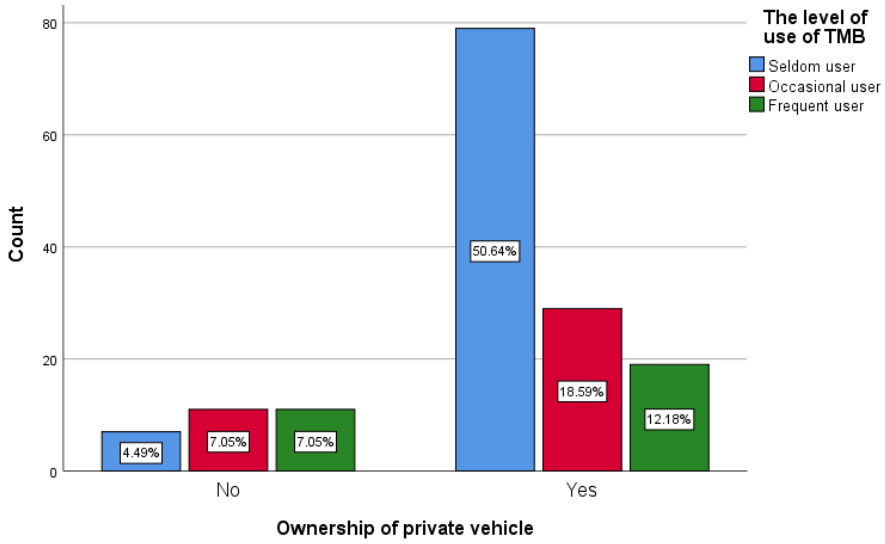
Graph 20 Cross-tabulation between driving license ownership and perceived service quality



People who own a driving licence perceived all service quality lower than people who do not have a driving license. Having a driving license can be associated with owning a private vehicle; people who own a private vehicle will compare their experience using TMB and using their automobile. The next sub-section will give a more in-depth comparison among the private vehicle that people own and how it relates to their perception of service quality.

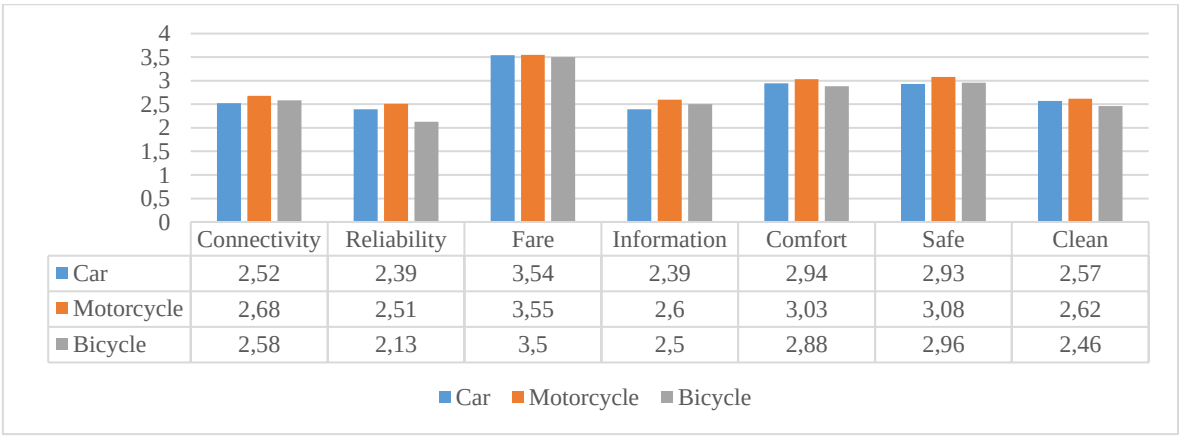
4.6.8 Automobile ownership

Graph 21 Cross-tabulation between automobile ownership and the level of use of TMB



There is a similar result from user characteristics of ownership of private vehicle and ownership of a driving license in terms of the level of use of TMB. It is because both are associated with one another. People who have a private vehicle must have a driving license to ride their automobile. Thus, the result shows a similar pattern. Ownership of the vehicle in this study is people who have a car, motorcycle, bicycle, or have all of these private modes. The trend for people who own a license is a downward pattern. The highest percentage is mostly a seldom user with 51%, and the percentage is getting lower and reaches the lowest for frequent users with 12%.

Graph 22 Comparison between car, motorcycle, and bicycle owners regarding the perceived service quality of TMB



	Connectivity	Reliability	Fare	Information	Comfort	Safe	Clean
Car	2,52	2,39	3,54	2,39	2,94	2,93	2,57
Motorcycle	2,68	2,51	3,55	2,6	3,03	3,08	2,62
Bicycle	2,58	2,13	3,5	2,5	2,88	2,96	2,46

Even though car owners mostly have a lower means score for almost all service quality aspects, the difference between a car, motorcycle, and bicycle owner is not significant. Hence, it is safe to assume that having a different type of private vehicle does not have a significant impact on how they perceived the service quality of TMB. Among all service qualities, the lowest mean score is given to the reliability of TMB. The interview also supports this result.

"I have a motorcycle; it is cheaper and faster. So, I am not going to choose TMB as my main mode of transport even though TMB improve the service quality because TMB could not compete with a motorcycle in terms of speed" (Occasional user of TMB, Frequent motorcycle user, Female, 22, High school student)

Besides, the private vehicle also offers flexibility and relatively fast (Taylor; Miller, et al., 2003). As a result, people who have a substitute option besides using transit like those who have an automobile will most likely compare to their private vehicle to public transportation.

Chapter 5: Conclusions and recommendations

5.1 Introduction

The chapter outlines the main findings and conclusion derived from the survey to answer the main research question and sub-research questions. The section then links back the results to literature. The end of the chapter is the recommendations for policy decisions.

5.2 Conclusion

5.2.1 Conclusion for sub-research question one

Sub-variable connectivity has several indicators which are; in-vehicle time, time consumed to the nearest TMB stop, ease of transfer, and waiting time. Results from the study indicate that the connectivity with the time consumed to the nearest stop as the indicator is considered 'short' for the frequent user but 'long' for seldom users. Similar answer occurs for ease of transfer with frequent user perceived it as fair, but seldom user has a lower mean score. Waiting time and traveling time inside TMB showed a different result where waiting time has the lowest score with a mean score of 2.13, which categorized as poor, but in-vehicle time considered 'short'.

TMB performed fair in terms of reliability and scheduling, scoring a mean average of 3.00 by the frequent user. However, seldom users have a different opinion for the reliability and scheduling with a means score of 2.42, which considered as a poor performance. As regards to fare, users perceived it as affordable. Unfortunately, the ticketing system is inadequate because there is no ticket, but the assistant driver collects the money from the passengers.

Respondents perceived that TMB performed somewhat fairly for all comfort aspects, which consist of drivers handling, access to the seat, and temperature control. TMB delivered poorly in terms of information. More than 70 % of respondent did not get any information, neither pre-travel information (online and at the stop) and en-route information (inside the TMB).

In accordance with a fair perception of safety, users perceived the security of TMB is fair. Though respondents perceived the cleanliness inside the bus to be good (M= 3.33), to the user TMB delivered poorly in terms of cleanliness at the TMB stop where it hit rock bottom with a mean score among all perceived service quality indicator (M= 1.92). The finding eventually has answered the first sub-research question; *'how do users perceive the service quality of Trans Metro Bandung?'.*

5.2.2 Conclusion for sub-research question two

Manova and Regression analysis answered the second sub-research question; *'to what extent does the perceived service quality influence the level of use of TMB?'.* Based on Manova analysis, it is found that the difference in the combination of perceived service quality has a relation with how frequent user utilize the TMB service. Seldom user perceived a lower level of the service quality compared to occasional and frequent user. The highest perceived service quality score comes from the frequent user. This result is emerging for seven out of eight service quality attributes, which means that more frequent people use TMB, the better they perceived the service quality in comparison with other categories of users.

Significant of Manova can prove that the difference between independent and dependent variable did not happen by chance. There is three service quality that shows a significant result based on Manova test. First, information sub-variable has a statistically significant finding with a 0.027 p-value. Second, the relationship between connectivity and the level of use also does not happen by chance (p= 0.01). Lastly, the fare has the highest significant with 0.009.

Therefore, it can be argued that the relationship between the level of use of TMB and perceived service quality, mainly fare, information and connectivity do not happen by chance.

Even though Manova can see which service quality correlate with the level of use, it cannot give an exact number of how much the independent variable is affecting the dependent variable. However, linear regression can show the extent to which users perceived service quality affecting the level of use of TMB. Multiple regression analysis concluded that for each component of the service quality, the indicator that has the most substantial influence is fare, in comparison to other components. Fare can increase the level of use by 40.2% when the respondents increased their perception of the price by one unit, and vice versa. Furthermore, connectivity also shows a significant influence on the level of use with B coefficient of 0.386, which indicates that if user's perception regarding the connectivity of TMB improves by one unit, the equation predicts the possibility that more people use TMB more frequent will increase by 38.6%. Lastly, the information service quality attribute affecting the level of use by 0.354. The meaning behind the B coefficient is for one unit increase of perception regarding information; the equation predicts that the level of use of TMB will increase by 35.4%.

5.2.3 Conclusion for sub-research question three

The third sub-research question; *'how does the relation between the perception of service quality and the level of use of TMB vary in the light of the user characteristics?'* answered through cross-tabulation analysis. Based on the gender, the female has an equal distribution for all categories of the frequency of using TMB, while the male is mostly categorized as a seldom user. There is no different opinion related to service quality despite gender.

Age category which patronized TMB is mostly adult with a range of 19-35 years, which comprises of more than 50% of all respondents in the study. The other age category does not patronize TMB as much. The fact that adult is dominant in the study also shows in the occupation and education level of users, where most of the respondents are bachelor's degree holders and a private sector employee meaning that they are still in the productive age.

As for the income, there is an inverse relationship between income and the level of use of TMB. The higher the income of users, the fewer people use TMB. It is shown in the declining percentage of the frequent user as the earning gets higher. As observed, this may be because the high-income earners prefer to use their private car or taxis, which are more expensive to low- and mid-income earners. As for the perception of service quality, low-income earners give a better score for all perceived service quality but for middle to high-income earners perceived a lower score. With regards to family structure, single have a higher level of use of TMB compared to married and married with children. It is aligned with the previous research where it concluded that people who are married and having children have a tendency to not using public transportation. However, the perception of service quality does not differ as much.

