

Effectiveness of Rea Vaya Bus Rapid Transit System (BRTS) in the City of Johannesburg

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Abstract

Transport remains connected to our indigenous habitat, wellbeing and monetary thriving which rely upon good transport frameworks that provides effectiveness, comfort, fairness as well as affordability. Public transport is often framed as key component of building sustainable cities. Nonetheless, present estimations recommend that transport development is unjustifiable. Transport intimidates the social, economic, and our environmental future. Modifying as well as overseeing patterns of transport shows a critical issue which necessitates collaboration from participants' at all governmental spheres. The paper presents a critical literature review of the relationship between public transport and sustainability. The paper contributes to transport domain by identifying the key problems associated with sustainability of transport based on the perceptions and discussions of significant literature on transport. The attention is on connection amongst sustainable transport division and the sustainable development within South African setting. Outcomes demonstrate that the concept of sustainable transportation has received recognition from the globe and improvement of sustainable transport is evident around the city. This work concludes that sustainable transportation is still a long process for developing countries, as it provides a progression of proposals that are intended to upgrade the execution of the Johannesburg transport development and design method, with suggested changes for moving transportation improvement to a sustainable motivation.

Keywords

Public Transport, Sustainable Transport, Bus Rapid Transit System (BRTS), Sustainability Analysis, Sustainable development.

1. Background

In this century, both the private and public transportation divisions are facing difficulties due to an expansion in car possession as well as the suburbanization of the residences and firms in the ecosphere. Previously, transportation was revolved around focal regions of urban communities where work densities and high populace empowered constant administrations, high inhabitation rates and numerous courses (Vaz & Venter, 2012). Todes (2012) state that as development is scattering to country domains from the urban zone, public transport experiences fundamental challenges, to expand services with the end goal of delivering high quality service to commuters and to coordinate rural administration with metropolitan administration.

As indicated by Yusuf and Allopi (2010), the idea of Bus Rapid Transit System started in 1937 in Chicago, be that as it may, the full system was just actualized in 1974 in Curitiba, Brazil. The first system in Brazil was worked in 1974 in the city of Curitiba by the mayor, architect Jaime Lerner, and turned into the primary BRT on the planet with the objective to give amazing rail travel administration to clients and at a practically identical cost (Wright & Hook, 2007). Pirie (1992) likewise includes that Curitiba's prosperity motivated the execution of comparable plans in excess of 100 urban communities around the globe, including the Brazilian urban areas of Brasília, São Paulo, Belo Horizonte, Rio de Janeiro, Manaus, Goiânia, Porto Alegre Aracaju, Recife and Salvador.

BRT as intended to address these problems, the development of a rail-based metro framework was well-thought-out be that as it may, an option must be looked for because of the absence of assets (Vasconcellos, 2003). Public transport before the execution of the BRT framework was loose, ruled by private division administrators and neglected to address customer issues (Wilkinson, 2006). Keeping in mind the end goal to locate a less expensive type of transport, the BRT framework was created.

Johannesburg turned into the main city to develop South Africa's Bus Rapid Transit framework, introducing another time of top of the line, first-world public transport in the nation. Johannesburg: The Rea Vaya (signifying "we are moving") initial phase 1A was launched to the general population of the city on 30 August 2009 (Rea Vaya, 2014). Cape Town: The City's MyCiTi BRT framework began functioning in May 2010, before the World Cup in 2010 (South Africa, 2011). Tshwane: A Re Yeng meaning (Let's Go). Development started in July 2012. According to Todes (2012), taxis were and still are a most used mode of transport within the Johannesburg city however with its rapidly growing issues like inefficiency and unreliability, the Rea Vaya, BRT system was presented in the City of Johannesburg with the aim to lessen the issues brought about informal transportation as well as the lack of transport in the rural areas of the city.

The City of Johannesburg is evolving in the direction of a sustainable city using projects, for example, Corridors of Freedom for a people centered city. Corridors of Freedom projects are meant to join the city with its surrounding rural areas through framework venture. As indicated by Clr Mpho Parks Tau Executive Mayor of Johannesburg (2013), Corridors of Freedom will transform present rooted apartheid settlement patterns in urban areas that were created by the uncontrolled sprawling of low-density development occurring on the city edges as well as the conditions made up of a blend of private space with retail, office convenience, relaxation and recreational openings. The undertaking is likewise about creating viable and reasonable open transport that is available to everybody in the city empowering occupants to save on transport costs, distance travelled to places of employment as well as time. The city is still experiencing traffic congestion problems.

In the South African setting, taxis with a carrying capacity of sixteen travelers have developed as a dominating type of transportation in urban as well as rural areas carrying around those who do not depend on private cars, utilized by approximately 72% of the city travelers (Hitge & Gqaji, 2011). This type of transport mode is all around adjusted to spreading urban communities, yet there have for some time been worries about their wellbeing and productivity. The industry has developed as an intense arrangement of players with resistance to change. Hetherington (2011) states that the instance of Bogota, where comparative situations succeed and where taxis were convinced to wind up some portion of the BRT framework, was an essential effect on the advancement of city's Bus Rapid Transit framework.

