



# Transformation of Public Transport Based on Bus Rapid Transit (BRT) and Implementation of Buy the Service (BTS) Scheme in A Metropolitan City of Sarbagita, Bali

Nyoman Budiarta RakaMandi<sup>1</sup>, I Putu Preantjaya Winaya<sup>2</sup>

<sup>1,2</sup>Civil Engineering, Faculty of Engineering, Udayana University, Bukit Jimbaran Campus, Bali-Indonesia

**ABSTRACT:** The level of congestion in Indonesia's big cities, including Denpasar, is already so severe. This is inseparable from the phenomenon where most people in Indonesia now have a car transportation system that is growing rapidly. Furthermore, the city is characterized by high car dependence and a low and steadily declining public transport profile. The Indonesian government seeks to transform the public transportation industry so that drivers want to change to public transportation through the implementation of Bus Rapid Transit (BRT) and most recently, in 2020 the government through the Ministry of Transportation launched the "Buy the Service" program or known as BTS which has been implemented in Indonesia. 5 big cities, namely: Palembang, Solo, Medan, Yogyakarta, and Denpasar. Then followed by Bandung, Makassar, Banjarmasin, Surabaya, and Banyumas in 2021. However, there is an indication that the interest of private car users to switch to using public transportation is very small. The study is intended to evaluate of service or transit improvement. Identify different categories of impacts and how to measure them, discuss the best way to evaluate public transport and identify common mistakes that distort results as well as discuss the travel impacts of changes to the transit system (BRT) and incentives (BTS). The results of this study are expected to explain ways to optimize transit benefits by increasing system efficiency, increasing passengers and creating more transit-oriented land use patterns.

**KEYWORDS:** Bus Rapid Transit (BRT), Buy The Service (BTS), Evaluation, Public transport.

## I. INTRODUCTION

The development and growth of Bali tourism have provided the benefits of increasing welfare for its residents. This increase in tourism has led to the movement of people to tourist destinations or *daerah tujuan wisata* (DTW) intending to be able to improve their standard of living. Migration of population does not only occur in local (native) Balinese but also from various regions throughout Indonesia. This massive population movement coupled with the increasing number of tourists causes an economic cycle that tends to be concentrated in the DTW and creates tourist cities such as Kuta, Ubud, and Sanur which are the main destinations for tourists visiting Bali (RakaMandi, Achmadi et al. 2015). Moreover, Ubud has been named the fourth best tourist city in the world by Travel+Leisure, a leading travel magazine based in New York, United States (US). (OkeTravel 2022) Ranked fourth, Ubud beat popular tourist cities such as Bangkok in Thailand, Tokyo in Japan, and Seoul in South Korea. By offering a rural atmosphere, it has a stretch of rice fields with a charming terrace model. In addition, Ubud is also known as a center for traditional dances and crafts. Tourists can find many art galleries, arenas for music performances to dance stages which are held alternately every night in all corners of the village. This causes one classic problem, namely congestion, due to the large number of people accessing the area. Efforts to overcome (reduce) the pressure of traffic congestion can be done in 2 methods, namely: improvement of transportation infrastructure and management of transportation operations (Morlok 1978).

The first method aims to increase road capacity. This method works well in increasing the flow of vehicles per unit time. However, in the long run, this method stimulates traffic growth, which in turn can reduce road capacity again. Road expansion tends to encourage additional vehicle travel which increases external costs such as downstream congestion, parking demand, traffic risk, barrier effects during construction activities, and pollution emissions (Todd Litman 2021). In addition, efforts to improve transportation infrastructures, such as road widening and construction of new roads, construction of flyovers, underpasses, and toll road construction have obstacles, namely large costs and especially limited land.

The second method aims to streamline the benefits of roads, namely increasing the flow of goods and people per unit of time. The usual effort to increase the flow of people is by operating public transportation. Public transportation (PT) is not only expected to be able to serve urban people who do not have private vehicles, but it can also function as a substitute for private cars. However,



from the research in Bali (RakaMandi and Joni 2017) it turns out that the sensitivity of private car users is very small to the attributes of public transportation services. This means that there is an indication that the interest of private car users to switch to using public transportation is very small.

The BTS scheme for urban mass transportation is a mechanism for purchasing mass transportation services by the government, in this case the Ministry of Transportation, to operators with an auction mechanism based on Minimum Service Standards or *Standar Pelayanan Minimum* (SPM) or Quality Licensing that meets the aspects of comfort, security, safety, affordability, equality and fulfills health aspect. In this scheme, the government only focuses on evaluating the performance of the services run by the operators. This scheme is regulated through the Minister of Transportation Regulation Number 9 of 2020 concerning the Provision of Subsidies for Urban Public Passenger Transportation, which was later amended by PM Number 2 of 2022. "However, the facts on the ground are still not encouraging. Public transportation is still less attractive and for most of the tourists who visit Bali, public transport currently serves a relatively small portion of the total trip, but the trips it serves tend to be of high value for tourists and the community (RakaMandi 2022). Meanwhile, congestion in Denpasar is already bad." This is inseparable from the phenomenon where most people in Indonesia now have a car transportation system that is growing rapidly, including the Sarbagita area. Furthermore, the city is characterized by high car dependence and a low and steadily declining PT profile.