Possession of a driving license and private ownership shows a similar pattern where people who have a driving license or automobile less likely to use TMB and have a lower perception of the service quality that TMB offers as well.

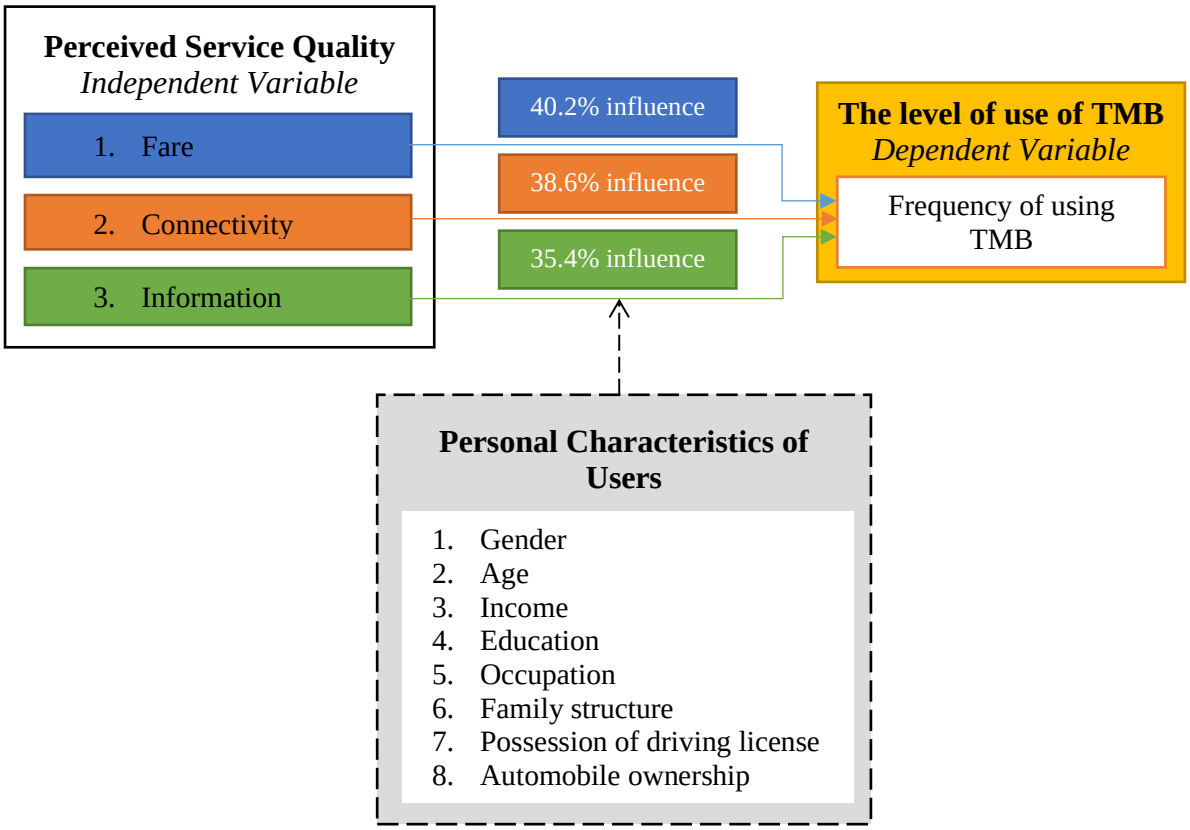
5.2.4 Conclusion for the overall research question

All sub-research questions are examined to answer the overall research question; *'how does the determinants of perceived service quality influence the level use of TMB?'*. In conclusion, there are three service quality indicators which significantly determines the level of use of TMB based on Manova and Regression analysis which are fare, information, and connectivity.

Before finding out the degree to which service quality determinants influence the level of use of TMB, it is also essential to understand the perception of users for each service quality

indicators. reliability and scheduling, information, and cleanliness are the service quality that the user perceived as poor. Additionally, cleanliness at TMB stop is also an essential indicator of service quality of TMB based on the result from the questionnaire, interview, observation, and secondary data.

Another finding is that frequent user of TMB has a better perception in comparison with respondents who based on descriptive analysis and supported with the result from Manova. Based on the regression analysis, the fare has the most considerable influence on the level of use with 40.2% of change if the perception of fare changes by one unit. Connectivity becomes the second highest with 38.6% possibility to influence the level of use. Lastly, information has the lowest influence among three service qualities that are significant with 35.4%. In conclusion, the revised conceptual framework is shown below;



5.2.5 Linking back to literature

Based on the findings, frequent users perceived a better service quality than occasional and seldom users in most of the attributes of perceived service quality. The finding is in harmony with the argument of De Vos (2019) where he stated that people would most likely give a good perception when they travel with the mode that they like or their preferred travel mode.

Furthermore, three determinants of perceived service quality which influence the frequency of use of TMB are fare, information and connectivity. As for connectivity, the literature from the Transport Research Board (2000) stated that the first step to decide if the transit is feasible or not to be chosen is the availability. Availability closely related with the connectivity, which means that connectivity is a basic indicator that needs to be fulfilled first to get the recognition from people that TMB could be one of the options for their daily transportation. Thus, it is related to literature that connectivity is one of the determinants to travel by TMB.

Another finding of this research is that 79% of respondents are willing to use TMB more often if TMB can improve its service quality. It is interconnected to the study from Bamber, Ajzen (2003), which stated that an intervention could influence prior behavior to the future ridership. For example, by accelerating the service quality of TMB, the government could increase the usage of TMB.

In relation to the characteristics of users, Le Loo (2015) stated that the elderly and younger generation are the category of users who use public transport more often than other age categories. This theory is not the same with the findings of this study; instead, productive age is the one who patronizes TMB more often than elder and younger users. As for the income, the theory and the result of this study are the same where the higher-income earners tend to drive compared to a lower-income earner.

Additionally, each category of the user has a different opinion regarding the service quality that is more important than others for them. For a frequent user of TMB, the most important factors are affordability and availability, but for other respondents who are not the frequent user of TMB, consistency of arrival time is also essential besides affordability and availability. The result shows that each category has a different perspective that is also needed to take into consideration. The finding is in accordance with the study by Beirão and Cabral (2007) which concluded that the improvement of service quality based on user's perspective from a different category of people (such as seldom user, occasional user, and the frequent user are needed to capture the concern of different category.

5.3 Recommendations

5.3.1 Policy recommendation

The government needs to excel the service quality to improve the perception of the TMB and to increase the usage of TMB. Based on the findings, the perceived service quality is indeed influencing the level of use of TMB. It is also concluded that the higher positive perception from users, the higher the possibility that people will patronize TMB more often. Based on user's perception, several service qualities that are required to be improved are the reliability and scheduling, information, and cleanliness at the TMB stops because these aspects have a very poor performance based on user's point of view.

More importantly, there are three determinants of perceived service quality attributes which significantly influence the level of use of TMB, namely fare, information and connectivity. Fare is the determinant that has the most substantial influence on the level of use. Based on the findings, users perceived that the fare of TMB is already good. Secondary data from the government support this result, it even stated that users are most satisfied with the fare of TMB. A good perception about the fare means that the government should keep the price to sustain the users. TMB already gives subsidies for the student, which is an excellent start to help economically disadvantaged people. The policymaker could also target other groups, such as elder and disable. In order to give fairness between different level of income by giving subsidies for the elderly, student, and disable (Geurs and Ritsema van Eck, Jan R, 2001). Furthermore, the government should be careful if they are planning to increase the price of TMB because fare has the most substantial possibility to influence the level of use of TMB.

As for connectivity, several indicators are inside connectivity such as distance to stop, walking time to reach the nearest stop, transfer time, waiting time and in-vehicle time. The survey concluded that some respondents are willing to choose TMB as their primary mode of transport if TMB manages to cover their origin and destination place. With regards to information, the existing condition is the user waits at the TMB stop without knowing when exactly will the TMB arrive because there is no information at all at the TMB stop. This uncertainty is

unpleasant for the commuters, thus, installing the TMB schedule at every stop and depend on that schedule is required as the first step to improve the quality of TMB. Moreover, with the proliferation of technology, TMB should manage to provide real-time information about the arrival time of TMB and people should be able to access it through their smartphones. Online information will surely increase the attractiveness of TMB and will intensify the usage of TMB.

Furthermore, the result of the study can enrich Bandung Transport Department monitoring and evaluation because the service quality attributes in this study are quite specific with regards to the service quality of TMB. Hence, it can be a new input for Bandung Transport Department to see how the service quality of TMB is based on the user's perspective.

5.3.2 Recommendations for further research

The focus of the study is the perception of the users. It will be more comprehensive if the perception of the government as the provider is also studied for further research to understand more profound about the regulation and mechanism of TMB. Another limitation of the study is the focus on perceived service quality. Further research could conduct another point of view, such as expected quality, delivered quality, and targeted quality. If further research wants to focus on the provider side, the service quality that can be the variable is targeted and delivered service quality.

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Annex 1: Questionnaire and Interview (English Version)

1.1 Questionnaire

Title: Effect of Perceived Service Quality on The Level of Use of Trans Metro Bandung, Bandung, Indonesia

My name is Yulia Puspa Sari, a master student of Urban Management and Development in Institute for Housing and Urban Development Studies, Erasmus University Rotterdam, the Netherlands. I would like to observe the effect of commuter's perception of Trans Metro Bandung on level of use.

This questionnaire is for people who have experienced using Trans Metro Bandung (TMB) at least once. This questionnaire is divided into six section with a total of 35 question. It would be appreciated if you can take some time to help complete the following questionnaire. It should take about fifteen minutes of your time.

Please be assured that all your responses are voluntary and would be treated confidentially. All responses in this survey would be analyzed as a group and not identified individually. Thank you for your participation.