BRT frameworks are being advanced in South Africa as well as other countries as a conceivably viable method for conveying significantly enhanced public transport administrations to marginalized urban communities and in this manner diminishing exclusion-related poverty (DOT, 2007). The city has implemented its new long term transport plan, which was launched during Transport Month October 2013 (Adewumi & Dhiren, 2013). According to Hetherington (2011) the "Strategic Integrated Transport Plan Framework" (SITPF) sets out the city's transport vision and strategic thrusts that will empower a formative acknowledgment of the city's long term vision set out in the 2040 Growth and Development Strategy. Kane (2010) state that transportation is the foundation of any city's economic growth and has a critical part in reshaping the city's divided spatial form and the acknowledgment of comprehensive economic development through TOD. However, TODs planning and implementation involves multi-layered critical issues from finances, design and implementation (Ndebele, Aigbavboa and Ogra, 2017).

The municipality has pushed forward with connecting infrastructure to spatial planning though the newly adopted BRT system (Litman, 2011). The idea of BRT framework in the city has been comfort to the network of Johannesburg due to the fact that it has constrained movement blockage and has been the dependable method of transport. The planning processes for the system in the city has incorporated exhaustive debates with different parts of the taxi business (Mabena, 2010). It has been an extensive, regularly conflictual, procedure. The district has endeavored to include taxi administrators as accomplices in administrating the BRT and as investors in the organization. Possibility studies demonstrated that contribution in the BRT in these ways would supplant employments and salaries lost through the removal of taxis on their key courses (Todes, 2012). A few taxi affiliations went ahead board from the get-go, some were resilient, appealing that the system would challenge their jobs. Resistance from the system prompted delays in development, however moved by the need set up a functioning framework to help the 2009 Soccer Confederation Cup games, and particularly the FIFA World Cup in June 2010, the city pushed forward with its plans (Rea Vaya, 2014). A number of the BRT transports were faced with vicious assaults, and intercession was required by South

Africa's president Zuma to advance arrangements (Venter, 2011). Agreements of the initial phase was last reached in late 2010, yet different stages have still to be arranged. The framework was introduced in the city and it took under three years for the city's Rea Vaya to function. Nonetheless, Rea Vaya does not work in a void; it is a critical part of a city wide plan to provide the all-inclusive community of Johannesburg a consistent transportation network consolidating other modes of transports, taxis, rail, and private cars (Walters, 2012).

2. Research Significance

Based on previous literature on BRT it is evident that there is lack in accessibility to the BRT. This is because, in view of other studies, the routes of these system operate in specific streets within their cities which basically means that the other streets where they do not operate or have station, those routes are served by other informal transport modes. They basically feed passengers to the BRT from these other streets where they do not operate.

Accessibility alludes to individual's capacity to reach goods, administrations and activities, which is a definitive objective of most transport activity. According to Bocarejo and Oviedo (2012), numerous elements influence, the quality, accessibility, affordability, the movement of transport choices, transport framework network, mobility substitutes, and land use designs. Accessibility can be assessed from different points of view, including a specific group, mode, area or movement. Since accessibility is a definitive objective of most transportation action, transport planning ought to be founded on accessibility. Nevertheless traditional panning tends to neglect and underestimate some of these elements and points of view. More extensive examination of accessibility in planning extends the extent of possible resolutions for transport issues.

Accessibility to stations is an essential issue with regards to transport development. Writing has demonstrated that enhanced access to transport gives various chances to poor people (Tiawoun, 2000). Taxis are for the most part accessible within a 5-minute stroll from home. Adewumi and Dhiren (2013) say that additionally the system has a comparable accessibility as the ordinary transport (Metrobus and Putco), with the majority of families arranged within a 10 minute stroll from a feeder course or station. Assumed the officially large amounts of public transport availability in the cities, evidently Rea Vaya does not all in all provide any preferable accessibility within the area of the city over existing public transport services (Ogra and Ndebele, 2014). Access to transport gives various opportunities to the poor. The absence of transportation accessibility will constrain urban opportunity access for less fortunate people (Waldeck & Van Heerden, 2017). As per Bocarejo and Oviedo (2012), the accompanying are a few general factors that can influence availability:

- Motor vehicle travel conditions, car travel velocities, safety as well as affordability.
- Quality of different modes, cycling, telework, walking, public transit, speed, comfort and service delivery.
- Transport integration- the level of incorporation among transport framework connections and modes.
- Density of ways and roadway associations, and along these lines the explicitness of movement between areas, in addition to the nature of integration between transport, for example, the simplicity of strolling and cycling to open transport stations.
- Land use proximity, improvement of compactness and blend, and along these lines distances between nodes.

3. Research Objectives

The research aims at assessing the effectiveness of BRT systems of the City of Johannesburg. The research explored the status quo of the BRTs in Johannesburg, integration of BRTS to other public transport and perception of the Rea Vaya by commuters. The research scope mainly covered development of Rea Vaya in the Metropolitan City of Johannesburg in the Gauteng province. The research looked the temporal period from 2010 to 2017, which is the period of seven years where the municipality decided to go ahead with the idea of linking spatial planning with transportation and adopted on BRT and things have been changing since the development of the BRT.