As a scheduled carrier (scheduled carrier) and mass (mass transit), BRT public transportation is indeed cheap but has many weaknesses. The main weakness is that it is not flexible and less familiar or impersonal and must be connected to the center of community activities such as educational activities, and tourism so that it can be a choice of transportation. In addition to connectivity, of course, services from public transportation are also a reference point for people to choose to use public transportation compared to private vehicles. The mass transportation system no longer merely speeds up a person's mobility to reach their destination but also provides comfort, security, and safety for the community. Therefore, urban transportation must be built following the needs of the community that considers aspects of efficiency and effectiveness (Wright, 2007) in (Tangkudung, Fitriati et al. 2011).

In Europe and Asia, the transformation of public transport has worked well as evidenced in America. Between 2004 and 2012 the US population grew by 6%, motorized travel decreased by 1% and transit passengers increased by 14% (Todd Litman 2021). This trend represents a changing demand for travel – although few people want to completely abandon car travel, many prefer to drive less and rely more on walking, cycling, and public transport, as long as they are convenient, comfortable, and integrated. It is, therefore, necessary to implement integration measures to improve the service quality of the newly formed PT network, ensure the cooperation of the operators involved and promote it as a strong integrated attraction alternative, compatible with cars to achieve a mode shift towards a balanced intermodal transport system.

There are many reasons to improve the evaluation of the existence of Transmetro Dewata which is very relevant to the needs of people who want fast mobility. The problem is how to strengthen the existence of Transmetro Dewata as a fast public transportation mode, to optimally support the mobility needs of the urban community. The purpose of this study is to identify and analyze the process of social engineering in creating order and public order in transportation. If this is achieved, there will be an increase in the quality of life of people in urban areas. As such, people are forced to make more rational choices in determining their choice of the mode of transportation that they consider the most efficient and effective. Based on this background, it is necessary to conduct a thorough evaluation to uncover the underlying factors that led to the project's results in the public transport reform effort launched in the metropolitan area of Sarbagita. The conceptual framework and problems and solutions can be seen in Figure 1.

## II. TRANSFORMATION OF PUBLIC TRANSPORTATION IN SARBAGITA AREA

### A. Sarbagita Urban Area

Denpasar, Badung, Gianyar, and Tabanan Urban Areas, hereinafter referred to as Sarbagita Urban Areas, are a single urban area consisting of Denpasar City and Kuta Urban Area as core urban areas. Mangupura Urban Area and Jimbaran Urban Area in Badung Regency, Gianyar Urban Area, Sukawati Urban Area, Ubud Urban Area in Gianyar Regency, and Tabanan Urban Area in Tabanan Regency as the surrounding urban areas that form a Metropolitan Area (Perda Provinsi Bali No.3 Tahun 2020)

### B. BRT-based public transport reform in the Sarbagita area

Trans Metro Dewata is a transportation revolution, especially in the field of urban transportation in the SARBAGITA area. Starting with Trans Sarbagita, a bus rapid transit (BRT) type of public transportation, which started operating on August 18, 2011, the goal

is to rebuild the public transportation network in Bali which has almost disappeared. The idea of Trans Sarbagita has been launched since 1998, but it was not realized because Indonesia was hit by a monetary crisis that affected the budget received by the provincial government. At that time, Trans Sarbagita operated in four corridors, namely Corridor 1 (Kota - Garuda Wisnu Kencana pp) and Corridor 2 (Batubulan - Nusa Dua pp) as well as two new corridors launched in 2015 namely Corridor 7. Tabanan - Mengwi - Airport and Corridor 11. Mahendradatta - Sanur – More. When it was launched, it only used 25 bus fleets, it continued to decline until at the time of this study there were only 5 buses.