Yulia Puspa Sari, S.T.

saripuspayulia@gmail.com

Supervisor: Taslim Alade

Section 1: Socio-demographic characteristics

Please tick as applicable

No	Question	Options
1.	Gender	□ Male □ Female
2.	Age	……. years old
3.	What is your employment status?	□ Unemployed □ Housewife □ Student □ Private sector employee □ Government employee □ Self-employed □ Others (please specifiy) …….
4.	Education level	□ No qualification □ Elementary school □ Middle school □ High school □ Bachelor's degree □ Master's degree or higher
5.	Family structure	□ Single □ Married □ Married with children

6.	Please indicate your monthly income range	□ Less than Rp. 3.500.000 □ Rp. 3.500.000 – 5.500.000 □ Rp. 5.600.000 – 7.500.000 □ More than Rp. 7.500.000

Section 2: Trip characteristics

7. How often do you use the selected mode of transport

Mode of transport	Never	Once a year	Once a month	Once a week	2-3 times a week	4-6 times a week	Every day (7 days a week)
TMB							
Bus							
Angkot							
OTS							
Taxi							
Motorcycle taxi							
Private Car							
Motorcycle							
Bicycle							
Walking							

8. What is your purpose of using those modes of transport? Based on your answer for question number 7.

Mode of transport	**Purpose of mode use**				
	Work/office	School/college	Social (visit family & friends, wedding)	Shopping	Recreational
TMB					
Bus					
Angkot					
OTS					
Taxi					
Motorcycle taxi					

Private Car					
Motorcycle					
Bicycle					
Walking					

9. Do you combine modes for any of the purpose of travel?

□ Yes □ No (If no, skip question number 13)

10. If yes, which combination of modes do you use?

Mode of transport	TMB	Bus	Angkot	OTS	Taxi	Ojek	Private Car	Motorcycle	Bicycle	Walking
TMB										
Bus										
Angkot										
OTS										
Taxi										
Motorcycle taxi										
Private Car										
Motorcycle										
Bicycle										
Walking										

No	**Question**	**Options**
11.	When you combine modes, how much time does it take for you to change from any stop along the TMB routes to another transportation mode?	□ Less than 6 mins □ 6-10 mins □ 11-15 mins □ 16-20 mins □ 22-25 mins □ 25-30 mins □ More than 30 mins

12.	Why do you combine modes?	□ The price is cheaper if I combine TMB with other modes □ The distance from TMB station to my destination is too far □ It is faster to get to the destination location □ Ease of payment system □ It is easier to get to the destination that I desire □ I do not have a choice (no other option) □ Other (please specify) ……

Section 3: Trans Metro Bandung time and cost

No	Question	Options
13.	How long does it take you to the nearest TMB stop from your house?	□ Less than 6 minutes □ 6-10 mins □ 11-15 mins □ 16-20 mins □ 22-25 mins □ 25-30 mins □ More than 30 mins
14.	How do you consider the time consumed to go to the nearest TMB stop?	□ Very long □ Long □ Not long nor short □ Short □ Very short
15.	How long do you wait at the TMB stops?	□ Less than 6 mins □ 6-10 mins □ 11-15 mins □ 16-20 mins □ 22-25 mins □ 25-30 mins □ More than 30 mins
16.	How do you consider the time consumed at the TMB stops for number 15	□ Very long □ Long □ Not long nor short □ Short □ Very short

No	Question	Answer
17.	How much do you spend on transport for using only the TMB per day?	Rp. ……..

No	Question	Answer
18.	What do you think about the price that you spend for TMB?	□ Very expensive □ Expensive □ Moderate □ Affordable □ Very cheap
19.	Do you have a driving license?	□ Yes □ No
20.	Does your family or relatives own a private vehicle which is used as transport purposes for you, at least twice a week?	□ Yes □ No
21.	If yes, please tick what type of vehicle do you own?	□ Car □ Motorcycle □ Bicycle

Section 4: Perception of service quality delivery of Trans Metro Bandung

22. How would you rate the following service quality attributes of TMB in terms of the following?

No	Indicator	Very Poor	Poor	Fair	Good	Very good
a.	Adherence to time schedule					
b.	Frequency of arrival time interval between busses					
c.	Time spent inside the TMB					
d.	Ease of purchasing ticket					
e.	Ease to continue trip with a different mode					
f.	Access to seat on the bus					
g.	Drivers handling (attitude)					
h.	Temperature control on the bus (air conditioning)					
i..	Safety from traffic accidents					
j.	Security of goods/luggage					
k.	Cleanliness inside TMB					
l.	Cleanliness of waiting area/stop					

No	Question	Options
Pre-travel information: information obtained prior to the journey		
23.	Do you get the pre-travel information through online source? (e.g. apps, website, phone)	□ Yes □ No (If, no skip question number 40)
24.	If yes, how would you rate the online pre-travel information?	□ Very poor □ Poor □ Fair □ Good □ Very good
25.	Do you get the pre-travel information at the TMB stops? (e.g. timetable, maps)	□ Yes □ No (If, no skip question number 42)
26.	If yes, how would you rate the pre-travel information at the TMB stops?	□ Very poor □ Poor □ Fair □ Good □ Very good
En-route information: information obtained inside TMB during the journey (e.g. journey progress)		
27.	Do you get the en-route information inside TMB?	□ Yes □ No (If, no skip question number 46)
28.	If yes, how would you rate the en-route information at the TMB stops?	□ Poor □ Fair □ Good □ Very good □ Excellent

Section 5: The modal choice of Trans Metro Bandung

29. Pick **ONLY ONE** main mode of transport that you use the most?

- □ Trans Metro Bandung (TMB)
- □ Bus
- □ Minivan (Angkot)
- □ Online Transportation Service (Go-Jek, Grab, Uber)
- □ Motorcycle
- □ Private car
- □ Conventional taxi
- □ Conventional motorcycle taxi (Ojek)
- □ Bicycle
- □ Walking

30. Why do you choose that mode of transport as your main choice? (you can choose more than one answer)

- □ Availability at my origin and destination
- □ Adherence to time schedule
- □ Waiting time for that mode of transport
- □ How long it operates (time duration)
- □ Less time spent for overall experience
- □ It is easier to continue trip with a different mode
- □ Cleanliness of vehicle
- □ Transport fare is affordable
- □ Clear information (pre-travel and en-route)
- □ Security from theft of goods/luggage
- □ Safety from traffic accidents
- □ Others (please specify)

- ☐ It is easier to reach the destination with the chosen mode of transport ……

31. If TMB is not your main mode of transport. Which factors **encourage** you to use TMB? (you can choose more than one answer)

- ☐ Availability at my origin and destination
- ☐ Adherence to time schedule
- ☐ Interval time between bus
- ☐ Operational hour of TMB (time duration)
- ☐ Short total travel time (at the stops and inside TMB)
- ☐ It is easier to continue trip with a different mode
- ☐ It is easier to get to the destination with TMB
- ☐ Cleanliness of TMB
- ☐ Transport fare is affordable
- ☐ Clear information (pre-travel and en-route)
- ☐ Security from theft of goods/luggage
- ☐ Safety from traffic accidents
- ☐ Cleanliness of the stop/station
- ☐ Good drivers handling
- ☐ Access to seat inside TMB
- ☐ Others (please specify) ……

32. Which factors **discourage** you to use TMB?

- ☐ TMB does not available at my origin and destination
- ☐ TMB does not adherence to the time schedule
- ☐ Long interval time between busses
- ☐ Limited operational hour
- ☐ Long travel time (at the stop and inside TMB)
- ☐ Difficult to continue with a different mode
- ☐ Difficult to reach the destination by using TMB
- ☐ Cleanliness of vehicle is poor
- ☐ Transport fare is not affordable
- ☐ Information about TMB is inadequate
- ☐ Security from theft of goods/luggage
- ☐ Safety from traffic accidents
- ☐ Cleanliness of the stop/waiting area is poor
- ☐ Poor drivers handling
- ☐ No access to seat on the bus
- ☐ Others (please specify) ……

33. Will you recommend TMB to your family/friends/colleagues?

□ Yes □ No

34. Will you choose TMB as your main mode of transport if TMB can improve their service quality?

□ Yes □ No

Please explain why you choose the answer

……...

Section 6: Importance of the service quality of Trans Metro Bandung

35. Which service quality indicators are more important than others for the use of TMB? Please rank the **TOP FIVE** factors that would be the most **important** to you. (Please rank from 1-5. [1] being the highest priority)

[ ] Availability at my origin and destination

[ ] Adherence to time schedule

[ ] Consistency of arrival time

[ ] Operational hour

[ ] Waiting time at station

[ ] Time spent in the bus travelling

[ ] Ease of changing to a different modes of transport

[ ] Affordable public transportation

[ ] Destination is easy to reach by public transportation

[ ] Clear pre-travel and en-route information

[ ] Security from theft of goods/luggage

[ ] Safety from traffic accidents

[ ] Cleanliness of the stop/station

[ ] Cleanliness of vehicle

[ ] Drivers handling

[ ] Access to seat

[ ] Others (please specify)

……

1.2 Semi-structured Interview

The interview is aiming to obtain in-depth information about the determinants of perceived service quality of TMB and its influence the level of use of the commuters.

Section 1: Perceived service quality of Trans Metro Bandung

1. Do you think the bus stops are in an accessible / not accessible location?
2. What do you think about the frequency of TMB? Is it already enough?
3. Do you think it is easy for you to transfers from TMB to another mode of transport? Why?
4. Have you ever experienced any safety (accident) issue when you are using TMB?
5. Have you ever experienced any security (theft) issue when you are using TMB?
6. Is the price of TMB affordable for you? Do you think TMB is cheaper than other mode of transport?
7. What is your opinion regarding the fact that TMB stops anywhere and not at the designated stop?
8. What do you think about the cleanliness and odors of TMB stops?
9. Do you get enough pre-travel and en-route information about TMB?

Section 2: The modal choice of Trans Metro Bandung

10. Is TMB your main mode of transportation?
    i. If yes, why do you choose TMB as your main mode of transportation?
    ii. If not, what factors discourage you to use TMB?
11. What are the service quality attributes of TMB that need to be improved in order to increase usage of TMB?

Annex 1: Questionnaire and Interview (English Version)

1.1 Questionnaire

Title: Effect of Perceived Service Quality on The Level of Use of Trans Metro Bandung, Bandung, Indonesia

My name is Yulia Puspa Sari, a master student of Urban Management and Development in Institute for Housing and Urban Development Studies, Erasmus University Rotterdam, the Netherlands. I would like to observe the effect of commuter's perception of Trans Metro Bandung on level of use.

This questionnaire is for people who have experienced using Trans Metro Bandung (TMB) at least once. This questionnaire is divided into six section with a total of 35 question. It would be appreciated if you can take some time to help complete the following questionnaire. It should take about fifteen minutes of your time.

Please be assured that all your responses are voluntary and would be treated confidentially. All responses in this survey would be analyzed as a group and not identified individually. Thank you for your participation.