4. Study Area

The BRT in Johannesburg is directed and overseen by the Johannesburg Municipality where Rea Vaya Management is arranged at the Johannesburg Roads Agency offices in the downtown area (Rea Vaya, 2014). To get authorization

to do the study within the stations, it was important to send a letter for permission from the university in which the researcher is enrolled to clarify the reason for the visit to the stations. The data that was gathered from observation at the station gave data on the encounters of using the Rea Vaya. The focus of the study was based on the Ellis Park Station and Johannesburg Art Gallery station. The Ellis Park Station was decided on because it serves the T1 (Trunk course), which is a course that transports individuals from Thokoza Park to Ellis Park. This station is additionally situated in nearness to student accommodations. Trunk route buses keep running on the devoted path and just stop at the BRT stations, these are the transports that are not permitted to make a stop anyplace else but certain stations (Rea Vaya, 2014). The Johannesburg Art gallery and Ellis Park stations were chosen on the grounds that they are the busiest stations in the Doornfontein and Braamfontein territories. In choosing the stations it was predicted that the encounters of travelers who are located on the city edges and the individuals who live in the city would utilize the Rea Vaya. The research locations are demonstrated on Figure 2 and 3 below. Both these stations were introduced as a component of Phase 1 A of the system, during the year 2009. The guide of the exploration destinations shows up beneath as figure 1:

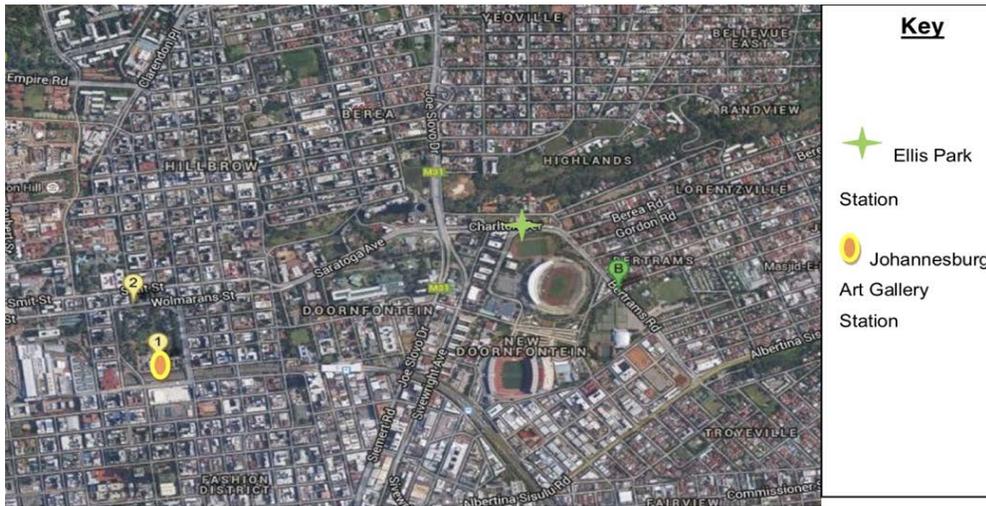


Figure 1: Research sites (Ellis Park and Johannesburg Art Gallery stations)
Source: Rea Vaya, 2014

The Ellis Park station is arranged inverse the Ellis Park stadium in Doornfontein on Charlton Terrace Street. The station is midway arranged in the street with movement paths on either side. The station is situated in nearness to the student accommodation which allowed interviews from various commuters including students.



Figure 2: Ellis Park Station (On site picture, 2017)

The Johannesburg Art Gallery station is arranged in a piece of Johannesburg that is decaying, with domestic waste disposed in the road side walks within the city center, and abnormal amounts of noise pollution and unoccupied structures. Inverse the station is a setting of independent businesses. Nonetheless the stations inside are spotless and calm. The station is situated within the Braamfontein area opposite the Johannesburg Art Gallery in the center path of Twist Street, one of the busiest streets in the city.



Figure 3: Johannesburg Art Gallery station (On site picture, 2017)

5. Literature Review

5.1 Urban Transport System

The numerous social, ecological as well as economic issues globally are additionally fundamentally urban issues: urban areas are the places where the general individual are. This prompts an intelligent prescription: urban communities should manage these issues in an incorporated manner, with coordination crosswise over topography, issues, organizations and disciplines (Waldeck & Van Heerden, 2017). The expressions "quality of life" as well as "livability" are currently regularly utilized in land use and ecological planning as well as in economic growth and city infrastructure. Urban surface transportation system remains the important part of the city's infrastructure. Notwithstanding enormous private as well as public ventures, city blockage is getting worse, and greatest part of the public transportation is not pulling in adequate riders to pay even 33% of its working cost, considerably less its capital cost (Vaz & Venter, 2012).

According to Venter (2011), the development of economically and socially vibrant urban communities highly relies on good transportation frameworks. In the development of cities, transportation frameworks remain forever, they act like a backbone that help a compound economic and social fabric (Wright & Hook, 2011). Transportation innovation enabled individuals to travel to their areas of employment places with common points of interest for populace concentrations. It enables current urban communities to exploit the benefits of population concentrations to all the more proficiently give improved products and enterprises, and to exchange those merchandise and ventures with different areas, which thusly take into consideration economic specialization and effectiveness (Tiawoun, 2000).