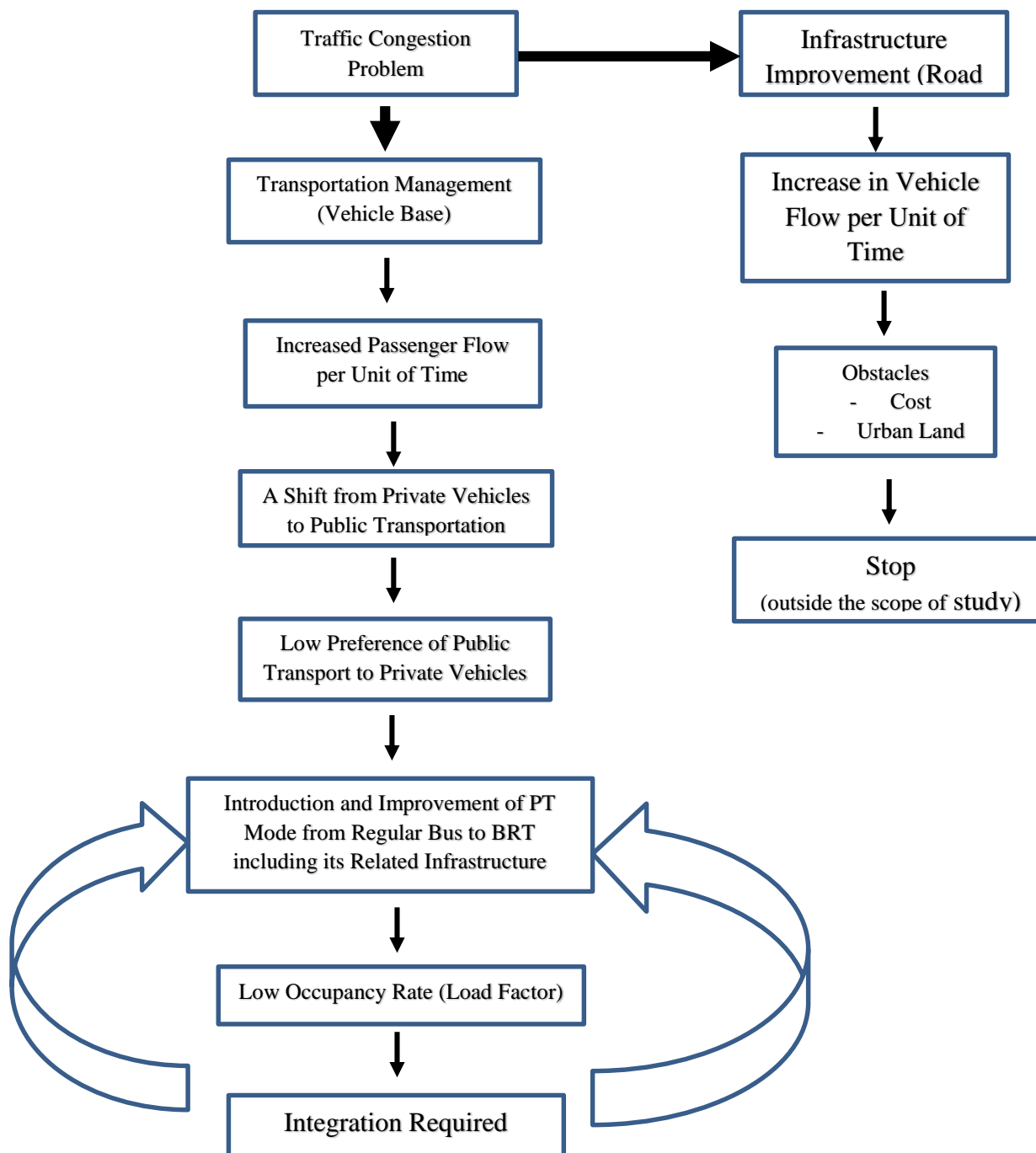


Figure 1. Conceptual Framework for Problems and Solutions

Then Trans Metro Dewata with a fleet of 105 buses with 5 corridors. Corridor 1 (Preparatory Terminal for Tabanan Regency – ends at Sentral parking lot in Kuta, Badung Regency) with 32 stops. Corridor 2 (Gor Ngurah Rai Denpasar City – Ngurah Rai Airport) with 21 stops. Corridor 3 (Dalung Integrated Security Post – Matahari Terbit Beach) with 16 stops. Corridor 4 (Ubung Terminal – Monkey Forest Ubud) with 29 stops. Corridor 5 (Terminal Ubung – Central Parking Kuta) with 33 stops. Both (Trans Sarbagita and Trans Metro Dewata) still exist with different operators and coverage areas..