Yulia Puspa Sari, S.T.

saripuspayulia@gmail.com

Supervisor: Taslim Alade

Section 1: Socio-demographic characteristics

Please tick as applicable

No	Question	Options
1.	Gender	□ Male □ Female
2.	Age	……. years old
3.	What is your employment status?	□ Unemployed □ Housewife □ Student □ Private sector employee □ Government employee □ Self-employed □ Others (please specifiy) …….
4.	Education level	□ No qualification □ Elementary school □ Middle school □ High school □ Bachelor's degree □ Master's degree or higher
5.	Family structure	□ Single □ Married □ Married with children

6.	Please indicate your monthly income range	□ Less than Rp. 3.500.000 □ Rp. 3.500.000 – 5.500.000 □ Rp. 5.600.000 – 7.500.000 □ More than Rp. 7.500.000

Section 2: Trip characteristics

9. How often do you use the selected mode of transport

Mode of transport	Never	Once a year	Once a month	Once a week	2-3 times a week	4-6 times a week	Every day (7 days a week)
TMB							
Bus							
Angkot							
OTS							
Taxi							
Motorcycle taxi							
Private Car							
Motorcycle							
Bicycle							
Walking							

10. What is your purpose of using those modes of transport? Based on your answer for question number 7.

Mode of transport	**Purpose of mode use**				
	Work/office	School/college	Social (visit family & friends, wedding)	Shopping	Recreational
TMB					
Bus					
Angkot					
OTS					
Taxi					
Motorcycle taxi					

Private Car					
Motorcycle					
Bicycle					
Walking					

9. Do you combine modes for any of the purpose of travel?

□ Yes □ No (If no, skip question number 13)

10. If yes, which combination of modes do you use?

Mode of transport	TMB	Bus	Angkot	OTS	Taxi	Ojek	Private Car	Motorcycle	Bicycle	Walking
TMB										
Bus										
Angkot										
OTS										
Taxi										
Motorcycle taxi										
Private Car										
Motorcycle										
Bicycle										
Walking										

No	**Question**	**Options**
11.	When you combine modes, how much time does it take for you to change from any stop along the TMB routes to another transportation mode?	□ Less than 6 mins □ 6-10 mins □ 11-15 mins □ 16-20 mins □ 22-25 mins □ 25-30 mins □ More than 30 mins

12.	Why do you combine modes?	□ The price is cheaper if I combine TMB with other modes □ The distance from TMB station to my destination is too far □ It is faster to get to the destination location □ Ease of payment system □ It is easier to get to the destination that I desire □ I do not have a choice (no other option) □ Other (please specify) ……

Section 3: Trans Metro Bandung time and cost

No	Question	Options
13.	How long does it take you to the nearest TMB stop from your house?	□ Less than 6 minutes □ 6-10 mins □ 11-15 mins □ 16-20 mins □ 22-25 mins □ 25-30 mins □ More than 30 mins
14.	How do you consider the time consumed to go to the nearest TMB stop?	□ Very long □ Long □ Not long nor short □ Short □ Very short
15.	How long do you wait at the TMB stops?	□ Less than 6 mins □ 6-10 mins □ 11-15 mins □ 16-20 mins □ 22-25 mins □ 25-30 mins □ More than 30 mins
16.	How do you consider the time consumed at the TMB stops for number 15	□ Very long □ Long □ Not long nor short □ Short □ Very short

No	Question	Answer
17.	How much do you spend on transport for using only the TMB per day?	Rp. ……..

No	Question	Answer
18.	What do you think about the price that you spend for TMB?	□ Very expensive □ Expensive □ Moderate □ Affordable □ Very cheap
19.	Do you have a driving license?	□ Yes □ No
20.	Does your family or relatives own a private vehicle which is used as transport purposes for you, at least twice a week?	□ Yes □ No
21.	If yes, please tick what type of vehicle do you own?	□ Car □ Motorcycle □ Bicycle

Section 4: Perception of service quality delivery of Trans Metro Bandung

22. How would you rate the following service quality attributes of TMB in terms of the following?

No	Indicator	Very Poor	Poor	Fair	Good	Very good
a.	Adherence to time schedule					
b.	Frequency of arrival time interval between busses					
c.	Time spent inside the TMB					
d.	Ease of purchasing ticket					
e.	Ease to continue trip with a different mode					
f.	Access to seat on the bus					
g.	Drivers handling (attitude)					
h.	Temperature control on the bus (air conditioning)					
i..	Safety from traffic accidents					
j.	Security of goods/luggage					
k.	Cleanliness inside TMB					
l.	Cleanliness of waiting area/stop					

No	Question	Options
Pre-travel information: information obtained prior to the journey		
23.	Do you get the pre-travel information through online source? (e.g. apps, website, phone)	□ Yes □ No (If, no skip question number 40)
24.	If yes, how would you rate the online pre-travel information?	□ Very poor □ Poor □ Fair □ Good □ Very good
25.	Do you get the pre-travel information at the TMB stops? (e.g. timetable, maps)	□ Yes □ No (If, no skip question number 42)
26.	If yes, how would you rate the pre-travel information at the TMB stops?	□ Very poor □ Poor □ Fair □ Good □ Very good
En-route information: information obtained inside TMB during the journey (e.g. journey progress)		
27.	Do you get the en-route information inside TMB?	□ Yes □ No (If, no skip question number 46)
28.	If yes, how would you rate the en-route information at the TMB stops?	□ Poor □ Fair □ Good □ Very good □ Excellent

Section 5: The modal choice of Trans Metro Bandung

29. Pick **ONLY ONE** main mode of transport that you use the most?

- □ Trans Metro Bandung (TMB)
- □ Bus
- □ Minivan (Angkot)
- □ Online Transportation Service (Go-Jek, Grab, Uber)
- □ Motorcycle
- □ Private car
- □ Conventional taxi
- □ Conventional motorcycle taxi (Ojek)
- □ Bicycle
- □ Walking

30. Why do you choose that mode of transport as your main choice? (you can choose more than one answer)

- □ Availability at my origin and destination
- □ Adherence to time schedule
- □ Waiting time for that mode of transport
- □ How long it operates (time duration)
- □ Less time spent for overall experience
- □ It is easier to continue trip with a different mode
- □ Cleanliness of vehicle
- □ Transport fare is affordable
- □ Clear information (pre-travel and en-route)
- □ Security from theft of goods/luggage
- □ Safety from traffic accidents
- □ Others (please specify)

- ☐ It is easier to reach the destination with the chosen mode of transport ……

31. If TMB is not your main mode of transport. Which factors **encourage** you to use TMB? (you can choose more than one answer)

- ☐ Availability at my origin and destination
- ☐ Adherence to time schedule
- ☐ Interval time between bus
- ☐ Operational hour of TMB (time duration)
- ☐ Short total travel time (at the stops and inside TMB)
- ☐ It is easier to continue trip with a different mode
- ☐ It is easier to get to the destination with TMB
- ☐ Cleanliness of TMB
- ☐ Transport fare is affordable
- ☐ Clear information (pre-travel and en-route)
- ☐ Security from theft of goods/luggage
- ☐ Safety from traffic accidents
- ☐ Cleanliness of the stop/station
- ☐ Good drivers handling
- ☐ Access to seat inside TMB
- ☐ Others (please specify) ……

32. Which factors **discourage** you to use TMB?

- ☐ TMB does not available at my origin and destination
- ☐ TMB does not adherence to the time schedule
- ☐ Long interval time between busses
- ☐ Limited operational hour
- ☐ Long travel time (at the stop and inside TMB)
- ☐ Difficult to continue with a different mode
- ☐ Difficult to reach the destination by using TMB
- ☐ Cleanliness of vehicle is poor
- ☐ Transport fare is not affordable
- ☐ Information about TMB is inadequate
- ☐ Security from theft of goods/luggage
- ☐ Safety from traffic accidents
- ☐ Cleanliness of the stop/waiting area is poor
- ☐ Poor drivers handling
- ☐ No access to seat on the bus
- ☐ Others (please specify) ……

33. Will you recommend TMB to your family/friends/colleagues?

□ Yes □ No

34. Will you choose TMB as your main mode of transport if TMB can improve their service quality?

□ Yes □ No

Please explain why you choose the answer

……...

Section 6: Importance of the service quality of Trans Metro Bandung

35. Which service quality indicators are more important than others for the use of TMB? Please rank the **TOP FIVE** factors that would be the most **important** to you. (Please rank from 1-5. [1] being the highest priority)

[ ] Availability at my origin and destination

[ ] Adherence to time schedule

[ ] Consistency of arrival time

[ ] Operational hour

[ ] Waiting time at station

[ ] Time spent in the bus travelling

[ ] Ease of changing to a different modes of transport

[ ] Affordable public transportation

[ ] Destination is easy to reach by public transportation

[ ] Clear pre-travel and en-route information

[ ] Security from theft of goods/luggage

[ ] Safety from traffic accidents

[ ] Cleanliness of the stop/station

[ ] Cleanliness of vehicle

[ ] Drivers handling

[ ] Access to seat

[ ] Others (please specify)

……

1.2 Semi-structured Interview

The interview is aiming to obtain in-depth information about the determinants of perceived service quality of TMB and its influence the level of use of the commuters.

Section 1: Perceived service quality of Trans Metro Bandung

12. Do you think the bus stops are in an accessible / not accessible location?
13. What do you think about the frequency of TMB? Is it already enough?
14. Do you think it is easy for you to transfers from TMB to another mode of transport? Why?
15. Have you ever experienced any safety (accident) issue when you are using TMB?
16. Have you ever experienced any security (theft) issue when you are using TMB?
17. Is the price of TMB affordable for you? Do you think TMB is cheaper than other mode of transport?
18. What is your opinion regarding the fact that TMB stops anywhere and not at the designated stop?
19. What do you think about the cleanliness and odors of TMB stops?
20. Do you get enough pre-travel and en-route information about TMB?

Section 2: The modal choice of Trans Metro Bandung

21. Is TMB your main mode of transportation?
    i. If yes, why do you choose TMB as your main mode of transportation?
    ii. If not, what factors discourage you to use TMB?
22. What are the service quality attributes of TMB that need to be improved in order to increase usage of TMB?

Annex 2: Questionnaire and Interview (Bahasa Indonesia Version)

1.1 Kuesioner

Judul: Kualitas Pelayanan yang dirasakan pengguna dan Pengaruhnya terhadap Pemilihan Moda Perjalanan Utama. Studi kasus: Trans Metro Bandung (TMB).