The wellbeing of urban communities, and their capacity to produce salary and riches for their tenants, is enhanced if the transport framework is effective, and also its development and functionality takes into account the transportation effects on residents, the environment, as well as the economic development of a city (Maunganidze, 2011).

As per Kane (2002), making any framework proficient and reasonable begins with a comprehension of circumstances and end results of the key attributes of the current urban transportation framework and variables that are probably going to make it change later on.

5.2 Sustainable Transport

The idea of maintainability is prominent in transport vision statements for regions. Be that as it may, as Litman and Burwell (2006) debate that what sustainable transport implies is frequently an issue because its meaning is of wide and undistinguishable ideas which regularly gets abused. Transportation systems are a noteworthy element that contributes towards the financial, environmental as well as the social sustainability of urban areas. Manageability as an idea which incorporates all of the zones it is basic that the financial, environmental as well as social challenges are tended to in the transportation field of research for the future.

Dibakwene (2011) is precarious of the capacity of SA's metropolitan regions to develop transport arrangements that are sustainable in addition contends that not even the administrative concentration or necessary ability is apparent for these regions to be able do all things considered. Hitge and Gqaji (2011) in their paper they examines the Transit program that situated a manageable transportation master inside one of the SA's metropolitan municipality, the Cape Town within development during the Soccer World Cup in 2010. McCaul and Ntuli (2011), as they examined the Transit program insinuate at comparative decisions to those of (Yusuf & Allopi, 2011) who highlight the unmistakable limit shortage as well as need clashes in the endeavor to give practical transportation resolutions. Yusuf and Allopi (2011) as well as Dibakwene (2011), their work highlights that despite the fact that sustainability is a talk need, a similar accentuation isn't put on the practicality of sustainability. It is credited generally on these components: the absence of technical as well as political management vigorously planning and working on sustainable plans; and the absence of civic staffs who have the comprehension as well as the skills in the conveyance of sustainable transport arrangements.

The idea of sustainable transport is widely inclusive and thus having numerous viewpoints which it accommodates. The South African urban areas, culturally and socio-economically isolated spatial landscape to a great extent acquired from politically-sanctioned racial segregation planning demands focus on the transformation of broke spatially spreading urban frames, and additionally the path where individuals reside and work within these urban areas (Tiawoun, 2000). The customary methods towards transport planning embraced in South Africa are driven by Mother Nature encouraging the atmospheres that try to fundamentally inspire effective travelling means of transportation. Therefore, the field of sustainable transport planning has had a number of writings which cover the movements in the direction of more sustainable practice and planning of transportation in South African urban areas.

5.3 Urban Density and BRT Usage

This system delivers ecological and transport benefits only if it draws in riders, particularly previous private car drivers instead of the individuals who already utilized a traditional transport or relied on train systems. One investigation in the US evaluated that 24% to 33% of travelers catered by the BRT frameworks are new travel clients, most having changed from private cars (McCaul, & Ntuli, 2011). In Adelaide, 40% of those traveling track-guided bused were previous car drivers (McCaul, & Ntuli, 2011).

The connection amongst BRT ridership and elements such as family pay and car possession, is for the most part an inverse one (Vasconcellos, 2003). Notwithstanding factors like wage and private owned cars, urban compactness additionally impact travel ridership, regardless of whether for bus based or rail frameworks (McHugh, 2013). It is said that, "mass transit" necessitates "mass", or compactness to function well.

There's a solid relationship between urban compactness and ridership (Waldeck & Van Heerden, 2017). Latin American BRT urban communities, in any case, have normal low compactness than their Asian counterparts yet they have a tendency of pulling in impressively extra clients, by and large and on a per kilometer premise (Hetherington, 2011). Basically, in LA other elements besides compactness, for example, the affordability and service delivery quality of BRT are playing a part in pulling in travelers in addition increasing profitability (Waldeck & Van Heerden, 2017). The quantity of travelers has a tendency to change often as urban compactness increment. Notwithstanding, there is a positive relationship between ridership efficiency and urban densities.

5.4 Characteristics of an Effective BRT

Accessibility to stations is an essential element with regards to transportation development. Studies have demonstrated that enhanced access to transport gives various chances to poor people (Tiawoun, 2000). A maintainable transport framework gives access to fundamental administrations, for example, medicinal services and training (World Bank, 1996).

Reliability is a vital perspective that most investigations featured and remarked on the dependability and timeliness of the Rea Vaya. A framework like the Rea Vaya ought to be one on which workers may depend (Cervero, 2013a).

Affordability - one of the primary purpose of the BRT is to give a moderate methods for open transport (Sibiya, 2009), with smart card systems which allows for loading of a reasonable amount and enable commuters to have several rides with the loaded amount.

Time Spent Commuting and Assigned Bus Lanes - Designated paths isolate the buses from the movement congestion, allowing them selective right of way which empowers the bus to achieve more noteworthy velocities (Wright & Hook, 2007).

Speedier boarding: According to Litman (2011) on board gathering of charges slows the boarding procedure, especially when an assortment of passangers is gathered for various destination.

Improved service - BRT frameworks for the most part incorporate quick travel features, the service ranges, walkable distances between stations, as well as the extra continuous administration compared to other transport modes (Deng & Nelson, 2013).