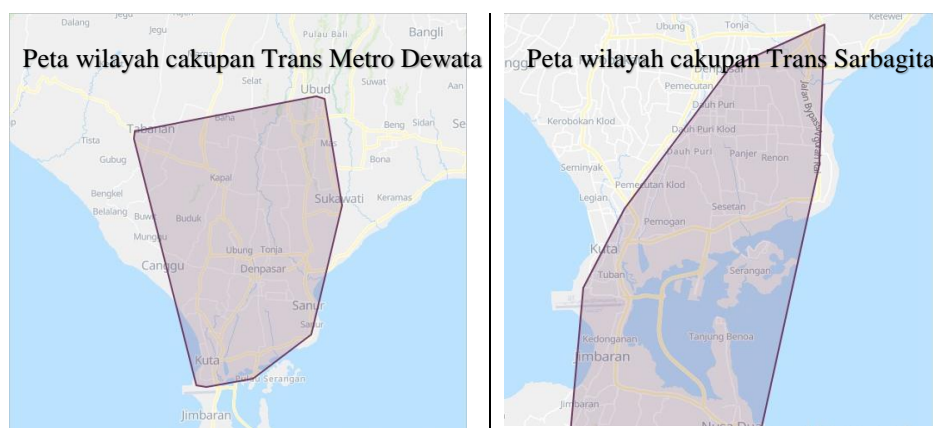
**C. Trans Metro Dewata coverage area**

Trans Metro Dewata is a public transportation provider in Denpasar that operates Bus routes. Trans Metro Dewata has 5 Bus routes in Denpasar with 192 Bus stops. Their bus routes cover the area from the North (Gianyar) with one stop at Puri Ubud to the South (Badung) with one stop at Perum Komplek Burung Selatan. Their westernmost stop is Simpang Gubug Selatan (Tabanan) and the easternmost stop is Bale Banjar Bababakan / Sukawati (Gianyar).

**D. Trans Sarbagita Coverage Area**

Trans Sarbagita is a public transportation provider in Denpasar that operates Bus routes. Trans Sarbagita has 3 Bus routes in Denpasar with 88 Bus stops. Their bus routes cover the area from the North (Gianyar) with one stop at Batubulan to the South (Badung) with one stop at Gwk (Garuda Wisnu Kencana). Their westernmost stop is Ungasan 1 (Badung) , and their easternmost stop is Batubulan (Gianyar).

Bus Rapid Transit (BRT) is expected to represent city transportation that can change an inhumane transportation culture. The introduction of new transportation values, such as disciplined behavior and attitudes, ticket payment systems, real-time information, and easy travel applications, is a new order that is urgently needed by the urban community as a whole. The values of convenience, safety, respect for time, and costs inherent in Transmetro services are expected to reduce various forms of risk in transportation. Thus, the Transmetro Dewata bus can improve or improve the quality of life of people in the Sarbagita area. Coverage area maps of Tran Metro Dewata and Trans Sarbagita see Fig.2



**Figure 2.** Coverage area maps of Trans Metro Dewata and Trans Sarbagita  
**Source:** (moovit 2022)

**III. BUS RAPID TRANSIT**

**A. The concept of Bus Rapid Transit (BRT)**

The world's first bus rapid transit system (BRT) began in 1974 at Curitiba in Brazil (ITDP 2016). Since the study of BRT, there have been many differences between the various approaches to defining BRT. Bus Rapid Transit (BRT) is traditionally defined as a mass transit bus which is defined as large capacity, there is a route (corridor), stops at the bus stop, and is integrated.

According to (ITDP 2016) Bus Rapid Transit (BRT) is a high-quality bus-based transit system that provides fast, convenient, and cost-effective service at metro level capacity. This is done through the provision of dedicated lanes, with iconic busways and stations usually aligned with the center of the road, off-board fare collection, and rapid and frequent operation.

Furthermore, the BRT concept is described by (ITDP 2016) is as follows:



## *BRT Corridor*

A BRT corridor is a section of a road or continuous road served by a bus route or several bus routes with a minimum length of 3 kilometers (1.9 miles) that has a dedicated bus lane. The BRT standard will be applied to specific BRT corridors rather than the BRT system as a whole, as the quality of BRT in cities with multiple corridors can vary widely.

To be considered a BRT, a corridor must:

- Minimum length of 3 km with special lanes,
- Scored 4 points or more in special road elements,
- Scored 4 or more points on busway alignment elements; and
- Scored 20 points or more across all five elements of BRT Fundamentals.

## *Basics of BRT*

Five important features define BRT, these features significantly result in faster travel for passengers and make transit journeys more reliable and more comfortable.

### *Special Line*

Dedicated bus lanes make travel faster and ensure that buses are never delayed due to various traffic jams.

### *Busway Road Alignment*

Highway centers or bus corridors keep buses away from busy roadsides where cars park, stand, and turn.

### *Off-board Fare Collection*

Paying tickets at the station instead of on the bus eliminates delays caused by passengers waiting to pay on the bus.

### *Intersections Treatment*

Forbidding turns for traffic across bus lanes reduces delays caused by buses by deflecting traffic. Banning such turns is the most important measure of moving buses through intersections – even more important than a signal priority.

BRT is a bus that runs in its lane as *the right of way*. Going through in a special lane does not mix with other vehicles so that travel times can be measured and scheduled,” Referring to the definition of ITDP and World Bank, it means that in Indonesia only Jakarta has done this, although not completely because sometimes it still cuts off public roads. That means Trans Metro Dewata let alone Trans Dewata including other cities. In fact, currently cities have BRT network claims such as Trans Pakuan Bogor, Batik Solo Trans, TransSemarang, TransJogja, Trans Metro Bandung, Trans Musi Palembang, Trans Padang, Trans Mamminasata Makassar, Trans Bandar Lampung, Trans Dewata Denpasar, BRTS Medan, and Suroboyo Bus. The adoption of the name is the same as the brand in Jakarta, namely the Trans Jakarta Bus which is operated by PT Transport Jakarta (BUMD).