Perkenalkan, nama saya Yulia Puspa Sari, saya adalah mahasiswi magister jurusan Manajemen dan Pengembangan Perkotaan di *Institute for Housing and Urban Development Studies, Erasmus University Rotterdam*, Belanda. Survei ini merupakan bagian dari tesis saya yang bertujuan untuk menjelaskan sejauh mana kualitas pelayanan Trans Metro Bandung (TMB) yang dirasakan oleh pengguna memengaruhi pilihan moda perjalanan utama.

Kuesioner ini ditujukan bagi: Seseorang yang pernah menggunakan Trans Metro Bandung (TMB) setidaknya sekali dan memiliki aktivitas rutin di Kota Bandung.

Kusioner ini memiliki 6 bagian dengan total 35 pertanyaan dan dapat diselesaikan sekitar 10-20 menit.

Semua jawaban anda akan dijaga kerahasiaannya dengan tidak mencantumkan identitas pribadi dan hasil survey akan diolah dan dianalisa secara kelompok.

Saya sangat menghargai jika anda dapat meluangkan waktu untuk menyelesaikan survei ini. Terima kasih banyak.

Yulia Puspa Sari, S.T.

saripuspayulia@gmail.com

Supervisor: Taslim Alade

Bagian 1: Karakteristik sosio-demografik pengguna TMB

Silahkan centang sesuai jawaban yang menggambarkan diri dan persepsi anda.

No	Pertanyaan	Pilihan Jawaban
1.	Jenis kelamin	□ Perempuan □ Laki-laki
2.	Usia	…… tahun
3.	Pekerjaan	□ Tidak bekerja/sedang mencari kerja □ Ibu rumah tangga □ Pelajar/mahasiswa □ Pegawai swasta □ Pegawai negeri sipil □ Wiraswasta □ Lainnya (mohon tulis pekerjaan anda) ……
4.	Jenjang pendidikan terakhir	□ Tidak tamat Sekolah Dasar □ Sekolah Dasar (SD) □ Sekolah Menengah Pertama (SMP) □ Sekolah Menengah Atas (SMA) □ Sarjana / Diploma □ Magister dan setingkat diatasnya
5.	Status perkawinan	□ Lajang □ Menikah

		□ Menikah dan memiliki anak
6.	Berapa kisaran pendapatan anda per bulan?	□ Kurang dari Rp. 3.500.000 □ Rp. 3.500.000 – 5.500.000 □ Rp. 5.600.000 – 7.500.000 □ Lebih dari Rp. 7.500.000

Bagian 2: Karakteristik Perjalanan

7. Seberapa sering anda menggunakan moda transportasi dibawah ini?

Moda transportasi	**Tidak pernah**	**Sekali dalam setahun**	**Sekali dalam sebulan**	**Sekali dalam seminggu**	**2-3 kali seminggu**	**4-6 kali seminggu**	**Setiap hari / 7 hari seminggu**
TMB							
Bus DAMRI							
Angkot							
Transportasi *online* (Go-Jek / Grab)							
Taksi konvensional							
Ojek konvensional							
Motor pribadi							
Mobil pribadi							
Sepeda							
Berjalan kaki							

8. Centang tujuan anda menggunakan moda transportasi yang pernah anda gunakan berdasarkan jawaban nomor 7.

Moda transportasi	**Tujuan penggunaan moda transportasi terpilih**				
	Bekerja/bisnis	**Sekolah/kampus**	**Kegiatan sosial***	**Berbelanja**	**Hiburan**
TMB					
Bus DAMRI					
Angkot					
Transportasi online (Go-Jek / Grab)					

Taksi konvensional					
Ojek konvensional					
Motor pribadi					
Mobil pribadi					
Sepeda					
Berjalan kaki					

*Kegiatan sosial = mengunjungi keluarga/teman, datang ke pernikahan, menjenguk, dll.

Bagian 3: Penggunaan moda transportasi yang dikombinasikan

9. Apakah anda menggunakan lebih dari satu moda transportasi pada perjalanan yang biasa anda lakukan?

□ Ya □ Tidak (Jika tidak, lanjut ke nomor 13)

10. Jika ya, moda transportasi apa saja yang anda kombinasikan?

Moda transportasi	TMB	Bus	Angkot	Transportasi *online* (Go-Jek/Grab)	Taksi	Ojek	Motor pribadi	Mobil pribadi	Sepeda	Berjalan kaki
TMB										
Bus DAMRI										
Angkot										
Transportasi *online* (Go-Jek/Grab)										
Taksi konvensional										
Ojek konvensional										
Motor pribadi										
Mobil pribadi										
Sepeda										
Berjalan kaki										

No	Pertanyaan	Pilihan jawaban
11.	Berapa lama waktu yang anda butuhkan untuk berpindah dari halte TMB ke moda transportasi selanjutnya?	□ Kurang dari 6 menit □ 6-10 menit □ 11-15 menit □ 16-20 menit □ 21-25 menit □ 26-30 menit □ Lebih dari 30 menit
12.	Mengapa anda memilih untuk menggunakan lebih dari satu moda transportasi?	□ Tarif yang lebih terjangkau □ Jarak tempuh yang terlalu jauh jika hanya menggunakan satu jenis moda transportasi □ Waktu tempuh yang lebih cepat □ Kemudahan sistem pembayaran □ Tujuan perjalanan yang lebih mudah dijangkau □ Saya tidak memiliki pilihan lain selain mengkombinasikan dua moda transportasi untuk mencapai tujuan saya □ Lainnya (mohon tulis alasan anda) ……

Bagian 4: Waktu dan biaya yang dikeluarkan saat menggunakan TMB

No	Pertanyaan	Pilihan jawaban
13.	Berapa lama waktu yang anda butuhkan untuk berangkat dari titik awal keberangkatan/rumah anda ke halte TMB terdekat?	□ Kurang dari 6 menit □ 6-10 menit □ 11-15 menit □ 16-20 menit □ 21-25 menit □ 26-30 menit □ Lebih dari 30 menit
14.	Bagaimana pendapat anda terhadap waktu yang anda habiskan dari titik awal keberangkatan ke halte TMB?	□ Sangat lama □ Lama □ Biasa saja □ Sebentar □ Sangat sebentar
15.	Berapa lama waktu tunggu anda di halte TMB?	□ Kurang dari 6 menit □ 6-10 menit □ 11-15 menit □ 16-20 menit □ 21-25 menit □ 26-30 menit □ Lebih dari 30 menit
16.	Bagaimana pendapat anda terhadap waktu yang anda habiskan di halte TMB?	□ Sangat lama □ Lama □ Biasa saja □ Sebentar □ Sangat sebentar

No	Pertanyaan	Jawaban
17.	Berapa banyak biaya yang anda habiskan untuk TMB per harinya?	Rp. ……..
18.	Bagaimana pendapat anda terhadap biaya yang anda keluarkan untuk mengendarai TMB?	□ Sangat mahal □ Mahal □ Biasa saja □ Terjangkau □ Sangat terjangkau
19.	Apa anda memiliki Surat Izin Mengemudi (SIM)?	□ Ya □ Tidak
20.	Apa anda mempunyai akses terhadap kendaraan pribadi? (memiliki atau menggunakan secara pribadi, setidaknya dua kali dalam seminggu)	□ Ya □ Tidak
21.	Jika iya, mohon centang jenis kendaraan pribadi tersebut (dapat memilih lebih dari satu)	□ Mobil □ Motor □ Sepeda

Bagian 5: Kualitas pelayanan Trans Metro Bandung

22. Berikan penilaian anda terhadap kualitas pelayanan TMB dibawah ini?

No	Indikator	Sangat tidak puas	Tidak puas	Cukup puas	Puas	Sangat puas
a.	Ketepatan jadwal keberangkatan					
b.	Seringnya waktu kedatangan antar bus					
c.	Lama waktu yang di habiskan di dalam bus					
d.	Kemudahan membeli tiket					
e.	Kemudahan untuk berpindah moda transportasi					
f.	Akses untuk duduk di bus					
g.	Sikap dan penanganan pengemudi bus					
h.	Suhu di dalam bus (pendingin ruangan)					
i.	Keamanan dari kecelakaan					
j.	Keamanan barang bawaan					
k.	Kebersihan di dalam bus TMB					
l.	Kebersihan di halte TMB					

No	Pertanyaan	Pilihan jawaban
Informasi pra-perjalanan: Informasi yang didapatkan sebelum melakukan perjalanan		
23.	Apakah anda mendapatkan informasi pra-perjalanan secara *online* melalui aplikasi/website/SMS?	□ Ya □ Tidak (Lewati nomor 24)
24.	Bagaimana anda menilai informasi pra-perjalanan online tersebut? (seperti jadwal keberangkatan/jam operasional/rute)	□ Sangat buruk □ Buruk □ Cukup baik □ Baik □ Sangat baik
25.	Apakah anda mendapatkan informasi pra-perjalanan pada halte TMB seperti jadwal kedatangan/rute TMB?	□ Ya □ Tidak (Lewati nomor 26)
26.	Bagaimana anda menilai informasi pra-perjalanan pada halte TMB?	□ Sangat buruk □ Buruk □ Cukup baik □ Baik □ Sangat baik

No	Pertanyaan	Pilihan jawaban
Informasi dalam perjalanan: informasi yang didapatkan selama mengendarai TMB		
27.	Apakah anda mendapatkan informasi progres perjalanan di dalam bus TMB?	□ Ya □ Tidak (Lewati nomor 28)
28.	Bagaimana anda menilai informasi yang disampaikan di dalam bus TMB?	□ Sangat buruk □ Buruk □ Cukup baik □ Baik □ Sangat baik

Bagian 6: Pemilihan moda perjalanan utama

29. Pilih **SATU** moda transportasi utama yang paling sering anda gunakan?

- □ Trans Metro Bandung (TMB)
- □ Bus DAMRI
- □ Angkot
- □ Transportasi online (Go-Jek / Grab)
- □ Taksi konvensional
- □ Ojek konvensional
- □ Mobil pribadi
- □ Motor pribadi
- □ Sepeda
- □ Berjalan kaki
- □ Lainnya (tolong sebutkan) ……

30. Mengapa anda memilih moda transportasi tersebut sebagai moda transportasi utama? (dapat memilih lebih dari satu jawaban)