Increased capacity – This framework can offer bulks identical to other fast travel methods for the reason that it has the alternative of bigger buses and more noteworthy frequency (Deng & Nelson, 2013).

5.5 What is considered effective in BRT?

Public transport has remained the main means of accessing economic opportunities and basic services in urban areas for the people who are spatially isolated from the city and its urban areas.

- Reliability is an essential feature which majority of studies emphasized and remarked on the dependability and promptness of the buses. A framework, for example, the Rea Vaya system ought to be one on which travelers may depend (Cervero, 2013a).
- Accessibility to stations is also an essential element with regards to transport development. Previous writings have demonstrated that enhanced access to transportation gives various chances to poor people (Pirie, 1992)
- Time Spent Commuting and Assigned Bus Lanes: because of the designated paths for the buses, they have been isolated from the congestion, allowing them selected right of way that empowers the buses to achieve more noteworthy velocities (Dibakwene, 2011)
- Affordability: Giving affordable methods for transport is a fundamental element for this newly introduced system (Walters, 2012), with brilliant card frameworks which takes into consideration stacking of a sensible sum and empower workers to have a few rides with the stacked sum.
- Land use policy integration with transit development: BRT and compact, pedestrian-oriented land use advancement are commonly steady. The BRT framework can be operative with the incorporation inside a extensive planning system all-encompassing land use approaches, zoning controls, and financial and neighborhood improvement says (Todes, 2012).
- Improved service: BRT frameworks for the most part incorporate quick travel highlights like throughout the day service ranges, more prominent dispersing amongst stations, and more continuous administration compared to local neighborhood bus benefit. Adaptability and lower-cost of the buses enable it to give more prominent network coverage (Deng & Nelson, 2013).
- Increased capacity: Due to the choice of more automobiles and more prominent recurrence, the framework offers capacities similar to other quick travel modes. The BRT vehicles have a seated capacity that can extend from 45 to 90 travelers, whereas the greatest number of travelers that can be conveyed every hour per course can go from 11,000 on arterials to 25,000 (Deng & Nelson, 2013).

5.6 Challenges

Arrangements for the Bus Rapid Transit systems have comprised of exhaustive discussions with different taxi members within the taxi business (Todes, 2012). Municipal management has endeavored to include administrators from the taxi industry as accomplices in administrating the BRT as well as investors in the organization. Achievability considers demonstrated that inclusion in these manner would jeopardize their salaries and jobs through the removal of taxis on major roads (Gasennelwe, 2011). A few taxi affiliations went ahead board right off the bat, some were unaffected, asserting that the system would challenge their livings. Battling to the system prompted postponements in development, yet pushed by the necessity set up an operational framework to help the 2009 Soccer Confederation Cup games, particularly the FIFA World Cup in June 2010, the district advanced with its designs (Hetherington, 2011). A few buses experienced attacks so involvement was essential by the former president Jacob Zuma to propel discussions (Hitge & Gqaji, 2011).

5.7 Integration and Sustainability

Transport Integration implies that whatever modes of transport are included they all work as one 'consistent' substance for the advantage of the paying customers (Dibakwene, 2011). Private transport as a rule gives door to door service (Yusuf & Allopi, 2010) and while this isn't generally a practical probability for public transport, the transport integration idea is for give a 'consistent' trip that is as door to door as could be expected under the circumstances (Walters, 2012). As indicated by Hitge and Gqaji (2011), this is accomplished by arranging administrations with the goal that where a difference in vehicle is required travelers can appreciate simple to utilize, charming and protected trade offices in addition to short waitings for the next bus. Moreover, Litman and Burwell (2006) state that similarly as when a driver purchases fuel they do as such once for the entire trip so with traveler transport the traveler ought to have the capacity to profit through 'one buy' cards for the entire trip. Public transport can frequently be thought of as a tree, with a huge trunk that nourishes into littler branches, and at last, twigs. InterCity railroads speak to the trunks; high limit urban, rural and underground rail frameworks representing the major branches; monorails, rustic railroads and city tramways represent the littler branches, and so forth, down to low capacity small minibuses and computerized 'lodge' transports for the twigs (Cervero, 2001). Similarly as with trees every one of these segments are imperative to the general wellbeing of the framework; so while the chopping off of a couple of littler branches may seem to not have a quick negative impact at last it will hurt the entire element.

6. Research Methodology

The research involved descriptive and correlational research design. Through descriptive research, the research regulated who/which areas are serviced by the city of Johannesburg transport system, the impacts of using BRT and identified current challenges so as to propose recommendations for the better attainment of sustainable transport by the City of Johannesburg. The correlational research identified the preferred transport modes looking at what type of public transport is more frequently used in the cities. The research adopted qualitative and quantitative research approach. Through qualitative approach, key explanations were made about the subject in view of observations, literature from other previous studies and documents or assessments. Through quantitative research, the input, surveys, and reviews uncovered measurable numbers which were analyzed. This approach pulled members in different ways and matched real and truthful numbers to the inquiries asked.