Transit is becoming more important as cities grow. In small cities, transit mainly serves the transportation of disadvantaged drivers (people who cannot use cars), usually representing 5-10% of the population, but as cities grow and density, transit serves more free riders (people who have the choice to drive), thereby delivering more benefits by reducing traffic problems and supporting more efficient land use patterns (Todd Litman 2021).

## ***B. Integration***

For PT to be considered a viable alternative to private vehicles, globally, policymakers have developed strategies to produce effective integrated multimodal systems (Vassallo 2012). The purpose of the integrated system is to provide pedestrians with a broad spectrum of destination choices through a system that is convenient, accessible, convenient, safe, fast and affordable (Ulengin 2007). This can be achieved by strategically positioning transfer points within the network to optimize resources (Navarrete 2013). Therefore, an important element in the development of such an integrated system is for policy makers and operators to facilitate routes with “smooth” transfers.

Effective integration is possible through three processes. Most important is institutional integration with coordinated planning. Second, there must be physical integration; ensure network spatial connectivity through junctions and hubs, thus providing a seamless travel experience. Finally, there must be a unified operation achieved through the integration of information and tariffs.

Transport Integration means that whatever mode or type of transportation (rail, road, water and air) is involved, it all operates as a 'seamless' entity – for the benefit of the fare-paying customer (Sonar and Gaikwad November 2020).

A Public Transport System is made up of three kinds of integration (Sonar and Gaikwad November 2020):



- Infrastructure integration, consisting of dedicated transport infrastructure, such as park-and-ride facilities, interchange stations, and Priority Line buses:
- Mode integration, which consists of the possibility to use different types of public transport modes (buses, trains) in a coordinated schedule;
- Fare integration, which allows passengers to use different modes of transportation and services with the same ticket

**IV. BUY THE SERVICE (BTS) SCHEME**

Buy The Service or BTS scheme for urban mass transportation is a mechanism for purchasing mass transportation services by the government, in this case the Ministry of Transportation, to operators with an auction mechanism based on Minimum Service Standards (SPM) or Quality Licensing that meets aspects of comfort, security, safety, affordability, equality and fulfill health aspects. So, in this scheme, the government only focuses on evaluating the performance of the services run by the operators.

Through this concept, the government carries out a number of functions, namely:

- ◆ *Risk Responsibility*; The government is the bearer of the risk of providing transportation services due to the high operational costs of mass transportation.
- ◆ *Licensing*; The government grants service implementation licenses to operators who meet the Minimum Service Standard qualifications (SPM).
- ◆ *Priority*; The government gives priority to public transportation so that it has advantages over private vehicles.

There are at least seven criteria needed to become a recipient city for the Buy the Service program, including having a large population but not being served by public transportation facilities or the existing public transportation facilities are not optimal. Existing public transportation services show a positive trend and can withstand the pressure of using private vehicles. "Has big ambitions and commitments but still needs help, especially in terms of finances. And Denpasar can meet the requirements set by the Ministry of Transportation" In 2020, the BTS scheme will be implemented in 5 major cities, namely Palembang, Solo, Medan, Yogyakarta, and Denpasar. Then followed by Bandung, Makassar, Banjarmasin, Surabaya, and Banyumas in 2021 (Figure 3)



**Figure 3.** Pilot Cities Buy The Service (BTS)  
 Source: (Drs.Budi Setiyadi 2021)



## A. *Minimum Service Standard or Standar Pelayanan Minimal (SPM)*

Minimum Service Standard (SPM) is the lowest standard set by the Government so that transportation services have excellent quality and service. Some examples of services:

- ◆ *Security*; CCTV availability, ID Card Driver, and Hazard button
- ◆ *Safety*; Example: vehicle operation SOP, emergency SOP, etc
- ◆ *Comfort*; Temperature in the bus, cleanliness, lighting.
- ◆ *Affordability*; Accessibility, tariff
- ◆ *Equality*; priority seat availability
- ◆ *Regularity*; waiting time, travel speed, and stop time at the bus stop

BTS is a program dedicated to the convenience and safety of using public transportation in urban areas which is subsidized 100% of its operations by the Government so that people can enjoy the Teman Bus for free. "This subsidy is so that transportation services can also carry out the specified Minimum Service Standards (SPM). The application of this SPM, must be met by the operator when running bus services. In addition, the advantages of Teman Bus are supported by technological facilities to try to realize the conditions of urban mass transportation services that are far more excellent than before. The use of Internet of Things (IoT) technology in buses has also begun to be implemented. Other facilities available include passenger counting, mobile DVR for monitoring that can transmit signal speeds of 2G-3G-4G, GPS tracking, surveillance cameras, CP4 which is a device for monitoring vehicles on the driver dashboard panel and driver attendance using an RFID card.