- □ Kemudahan mendapatkan kendaraan di titik awal keberangkatan
- □ Kejelasan informasi sebelum dan selama perjalanan berlangsung
- □ Jadwal operasional (lamanya moda transportasi terpilih beroperasi)
- □ Kemudahan untuk melanjutkan perjalanan dengan moda transportasi berbeda
- □ Tujuan perjalanan yang lebih mudah dijangkau dengan moda transportasi tersebut
- □ Ketepatan jadwal
- □ Kebersihan dan kenyamanan kendaraan
- □ Tarif yang terjangkau
- □ Total waktu tempuh perjalanan
- □ Keamanan barang bawaan dari pencuri
- □ Keamanan dari kecelakaan
- □ Lainnya (mohon sebutkan) ……

31. Jika TMB bukan moda transportasi utama anda pada nomor 29, centang hal-hal yang **MEMOTIVASI** anda untuk menggunakan TMB? (dapat memilih lebih dari satu jawaban)

- □ Kemudahan mendapatkan kendaraan di titik awal keberangkatan
- □ Waktu kedatangan antar bus TMB
- □ Kejelasan informasi sebelum dan selama perjalanan berlangsung
- □ Jadwal operasional (lamanya moda transportasi terpilih beroperasi)
- □ Waktu tempuh perjalanan yang singkat (di halte dan selama perjalanan di bus TMB)
- □ Kemudahan untuk melanjutkan perjalanan dengan moda transportasi berbeda
- □ Ketepatan jadwal
- □ Sikap dan perilaku pengemudi TMB
- □ Kebersihan dan kenyaman halte TMB
- □ Kebersihan dan kenyamanan kendaraan TMB
- □ Tarif yang terjangkau
- □ Keamanan barang bawaan dari pencuri
- □ Keamanan dari kecelakaan
- □ Lainnya (mohon sebutkan)

- □ Tujuan perjalanan yang lebih mudah dijangkau dengan bus TMB ……
- □ Ketersediaan bangku di dalam TMB

32. Centang hal-hal yang anda **TIDAK SUKA** dari pengalaman anda mengendarai TMB? (dapat memilih lebih dari satu jawaban)

- □ Kesulitan mendapatkan kendaraan di titik awal keberangkatan
- □ Waktu kedatangan antar bus TMB lama
- □ Ketidakjelasan informasi sebelum dan selama perjalanan berlangsung
- □ Jadwal operasional TMB terbatas
- □ Waktu tempuh perjalanan yang lama (di halte dan selama perjalanan di bus TMB)
- □ Kesulitan untuk melanjutkan perjalanan dengan moda transportasi berbeda
- □ Tujuan perjalanan yang lebih sulit dijangkau dengan bus TMB
- □ Ketersediaan bangku di dalam TMB
- □ Ketidak tepatan jadwal
- □ Sikap dan perilaku pengemudi TMB
- □ Kurangnya kebersihan dan kenyamanan halte TMB
- □ Kurangnya kebersihan dan kenyamanan kendaraan TMB
- □ Tarif yang tidak terjangkau
- □ Fasilitas keamanan barang kurang memadai (misal: CCTV)
- □ Fasilitas keamanan dari kecelakaan kurang memadai (misal: *emergency push button*,pemecah kaca darurat)
- □ Lainnya (mohon sebutkan) ……

33. Apakah anda akan merekomendasikan TMB kepada keluarga / teman anda?

□ Ya □ Tidak

34. Apakah anda akan memilih TMB sebagai moda transportasi utama anda jika TMB mampu memperbaiki kualitas pelayanan sesuai harapan anda?

□ Ya □ Tidak

Mengapa anda memilih jawaban tersebut?

……

Bagian 7: Pentingnya kualitas pelayanan Trans Metro Bandung

35. Pilih **LIMA** kualitas pelayanan TMB yang **terpenting** bagi anda dan berikan peringkat.

Peringkat [1] merupakan prioritas/peringkat utama dan [5] yang terakhir.

[ ]	Kemudahan mendapatkan kendaraan di titik awal keberangkatan	[ ]	Ketepatan jadwal
[ ]	Konsistensi waktu kedatangan kendaraan	[ ]	Sikap dan perilaku pengemudi TMB
[ ]	Kejelasan informasi sebelum dan selama perjalanan berlangsung	[ ]	Kebersihan dan kenyamanan halte TMB
[ ]	Jadwal operasional (lamanya suatu moda transportasi beroperasi)	[ ]	Kebersihan dan kenyamanan kendaraan
[ ]	Waktu tempuh perjalanan	[ ]	Tarif yang terjangkau
[ ]	Waktu tunggu kendaraan	[ ]	Keamanan barang bawaan dari pencuri
[ ]	Kemudahan untuk melanjutkan perjalanan dengan moda transportasi berbeda	[ ]	Keamanan dari kecelakaan

[ ] Tujuan perjalanan yang lebih mudah dijangkau dengan moda transportasi tersebut
[ ] Ketersediaan bangku di dalam TMB
[ ] Lainnya (mohon sebutkan) …….

1.2 Wawancara

Wawancara ini bertujuan untuk mendapatkan informasi yang lebih mendalam tentang persepi anda terhadap kualitas pelayanan TMB dan hubungan persepsi tersebut terhadap pemilihan moda transportasi anda. Apabila anda bersedia meluangkan waktu sekitar 5-15 menit, anda akan mendapatkan hadiah.

Bagian 1: Kualitas pelayanan Trans Metro Bandung

1. Berdasarkan jawaban anda pada kuesioner, mengapa anda merasa TMB berada/tidak berada di lokasi yang mudah dijangkau/strategis?
2. Berdasarkan jawaban anda pada kuesioner, mengapa anda merasa interval kedatangan TMB dalam sehari cukup/tidak cukup?
3. Apakah mudah bagi untuk berpindah moda transportasi dari TMB ke moda transportasi lain?
4. Apakah anda pernah mengalami kecelakaan selama menggunakan TMB?
5. Apakah anda merasa aman selama menggunakan TMB?
6. Bagaimana pendapat anda terkait biaya tiket TMB? Apakah terjangkau untuk semua kalangan?
7. Apakah lebih murah daripada moda transportasi lainnya?
8. Bagaimana pendapat anda mengenai TMB yang sering berhenti di sembarang tempat dan tidak di halte TMB?
9. Bagaimana pendapat anda tentang kondisi halte TMB?
10. Apakah informasi tentang kedatangan sebelum and menaiki TMB dirasa cukup? Bagaimana dengan informasi yang anda dapatkan di dalam TMB?

Bagian 2: Trans Metro Bandung sebagai transportasi utama Anda

11. Apakah TMB merupakan moda transportasi utama anda?
    i. Jika ya, mengapa anda memilih TMB sebagai moda transportasi utama bagi anda?
    ii. Jika tidak, mengapa anda tidak memilih TMB sebagai moda transportasi utama bagi anda?
12. Kualitas pelayanan apa saja yang perlu TMB tingkatkan? (misalnya kebersihan, ketepatan waktu, interval kedatangan antar bus TMB, informasi yang jelas, dll)

Annex 3: Observation guide

Managing and Financing Urban Infrastructure Specialization Institute for Housing and Urban Development Studies (IHS) Erasmus University Rotterdam, the Netherlands							
Observation Guide							
Date:	Route:		Start time:		End time:		
	1 / 2 / 3 / 4		:		:		
Sub-Variable	**Indicator**	**Quality**					**Picture taken**
		Very poor	**Poor**	**Fair**	**Good**	**Very good**	
Fare	Ease of purchasing ticket						
	Ticket machine						
Information	Pre-trip information at the stops						
	En-route information						
Comfort	Availability of seats on peak hour						
	Availability of seats off peak hour						
	Temperature control						
	Drivers handling						
Safety & Security	Safety from accident						
	Security against crime at the bus or at the stop						
Cleanliness	Cleanliness of vehicles						
	Cleanliness of stops/waiting area						
	Stops condition						

Annex 4: Questions for each indicator

Sub-question	Variables	Sub-Variables	Indicators	Scale	Source	Data Type	Collection Methods	Value
i. How do users perceive the service quality of Trans Metro Bandung?	***Service Quality*** (Independent variables) Represents service quality as experienced by users (Barabino, 2016)	***Connectivity*** The coverage area of transit	Walking time to reach nearest stop	Ordinal	TRB,2000	Quantitative	Questionnaire	Likert scale (Minutes & Perception)
			Number of stops	Ratio	Eboli and Mazulla, 2009	Quantitative	Secondary data	Total stops
			Availability at origin and destination	-	TRB,2000	Qualitative	Semi-structured interview	Perception
			Ease of transfer	Ordinal	TRB,2000	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Likert scale (Minutes & Perception)
			Transfer time	Ratio	TRB,2000	Quantitative	Questionnaire	Likert scale (minutes)
			Waiting time at the stop	Ordinal	TRB,2000	Quantitative	Questionnaire	Likert scale (minutes & perception)
			In-vehicle time	Ordinal	TRB,2000	Quantitative	Questionnaire	Likert scale (perception)
		Reliability & Scheduling Arrival time of the bus is consistent with the schedule	Adherence to time schedule	Ordinal	Beirao,2007	Quantitative	Questionnaire	Likert scale (perception)
			Frequency of the bus arrive at the stops	Ordinal	Eboli and Mazulla, 2009	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Likert scale (minutes) & Perception
		Fare The fare of using the bus	Cost of fare	Ratio	TRB,2000	Quantitative & Qualitative	Questionnaire & Semi-structured interview	Rupiah (Indonesian currency) & perception
			Ease of purchasing ticket	Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire & Observation	Likert scale (perception)
		Information About when and where the transit is operating	Online Pre-trip information (apps, online, phone, website)	Nominal & Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire & Secondary data	Likert scale (availability)