7. Key Findings

The findings exhibited beneath explain the perspectives of the diverse partners and in addition the Rea Vaya's economic and social impact on the commuters. The key indicators for analysis were drawn from critical literature review in areas of BRTS effectiveness and essentially included variables: commuting needs, BRTS goals, traffic congestion, accessibility, reliability, transport modes, transport spending, financial implications, transport network integration, perception of commuters, social and economic effects, and stakeholder view.

Has transport systems objective of addressing the needs of commuters been accomplished?

With regards to public transportation meeting the needs of the commuters the following was discovered. The taxi industry has for the most part worked in favor for townships that are located in the outskirts of the city and areas that

area located far from major road networks. Taxis have and are still the favorable transport mode to townships despite the fact that they associated with challenges like unsafe, uncomfortable, but they have remained the most reliable mode of transport and accessible from any point of location. Rea Vaya on the hand, it had been said that the system is running efficiently with majority of commuters who are satisfied with the services provided. It can be ranged at 72% in meeting the needs of the communities while 28% trusted that the Rea Vaya has not addressed their issues. The system has decreased travel times for various members.

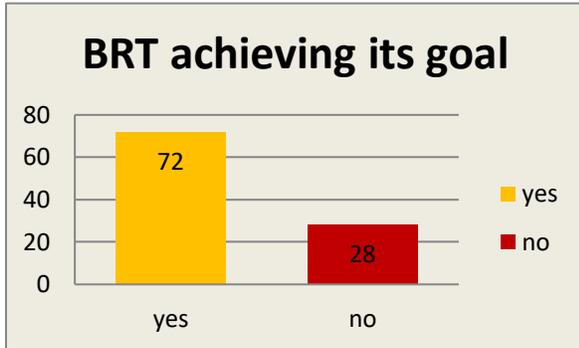


Figure 4: BRT achieving its goal

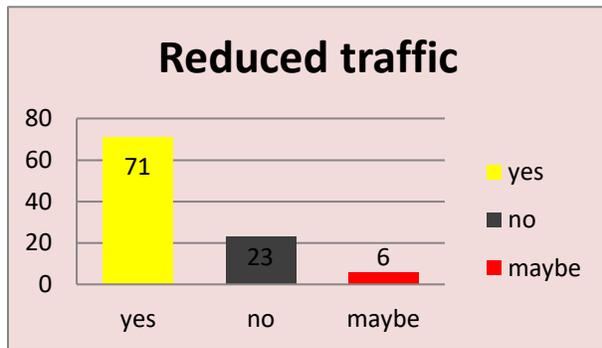


Figure 5: Traffic reduction

Traffic congestion

In any case, there has been no investigations done to affirm traffic congestion since the introduction of Rea Vaya, however it is believed by majority that with the dedicated lanes for Rea Vaya, traffic has lesson in the city. The dedicated lanes also contribute to the traffic congestion in the city for other modes of transport whom the lane is not dedicated for. The movement blockage in the city center had worsen from the time that the Rea Vaya system was developed.

Accessibility

With accessibility of transport modes in the city, it highly subject to your location and intended destination. Individuals located in the city near bus stations find the buses (Rea Vaya) reachable. This is because there are offices and accommodation situated near the stations so subsequently traveling becomes easy and does not consume much of their time before they reach the BRT stations/courses. However the system does not have many courses even within the city center, therefore it still remains accessible to a number of commuters.

The Braamfontein area receives a restricted quantity of buses this means that commuters cannot ride the buses to all desired locations within the city area, along these lines confining traveler's right of entry to the whole area, due to particular courses assigned to these buses constraining traveler's travels all over the urban area.

Commuters who live along edges of the city, highly depend on public transportation as their main means to get to urban areas and only when they get to the city they are able to access the Rea Vaya. Then again, a few commuters need to walk in order to reach buses. The system is accessible but not as taxis. This is due to the reality that the Rea Vaya works on particular courses and in this way the transport does not enter the core of neighborhoods, as compared with a few taxi that stop outside "your entryway".

Reliability

Reliability assumes a critical part in drawing in new consumers and in keeping the old purchasers (Bechstein, 2010). There are various factors with respect to reliability that should be viewed as, for example, traffic, climate, as well as failing framework. The components might impact transport framework dependability through upsetting framework functionality that might impact the client's perspective on the framework (Bickford, 2014). Opinions assume a noteworthy part in the decisions commuters make concerning the method of transport they use. Kane (2010) clarifies that if commuters have a tendency of picking a transport framework that is reliable, nonetheless should the framework neglect the addressing of the commuters issues they could move to a substitute type of transport.

The bus system is found to be dependable and punctual by the system users, in any case, there are times where the buses are generally not by the station on time as expressed by screens, conformations were made during observations

in stations. Screen demonstrated a few minute interruption in advance; be that as it may, once that time has slipped by you find that travelers are still waiting on that bus to arrive. All of this then results in delay for commuters.

Types of transport

Taxis are the only type of transport which commuters find affordable and is highly used by the individuals who are less fortunate. A majority of commuters were using taxis before the introduction of Rea Vaya while others used trains which they found was cheaper. Although these transports came with a lot of problems for them, it was what they had used for a long time to commute to the city and their places of work.