## B. *Buy the Service Implementation*

BTS is a development of the previous program, namely Bus Rapid Transit (BRT), where the government buys buses which are then handed over to local governments to be managed. The BTS program is the embryo of a sustainable mass transportation system, where safe and comfortable bus services, as well as the certainty of bus departure and arrival schedules, are prioritized.

This scheme is regulated through the Minister of Transportation Regulation Number 9 of 2020 concerning the Provision of Subsidies for Urban Public Passenger Transportation, which was later amended by PM Number 2 of 2022.

Procurement of "BRT (Bus Rapid Transit)" or other services based on BTS (Buy The Service) is the best option currently available because with this, system operators can be more optimal in providing services, especially during a pandemic, as we are now.

## V. **METHODOLOGY**

This study attempts to uncover the underlying factors that led to the project's outcome in the public transport reform effort launched in the Sarbagita metropolitan area. The method used is an explanatory research method, formulating variables, indicators, and parameters to analyze the BRT system in Sarbagita and as a boundary to determine the current situation in the Sarbagita Metropolitan City. Variables, indicators, and parameters are built from literature review journals, government documents, and implementation of the BRT system in several cities and several countries. To confirm the theory with the current situation, the data collection process involved field observations, in-depth interviews, literature review, and questionnaires.

## VI. **BRT-BASED PUBLIC TRANSPORT WITH BTS SCHEME IN SARBAGITA**

### A. *Public Transport in Sarbagita*

The most popular urban public transport system used in Denpasar and its surroundings (Sarbagita) is

- Angkot in the form of minibuses, Kura-Kura Bus, Dokar, Komotra Shuttle Bus, Taxis, Conventional Taxis, Online Transportation, charter
- Bus Rapid transit (BRT) large commuter bus
- Shared taxis serve as feeders to the Primary Public Transport System (BRT) and travel across cities to some extent

The BRT-based bus mode uses two operators where Trans Sarbagita, which was previously managed by the Restu Mulia auto (PO) company, then moved to Damri and is now managed by the Djakarta Passenger Transportation General Company or Perum PPD Jakarta which is one of the state-owned enterprises under the guidance of the Ministry of Transportation. communication. Meanwhile, Trans Metro Dewata is managed by PT Satria Trans Jaya. while other modes such as the angkot mode such as BRT which is partially implemented will cause commuters to encounter obstacles when traveling and may be the reason why the market



share of public transport in the Denpasar-Badung-Gianyar-Tabanan (Sarbagita) area has decreased. Moreover, BRT-based public transportation Based on observations (surveys) that have been carried out public transportation is still an obstacle for Bali. After Trans Sarbagita, which has been present since 2011, began to fade, now the presence of Trans Metro Dewata is still far from being a solution in facilitating the mobility of Balinese people. The available routes (corridors) are very limited so mobility is not as free as when you have a private vehicle. If no improvement or evaluation is carried out, the buses operating in Denpasar, Gianyar, Badung, and Tabanan are increasingly quiet and traffic jams will get worse.

In addition to the sophistication of the technology used, Trans Metro Dewata is also able to serve passengers from Ubud to Tuban. However, the limited number of stops to change lanes is one of the weaknesses of this bus operation. Passengers who come from the Ubud area also have to go to Ubung Terminal first, before they can go to the heart of Denpasar. Passengers heading to Nusa Dua, who board from the Sudirman bus stop (Unud campus) must transfer at the Benoa bus stop, wait a long time and pay again. In addition, not all bus stops serve transfers.

Unud lecturers and students benefited the most from the existence of this BRT as seen during peak hours when it is crowded but from observations, there are still very few who switch from drivers (cars/motorcycles) to BRT.

### ***B. Buy the Service (BTS) Scheme Implementation***

In this scheme, the government provides a 100% subsidy to the operational costs of transportation operations by applying the minimum service specified plus the profit determined by the operator. With this scheme, urban public transport fares will be free because it has been subsidized by the government. This scheme is also expected to improve mass transportation services because the operator does not have to be careless in pursuing deposits to cover operational costs as it has been subsidized. Both of these conditions are expected to attract people's interest to switch from private vehicles to public transportation.

Globally, 'sustainable transport' has become a major goal of transport planning and policy-making around the world. Two distinctions can be made between different policy measures, "push" and "pull". The purpose of the "push" type action is to reduce the traction of private vehicles, while the "pull" type action aims to increase the attractiveness of sustainable transportation (Chodhury and Ceder 2016). To maximize the implementation of the BTS scheme, the government implements a pull and push strategy. The pull strategy is the government's effort to attract people to choose to use public transportation. In the BTS scheme, the pull strategy is implemented by purchasing mass transit services from operators. The government takes over the risk of bus services and makes public transport services free to the public. Meanwhile, the push strategy is the government's effort to encourage people to prefer public transportation for their trips. This strategy is implemented in the BTS scheme through the determination of SPM that must be met by the operator if elected to operate the BTS service.