Sub-question	Variables	Sub-Variables	Indicators	Scale	Source	Data Type	Collection Methods	Value
			Pre-trip information at the stops (schedule and maps)	Nominal & Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire, Semi-structured interview & Observation	Likert scale (availability) & perception
			En-route information (information obtained on the bus during the journey)	Nominal & Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire, Semi-structured interview & Observation	Likert scale (availability) & perception
		Comfort The comfort of riding the transit	Availability of seats	Ordinal	TRB,2000	Quantitative & Qualitative	Questionnaire & Observation	Likert scale (perception)
			Temperature control	Ordinal	TRB,2000	Quantitative & Qualitative	Questionnaire & Observation	Likert scale (perception)
			Drivers handling	Ordinal	TRB,2000	Quantitative & Qualitative	Questionnaire & Observation	Likert scale (perception)
		Safety & Security Safety from accident	Safety from accident	Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire, Semi-structured interview & Observation	Likert scale (perception)
			Security against crime at the bus or at the stop	Ordinal	Mahmoud, 2016	Quantitative & Qualitative	Questionnaire, Semi-structured interview & Observation	Likert scale (perception)
		Cleanliness Internal and external cleanliness of the transit	Cleanliness of vehicles	Ordinal	TRB,2000	Quantitative	Questionnaire & Observation	Likert scale (perception)
			Cleanliness of stops/waiting area	Ordinal	TRB,2000	Quantitative & Qualitative	Questionnaire, Semi-structured interview & Observation	Likert scale (perception)

Sub-question	Variables	Sub-Variables	Indicators	Scale	Source	Data Type	Collection Methods	Value
ii. To what extent does the perceived service quality influence the level of use of TMB?	***The level of use of TMB*** (Dependent variables) the level of use can be measured by looking at the frequency of using a particular mode of transport (Diana, 2009)	***The level of use of TMB***	Frequency of using TMB	Nominal	Diana, 2009	Quantitative	Questionnaire	Never, once a week, 2-3 times a week, 4-6 times a week, everyday
iii. How does the relation between the perception of service quality and the level of use of TMB vary in the light of the user characteristics?	***Personal characteristics*** (Control Variable)	***Socio-demographic characteristics***	Gender	Nominal	Goulias, 2008	Quantitative	Questionnaire	Male, Female
			Age	Ratio	Goulias, 2008	Quantitative	Questionnaire	years old
			Income	Ordinal	Goulias, 2008	Quantitative	Questionnaire	Likert scale (income)
			Education	Ordinal	Goulias, 2008	Quantitative	Questionnaire	Likert scale (education)
			Occupation	Nominal	Goulias, 2008	Quantitative	Questionnaire	Likert scale (employment status)
			Family structure	Nominal	Goulias, 2008	Quantitative	Questionnaire	Likert scale (family structure)
		Characteristics of the trip maker Individual characteristics of the commuter	Possession of driving license	Nominal	Goulias, 2008, Ortuzar 2011	Quantitative	Questionnaire	Yes, no
			Automobile / motorcycle / bicycle ownership	Nominal	Goulias, 2008, Ortuzar 2012	Quantitative	Questionnaire	Yes, no

Annex 5: Time schedule

Activities	Jun				Jul				Aug				Sep				Oct				Nov
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1
Thesis Proposal due																					
Revising Thesis proposal																					
Pilot Survey online																					
Pilot Survey face to face																					
Data Collection (Survey and Interview, and Observation)																					
Input data period (translating and SPSS)																					
Data Analysis																					
Thesis Writing																					
Submission of draft thesis																					
Revising and developing final thesis																					
Final Thesis due																					

Annex 6: SPSS analysis

Rank of importance of fare

Rank for affordability of TMB

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Most important	54	34.6	44.6	44.6
	2nd choice	30	19.2	24.8	69.4
	3rd choice	17	10.9	14.0	83.5
	4th choice	6	3.8	5.0	88.4
	5th choice	14	9.0	11.6	100.0
	Total	121	77.6	100.0	
Missing	NR	35	22.4		
Total		156	100.0		

Relationship between time to the nearest stop and the level of use

Report

Perception of time consumed to go to the nearest TMB stop

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	2.41	86	.899	Very long	Very short	2.00
Once a month	2.91	23	.733	Very long	Short	3.00
Once a week	2.82	17	.951	Very long	Very short	3.00
2-3 times a week	3.00	13	.577	Long	Short	3.00
4-6 times a week	2.82	11	.874	Very long	Short	3.00
Everyday	3.33	6	.816	Not long nor short	Very short	3.00
Total	2.64	156	.887	Very long	Very short	3.00

Relationship between ease of transfer and frequency

Report

Ease to continue trip with a different mode

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	2.56	86	.662	Very poor	Very good	3.00
Once a month	2.74	23	.619	Very poor	Fair	3.00
Once a week	2.88	17	.697	Poor	Very good	3.00
2-3 times a week	2.69	13	.630	Very poor	Fair	3.00
4-6 times a week	3.00	11	.000	Fair	Fair	3.00
Everyday	3.00	6	.000	Fair	Fair	3.00
Total	2.68	156	.632	Very poor	Very good	3.00

Relationship between waiting time and frequency of using TMB

Report

Perception of waiting time at the stop

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	2.13	86	.779	Very long	Short	2.00
Once a month	2.78	23	.671	Very long	Short	3.00
Once a week	2.47	17	.624	Long	Short	2.00
2-3 times a week	2.46	13	.660	Long	Short	2.00
4-6 times a week	2.73	11	.467	Long	Not long nor short	3.00
Everyday	2.83	6	.753	Long	Short	3.00
Total	2.36	156	.762	Very long	Short	2.00

Relationship between frequency of using TMB and reliability and scheduling

Report

Adherence to time schedule

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	2.42	86	.694	Very poor	Fair	3.00
Once a month	2.83	23	.778	Very poor	Very good	3.00
Once a week	2.76	17	1.033	Very poor	Very good	3.00
2-3 times a week	2.31	13	.751	Very poor	Fair	2.00
4-6 times a week	2.82	11	.405	Poor	Fair	3.00
Everyday	3.00	6	.000	Fair	Fair	3.00
Total	2.56	156	.747	Very poor	Very good	3.00

Relationship between frequency of arrival time and frequency of using TMB

Report

Frequency of arrival time interval between busses

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	2.30	86	.687	Very poor	Fair	2.00
Once a month	2.87	23	.757	Very poor	Very good	3.00
Once a week	2.71	17	.772	Poor	Very good	3.00
2-3 times a week	2.38	13	.768	Very poor	Fair	3.00
4-6 times a week	2.82	11	.405	Poor	Fair	3.00
Everyday	2.83	6	.408	Poor	Fair	3.00
Total	2.49	156	.723	Very poor	Very good	3.00

Relationship between access to seat and frequency of use

Report

Access to seat on the bus

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	2.97	86	.710	Very poor	Very good	3.00
Once a month	2.87	23	.548	Very poor	Good	3.00
Once a week	3.29	17	1.047	Poor	Very good	3.00
2-3 times a week	3.00	13	.408	Poor	Good	3.00
4-6 times a week	3.18	11	.603	Fair	Very good	3.00
Everyday	3.00	6	.000	Fair	Fair	3.00
Total	3.01	156	.696	Very poor	Very good	3.00

Relationship between drivers handling and frequency

Report

Drivers handling

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	2.98	86	.460	Very poor	Very good	3.00
Once a month	3.00	23	.798	Very poor	Very good	3.00
Once a week	3.18	17	.636	Poor	Very good	3.00
2-3 times a week	3.31	13	.855	Poor	Very good	3.00
4-6 times a week	3.36	11	.809	Fair	Very good	3.00
Everyday	3.00	6	.000	Fair	Fair	3.00
Total	3.06	156	.604	Very poor	Very good	3.00

Relationship between safety and frequency of using TMB

Report

Safety from traffic accidents

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	2.97	86	.541	Very poor	Very good	3.00
Once a month	3.13	23	.757	Very poor	Very good	3.00
Once a week	3.06	17	.827	Very poor	Very good	3.00
2-3 times a week	3.31	13	.855	Poor	Very good	3.00
4-6 times a week	3.09	11	.701	Poor	Very good	3.00
Everyday	3.33	6	.816	Fair	Very good	3.00
Total	3.05	156	.660	Very poor	Very good	3.00

Relationship between security and frequency

Report

Security of goods/luggage

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	2.87	86	.480	Very poor	Very good	3.00
Once a month	3.04	23	.638	Very poor	Very good	3.00
Once a week	3.06	17	.827	Very poor	Very good	3.00
2-3 times a week	3.08	13	.760	Poor	Very good	3.00
4-6 times a week	3.36	11	.809	Fair	Very good	3.00
Everyday	3.33	6	.816	Fair	Very good	3.00
Total	2.99	156	.622	Very poor	Very good	3.00

Relationship between cleanliness inside TMB and frequency

Report

Cleanliness inside TMB

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	2.84	86	.550	Very poor	Very good	3.00
Once a month	2.96	23	.767	Very poor	Very good	3.00
Once a week	2.88	17	.781	Very poor	Good	3.00
2-3 times a week	3.23	13	.599	Fair	Very good	3.00
4-6 times a week	3.18	11	.603	Fair	Very good	3.00
Everyday	3.33	6	.816	Fair	Very good	3.00
Total	2.94	156	.639	Very poor	Very good	3.00

Relationship between cleanliness of the stop and the frequency of using TMB

Report

Cleanliness of waiting area/stop

How often people use TMB	Mean	N	Std. Deviation	Minimum	Maximum	Median
Once a year	1.99	86	.833	Very poor	Fair	2.00
Once a month	2.22	23	.795	Very poor	Fair	2.00
Once a week	2.06	17	.899	Very poor	Fair	2.00
2-3 times a week	1.92	13	.760	Very poor	Fair	2.00
4-6 times a week	2.64	11	.674	Very poor	Fair	3.00
Everyday	2.33	6	.816	Very poor	Fair	2.50
Total	2.08	156	.827	Very poor	Fair	2.00

Reliability analysis test for the aggregated independent variable

Reliability Statistics

Cronbach's Alpha	N of Items
.638	4

Reliability Statistics

Cronbach's Alpha	N of Items
.897	2

Reliability Statistics

Cronbach's Alpha	N of Items
.260	2

Reliability Statistics

Cronbach's Alpha	N of Items
.725	3

Reliability Statistics

Cronbach's Alpha	N of Items
.922	3

Reliability Statistics

Cronbach's Alpha	N of Items
.778	2

Reliability Statistics

Cronbach's Alpha	N of Items
.286	2

Mean score based on Manova result

	Frequency of using TMB	Mean	Std. Deviation	N
Connectivity	Seldom user	2.5439	.50250	57
	Occasional user	2.7917	.50898	24
	Frequent user	2.9286	.26726	14
	Total	2.6632	.49702	95
Reliability_Schedule	Seldom user	2.5263	.68414	57
	Occasional user	2.7917	.58823	24
	Frequent user	2.7857	.42582	14
	Total	2.6316	.63669	95
Fare	Seldom user	3.4912	.63027	57
	Occasional user	3.7083	.46431	24
	Frequent user	4.0000	.39223	14
	Total	3.6211	.58671	95
Information	Seldom user	2.491	.7102	57
	Occasional user	2.625	.4945	24
	Frequent user	3.000	.3922	14
	Total	2.600	.6425	95