Taxis have always been a most preferred mode of transport especially by the commuters who are located in the townships far from the city. This is because taxis do not have a specific stop where they can be accessible and unlike buses they are available at any time. Taxis are hardly stuck on traffic, they always find a way to beat traffic even though it is not condonable it does help sometimes if you are late for work. Trains are always packed and if you really want get to work early you'll have to catch it around 5:00 am in order to get to the city at 7:00 am.

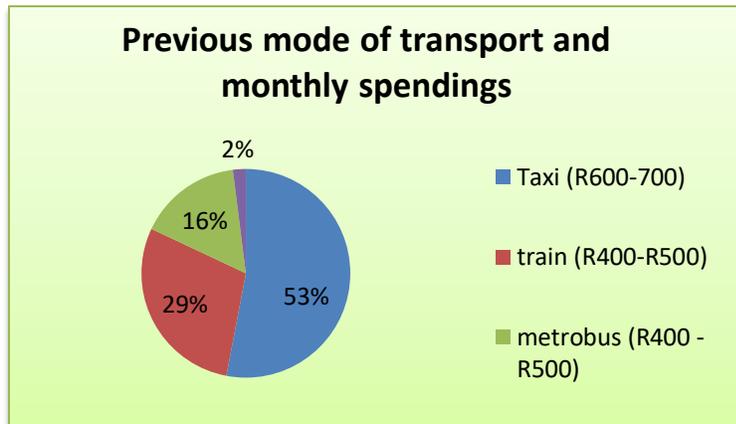


Figure 6: Types of transport and monthly sending

Financial implications

Usually finances have a major impact on transport preferred by commuters. It is evident that commuters find the new system reasonable in their costs; nonetheless, a number of commuters are not pleased increased fare prices which happened during the year 2013 on July. "Financially it is not too much compared to taxis". Taxis still remain cheaper compared to Rea Vaya. Rea Vaya prices calculate by distance which turns out to be expensive forcing a number of people back to using taxis instead. Commuters still find Rea Vaya affordable with the increase in prices. A comment provided by the Minister of Transport was that Rea Vaya is not effective as yet because the goal of transporting more public transport users is not reached yet by the system. The system still transport less than 75 000 individuals as per the minister. This is due to the increase in prices and therefore, he suggested that the systems needs a new brainstorming with an engagement of various stakeholders to look at different systematic thinking approach with regards to the pertaining problem. The shift from the focus on transport fares to delivering an accommodating system for all. Previously majority of participants was spending R600 to R700, and currently they are saving between R150-R200 with the use of Rea Vaya as most of them are spending between R350-R450 monthly on Rea-Vaya transportation. Their spending's have decreased by 25%.

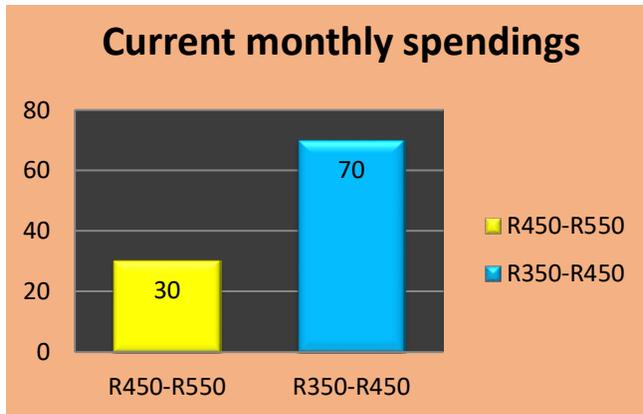


Figure 7: Current monthly spending

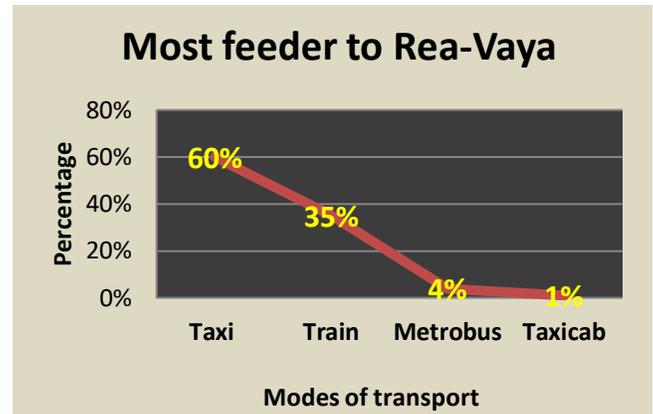


Figure 8: Most feeder to Rea Vaya

Integration of transport network systems

For the commuters whom the Rea Vaya is not accessible to, they rely on using other modes like taxis in order to access Rea Vaya and to get to their places of work. This calls for integration in transportation network systems. Consequent to broad deliberation as well as talk encompassing an incorporated transportation framework actions of integrating different transport modes has been evident. For instance BRT ought to move on particular courses so that taxis then can transport passengers from that point onwards. It's a suggestion for taxi industry and BRT to work together in commuter transportation within the city. Incorporation amongst the diverse means of transport might donate to an effective transport framework by having taxis, buses (metro), train as well as Rea Vaya coordinated into a framework which can fulfill passengers necessities. Integration of transportation is key to achieving accessible, effective and sustainable transport, to ensure that everyone can access their desired places including places of opportunities even to the less fortunate.