So far, the public's reluctance to choose mass transportation is more due to the inaccessibility of destination areas with mass transportation, as well as mass transportation services that tend to be poor, such as long bus waiting times, reckless drivers, and unclear departure times. Minimum service standards (SPM) are a requirement for submitting BTS payments to the government. Likewise, drivers who violate will be sanctioned by the operator company, ranging from light sanctions for lost bonus rights to the most severe dismissal. It is hoped that user/community complaints can be overcome by establishing and supervising the implementation of clear service MSS, such as the punctuality of bus arrivals, measured and not too long waiting times, services to passengers, or bus lane and parking arrangements so that they do not come into contact with other road users. With the implementation of the BTS system, there is an improvement in mass transportation services to the community. With good and measurable bus services and free mass transportation fares, because they have been subsidized by the government, people can choose to use urban mass transportation. In this way, the government's goal of reducing traffic jams can be achieved, plus reducing the level of fuel consumption and air pollution due to the reduced number of vehicles traveling on the highway.

### ***C. Integration***

The term "transport integration" is used in different contexts in many publications. One can distinguish different types and forms of transport integration in urban areas, described by different authors and presented in various reports (Starowicz W. 2008, Rudnicki A. 1999, (Hilferink P., Roest Crolius A., Van Elburg J. - C. 2003, Dydkowski G. 2005, Mei A. 1993, Hine J. 2002, Hull A. 2005, Stead D. 2003, Underdal A. 1980, Solecka K. 2013, Fierek S. 2013) dalam (Solecka and Żak 2014) Ini termasuk:

- Integration of various modes of public transport.
- Integration of public and individual transport.





- Integration of transportation policies with other policies on spatial planning and urban planning.
- Spatial integration is based on the implementation of efficient land use strategies (eg multimodal terminals and exchange platforms, shared paths for public transport).
- Infrastructure integration is based on the development of different technical solutions in transport infrastructure. (eg alleys connecting public transport stops, overpasses, underground roads, joint bus stops for public transport).
- Organizational integration (e.g., coordinated schedules; metropolitan tickets for different modes of transport).
- Economic integration focuses on introducing various measures that support the sustainability and efficiency of the public transport system (e.g., integrated fares).
- Information integration (e.g., passenger information systems; web pages; electronic trip planners).

(Sonar and Gaikwad 2020) in a study on Global Towards Integrated Public Transportation Planning, implemented an integrated transportation system with 4 (four) attributes, namely mode integration, information integration, tariff integration, and infrastructure integration. In this study, only a brief overview is carried out to evaluate the sustainability of BRT.

#### ***D. BRT Sarbagita Integration Challenge***

Sarbagita's public transport network spread across many jurisdictions (Denpasar, Badung, Gianyar and Tabanan) does not always lay the groundwork for physical, information and fare integration. Although the BRT program is under the jurisdiction of the province which in fact oversees the cities and districts of the Sarbagita region. As noted (Sonar and Gaikwad 2020) further barriers to integration are fragmented ownership of public transport with fragmented ownership of physical networks spanning multiple legal entities, duplication of procedures, failures in communication and lack of clear responsibilities and resources.

Integration of all modes of public transport is needed to facilitate greater mode choice, accessibility and reduction of waiting and travel times. Effective integration is possible through three processes (Sonar and Gaikwad 2020). Most important is institutional integration with coordinated planning. Second, there must be physical integration; ensure network spatial connectivity through interchanges and hubs, thus providing a seamless travel experience. Finally, there must be a unified operation achieved through the integration of information and tariffs.

#### **V. CONCLUSION**

This study reviews activity and issues related to BRT-based public transportation with the Buy The Service (BTS) scheme in Bali. It represents a golden opportunity to direct urban mobility in a more sustainable way. For this to happen, attractive alternatives, embodied in a single public transport option, must be planned and implemented. One of the challenges of the system is in presenting a face to passengers in terms of integration.

Like most other cities in Indonesia that are implementing this program, the transportation system is generally still not developed from the same platform. The underlying factors that led to the project's outcome in the public transport reform effort launched in the Sarbagita metropolitan area were:

First, Bali or Sarbagita have not demonstrated a systematic approach to implementing action packages for integration trips, and have benefited from the relatively new public transport infrastructure (BRT) and funding available from the Central Government in the form of BTS, on the other hand, it has not benefited from their high density; especially for the proximity of the population to the available public transport system. The transportation infrastructure has not been well integrated with the development of land use, especially tourism.

Both cities must pay attention to the role of the BRT network Integration takes time and money. A cost-effective measure in the short term is information integration – in the form of better signage, and easy-to-use transit guides both in print and via the Internet. There is uncertainty about how far public transport services must be improved to be effective in reducing car use. The investment required to affect a significant modal shift to BRT may be quite high. Apart from good public transport services, the Sarbagita area also relies on high car ownership and usage costs on road congestion and car park controls. To maintain a low level of car ownership improving the public transport system alone may not be effective in reducing car travel. The introduction of complementary measures such as more bus and transit lines and even congestion pricing may be necessary.