Comfort	Seldom user	2.9825	.40050	57
	Occasional user	3.0000	.41703	24
	Frequent user	3.1429	.36314	14
	Total	3.0105	.39933	95
Safe_Secure	Seldom user	2.9825	.35311	57
	Occasional user	3.0833	.50361	24
	Frequent user	3.2143	.57893	14
	Total	3.0421	.43554	95
Cleanliness	Seldom user	2.6140	.55916	57
	Occasional user	2.7083	.69025	24
	Frequent user	2.9286	.47463	14
	Total	2.6842	.58824	95

Mahalanobis test

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.79	1.34	1.11	.103	103
Std. Predicted Value	-3.068	2.206	.004	.993	103
Standard Error of Predicted Value	.043	.155	.080	.031	103
Adjusted Predicted Value	.74	1.27	1.11	.107	103
Residual	-.248	.912	-.003	.293	103
Std. Residual	-.813	2.984	-.008	.957	103
Stud. Residual	-.840	3.086	-.003	.998	103
Deleted Residual	-.270	.975	.001	.319	103
Stud. Deleted Residual	-.839	3.236	.009	1.027	103
Mahal. Distance	1.041	25.280	6.986	6.244	103
Cook's Distance	.000	.312	.012	.044	103
Centered Leverage Value	.010	.248	.068	.061	103

a. Dependent Variable: Is TMB main mode of transport

Test of normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
ConnectAgRnd	.404	95	.000	.648	95	.000
ReliablAgRnd	.413	95	.000	.671	95	.000
FareAgRnd	.372	95	.000	.733	95	.000
InfoAgRnd	.375	95	.000	.737	95	.000
ComfrtAgRnd	.447	95	.000	.486	95	.000
SafeSAgRnd	.465	95	.000	.475	95	.000
CleanAgRnd	.410	95	.000	.690	95	.000

a. Lilliefors Significance Correction

Spearman's correlation test

			ConnectAgRnd	ReliablAgRnd	FareAgRnd	InfoAgRnd	ComfrtAgRnd	SafeSAgRnd	CleanAgRnd	Is TMB main mode of transport
Spearman's rho	ConnectAgRnd	Correlation Coefficient	1.000	.498**	.167*	.391**	.166*	.153	.220**	.193*
		Sig. (2-tailed)	.	.000	.042	.000	.044	.063	.007	.019
		N	148	148	148	95	148	148	148	148
	ReliablAgRnd	Correlation Coefficient	.498**	1.000	.154	.378**	.254**	.286**	.453**	.167*
		Sig. (2-tailed)	.000	.	.061	.000	.002	.000	.000	.043
		N	148	148	148	95	148	148	148	148
	FareAgRnd	Correlation Coefficient	.167*	.154	1.000	.192	.220**	.196*	.163*	.141
		Sig. (2-tailed)	.042	.061	.	.063	.007	.017	.048	.088
		N	148	148	148	95	148	148	148	148
	InfoAgRnd	Correlation Coefficient	.391**	.378**	.192	1.000	.296**	.135	.364**	.267**
		Sig. (2-tailed)	.000	.000	.063	.	.004	.191	.000	.009
		N	95	95	95	95	95	95	95	95
	ComfrtAgRnd	Correlation Coefficient	.166*	.254**	.220**	.296**	1.000	.509**	.199*	.020
		Sig. (2-tailed)	.044	.002	.007	.004	.	.000	.015	.810
		N	148	148	148	95	148	148	148	148
	SafeSAgRnd	Correlation Coefficient	.153	.286**	.196*	.135	.509**	1.000	.370**	.032
		Sig. (2-tailed)	.063	.000	.017	.191	.000	.	.000	.698
		N	148	148	148	95	148	148	148	148
	CleanAgRnd	Correlation Coefficient	.220**	.453**	.163*	.364**	.199*	.370**	1.000	.158
		Sig. (2-tailed)	.007	.000	.048	.000	.015	.000	.	.055
		N	148	148	148	95	148	148	148	148
	Is TMB main mode of transport	Correlation Coefficient	.193*	.167*	.141	.267**	.020	.032	.158	1.000
		Sig. (2-tailed)	.019	.043	.088	.009	.810	.698	.055	.
		N	148	148	148	95	148	148	148	148

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Test of between-subjects effects

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[h]
Corrected Model	Connectivity	2.194[a]	2	1.097	4.799	.010	.094	9.598	.784
	Reliability_Schedule	1.579[b]	2	.790	1.989	.143	.041	3.978	.402
	Fare	3.154[c]	2	1.577	4.968	.009	.097	9.936	.799
	Information	2.929[d]	2	1.465	3.757	.027	.075	7.513	.673
	Comfort	.293[e]	2	.146	.916	.404	.020	1.832	.204
	Safe_Secure	.659[f]	2	.329	1.764	.177	.037	3.529	.361
	Cleanliness	1.131[g]	2	.565	1.657	.196	.035	3.313	.341
Intercept	Connectivity	522.778	1	522.778	2287.299	.000	.961	2287.299	1.000
	Reliability_Schedule	502.682	1	502.682	1266.132	.000	.932	1266.132	1.000
	Fare	960.127	1	960.127	3024.650	.000	.970	3024.650	1.000
	Information	504.238	1	504.238	1293.255	.000	.934	1293.255	1.000
	Comfort	637.415	1	637.415	3990.149	.000	.977	3990.149	1.000
	Safe_Secure	659.219	1	659.219	3531.614	.000	.975	3531.614	1.000
	Cleanliness	521.115	1	521.115	1527.044	.000	.943	1527.044	1.000
Freq_of_TMB	Connectivity	2.194	2	1.097	4.799	.010	.094	9.598	.784
	Reliability_Schedule	1.579	2	.790	1.989	.143	.041	3.978	.402
	Fare	3.154	2	1.577	4.968	.009	.097	9.936	.799
	Information	2.929	2	1.465	3.757	.027	.075	7.513	.673
	Comfort	.293	2	.146	.916	.404	.020	1.832	.204
	Safe_Secure	.659	2	.329	1.764	.177	.037	3.529	.361
	Cleanliness	1.131	2	.565	1.657	.196	.035	3.313	.341

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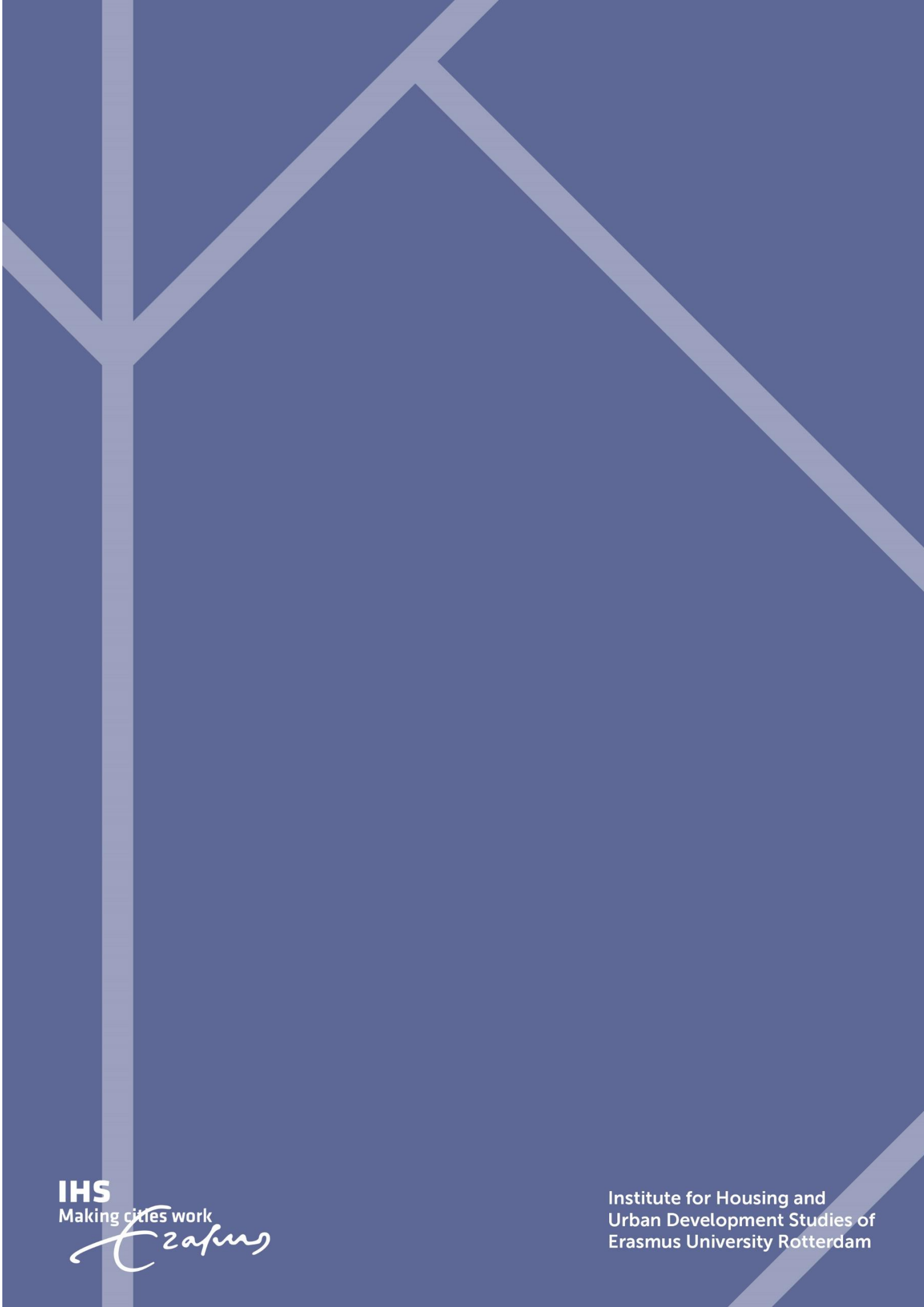

Institute for Housing and
Urban Development Studies of
Erasmus University Rotterdam