Perception surrounding the Rea Vaya

Individuals believe that the municipality is currently failing in planning to encourage travelers to utilize the newly introduced framework. The fact that numerous travelers are as yet utilizing their own automobile, it adds to blockage within the urban center. The resistant by owners of the private vehicles to use public transport shows various difficulties that have been worsened by the BRT within the city. There is no culture of utilizing open transport; the main reasoning behind their resistance is because of the judgment around local transportation where it is seen as hazardous and questionable (Bickford, 2014).

The Effects (Social and Economic) of the BRT on Business

Social and economic effect consist of these fundamental subjects, wellbeing, monetary effects, as well as enhancing the urban areas. These discoveries demonstrated that the monetary advantage of this framework for organizations isn't exceptionally profitable. Rea Vaya had reduced one of the runner of the shops situated opposite Rea Vaya as there are less travelers that line for buses compared to workers who lined for taxis, preceding the development of the system. Subsequently the shops received a few clients. For some business owners the presentation of this system diminished corruption within the city and as a result the area has been improving its image. This framework has positively affected the city by increasing the city worth.

Perception - Rea Vaya Management

Improving transport substance within the urban areas is amongst the Rea Vaya's development objectives, and it changed the spatial setting which was an element amid the politically-sanctioned racial segregation period. Individuals are given a chance of travelling to urban centers through an improvement in transportation systems. Also, Rea Vaya provides another method of transport that is reasonable. Purpose of the presentation of this system is to give simple access to areas of opportunities. The BRT framework was decided on by the council to improve development around the city. The system is meant to give improved public transportation, lessening traffic blockage, enhancing the surroundings and making employments (McCaul, & Ntuli, 2011). Clearly the Rea Vaya can enhance the spatial setting of the politically-sanctioned racial segregation period through transport accessibility to individuals of various places, who for a long time have been isolated by politically-sanctioned racial segregation regulations. Corridors of freedom

as per Sandra within the city are improving access to employment opportunities to individuals who are faced with unemployment. TODs happen along significant transport streets because of the improvement of the network transportation (Ndebele and Ogra, 2014). Within the city this comprises of student accommodation, for example, the South Point accommodations, and in addition infrastructure investment with patching up of city structures. A result of politically-sanctioned racial segregation spatial arranging is having numerous individuals who were compelled to live far from urban centers. Rea Vaya is improving majority of the conditions that were brought about politically-sanctioned racial segregation city structure, through bringing individuals who were barred in the past once more into the city. From a social point of view the Rea Vaya has brought individuals from various zones together, furnished them with the chance to drive to the city and brought individuals closer to financial openings. The above note being said, it is crucial to be aware of the lack of access to Rea Vaya to certain individuals within the city. Be that as it may, there are a few stations to which travelers may reach for Rea Vaya. Notwithstanding the aim for this framework to be in walkable distances from commuters' work place/home, it isn't generally the occasion. Sandra emphasized be that as it may, the municipality is moving in the direction of the improvement of a coordinated transport framework which was declared by the Minister of Transport in June, 2013. The approach of an integrated transport system would connect the distinctive transport modes, resulting in effective movements within the city. Johannesburg does not gloat a completely coordinated transport framework along these lines integration ought to reach out past methods of transport and ought to incorporate coordination in scheduling and transport fares.

8. Conclusions & Recommendations

The city of Johannesburg is still working towards achieving transit oriented development. Be that as it may, the strategy that the city has around the improvement of the corridors of freedom gives chances for transit oriented advancement with blended land use planning. The method of reasoning for the improvement of the BRT framework is to give an accessible, protected, dependable type of transport to the communities (McCaul & Ntuli, 2011). It has been in this investigation that the framework currently isn't open to the larger part of communities in the city. The Phase1b was introduced during the year 2013, and intended to attract more individual from different zones to use public transport, for example, Auckland Park to the down town area. Lack of accessibility is another reasons a number of individuals still utilize their private vehicles to move around; in any case, workers who can't manage the cost of having private cars are then compelled to using informal transport, for example, the taxis which are seen as more available compared to the BRT Rea Vaya. This system has resulted in various difficulties for the private car users as well as taxi business. With the conducting of this investigation the Rea Vaya system had been discovered to be unreachable to the dominant part of the communities within the city. Even though the future strategy of the city demonstrate the BRT Rea Vaya expansion to all zones around the city, the framework still remains inaccessible compared to informal taxis. To be able to attend to these issues it is important to integrate the diverse methods of transport. All together for this system to be cost effective, it is important for the municipality to adopt on friendly integrated fare prices as recommended by Sandra. It can make the system reasonable thus addressing the necessities of the less privileged. The city needs to gain from the achievement and disappointments of the BRT frameworks in the other nations where it has been a success. Maybe the Rea Vaya Management could watch best routine with regards to other transport frameworks in Johannesburg, for example, the Metro Bus and Putco and plan an installed charge installment like that utilized by Metro Bus. The Putco and Metro Bus were regarded as an effective installment technique by members as passengers would only pay their fare on the transport than having to make cards at the station. These buses have been working in the city for a long time, the newly introduced BRT Rea Vaya can gain from the achievement and disappointments of these buses and adopt on them to enhance this framework.

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