## REFERENCES

1. Chodhury, S. and A. Ceder (2016). "Users' willingness to ride an integrated public-transport service: A literature review." *Transport Policy* **48**(4): 183-195.
2. Cirianni, F., U. Crisalli and D. Iannò (2009). *Intermodality and fare integration for public transport in metropolitan areas*, Project: Local Public Transport.
3. ITDP (2016). What is BRT? <https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/what-is-brt/>.
4. Drs. Budi Setiyadi, S., M.Si, (2021). *Prospek dan Tantangan Sistem Transportasi Darat berbasis NKI untuk mendukung akselerasi KTI*. Webinar-1. Fakultas Teknik Universitas Hasannudin. ITDP (2016). What is BRT? <https://www.itdp.org/library/standards-and-guides/the-bus-rapid-transit-standard/what-is-brt/>.
5. moovit (2022). *Trans Metro Dewata Jadwal, Rute, dan Pemberhentian*: [https://moovitapp.com/index/in/Transportasi\\_Umum-lines-Denpasar-5575-2071907](https://moovitapp.com/index/in/Transportasi_Umum-lines-Denpasar-5575-2071907)
6. Morlok, E. K. (1978). *Introduction to Transportation Engineering and Planning*, Mc Graw Hill Book Co.
7. Navarrete, F. a. J. d. D. O. (2013). "Subjective valuation of the transit transfer experience: The case of Santiago de Chile." *Transport Policy*, **25**: 138-147.
8. OkeTravel (2022). *Ubud Jadi Kota Wisata Terbaik ke-4 di Dunia, Kalahkan Bangkok dan Tokyo*: <https://travel.okezone.com/read/2021/2011/2012/2406/2500648/ubud-jadi-kota-wisata-terbaik-ke-2500644-di-dunia-kalahkan-bangkok-dan-tokyo>.
9. *Perda Provinsi Bali No.3 Tahun 2020 tentang Perubahan atas Peraturan Daerah Nomor 16 Tahun 2009 tentang Rencana Tata Ruang Wilayah Provinsi Bali Tahun 2009 - 2029*. Bali.
10. RakaMandi, N. B. (2022). "Pedestrian Facilities as the Core of Sustainable Public Transport: A Case Study of Kuta-Bali Tourism Destinations." *International Journal of Current Science Research and Review* **5**(1): 256-266.
11. RakaMandi, N. B., T. Achmadi and D. Mnfaat (2015). "Port Location Selection Model Case Study of Tourism Sector in Bali." *Applied Mechanics and Materials Vol 776* **776**(2015): 87-94.
12. RakaMandi, N. B. and G. P. Joni (2017). *The Role of Transportation Policy to Support Accesibility and Mobility in The Development of Tourist Destination Kuta, Bali, Indonesia*. *International Conference of Applied Science on Engineering, Business, Linguistics and Information Technology (ICo-ASCNITech)*, Padang, Indonesia, Politeknik Negeri Padang and Politeknik Ibrahim Sultan.
13. Solecka, K. and J. Žak (2014). "Integration of the urban public transportation system with the application of traffic simulation." *Transportation Research Procedia*, **3**(2014): 259 - 268.
14. Sonar, D. S. G. and M. A. B. Gaikwad (November 2020). "Global Efforts Towards Integrated Public Transportation Planning : A Brief Review." *International Journal of Engineering Research & Technology (IJERT)* **9**(11).
15. *Planning : A Brief Review.* *International Journal of Engineering Research & Technology (IJERT)* **9**(11).
16. Tangkudung, E. S. W., R. Fitriati, R. Modjo and S. Aminah (2011). "Sistem Bus Transit Transjakarta dalam Studi Rekayasa Sosial." *Jurnal Transportasi* **11**(1): 1-10.
17. Todd Litman (2021). *Evaluating Public Transit Benefits and Costs Best Practices Guidebook*, Victoria Transport Policy Institute.
18. Ulingen, F., S. Onsel, Y. I. Topcu, E. Aktas and O. Kabak (2007). "An integrated transportation decision support system for transportation policy decisions: The case of Turkey." *Transportation Research part A: Policy and Practice*, **41**(1): 80-97.
19. Vassallo, J. M., F. Di Ciommo and A. Garcia (2012). "Intermodal exchange stations in the city of Madrid." *Transportation* **39**(5): 975-995.

*Cite this Article: Nyoman Budiarta RakaMandi, I Putu Preantjaya Winaya (2022). Transformation of Public Transport Based on Bus Rapid Transit (BRT) and Implementation of Buy the Service (BTS) Scheme in A Metropolitan City of Sarbagita, Bali. International Journal of Current Science Research and Review, 5(7), 2775-2784*