Commuter Experience in Developing Sustainable Transit Connectivity in Diego Martin, Trinidad and Tobago

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Abstract: Communities in Diego Martin, Trinidad and Tobago (T&T) have long suffered from poor transit connectivity which has created difficulty for residents engaging in essential daily activities. This deficiency of the transit system arose as a consequence of short-sighted land use planning policies, rapid population growth and uncontrolled increase in automobile ownership. This paper provides innovative yet practical and implementable measures to improve the sustainability of the transit system and thus alleviate the current transportation problems. It is argued that existing resources and facilities should be utilised before engaging in more expensive plans of action that are not guaranteed to achieve the desired outcome. Data was collected from both primary and secondary sources on three (3) major aspects - land use, transport demand, and transport supply. Individual factors have been analysed in terms of their ability to influence transit and the contributing role in developing the current transit system. Results show that the main factor hindering the connectivity and sustainability of the transit system of Diego Martin is the residents’ travel behaviour ignited by the obsession with automobile ownership and usage, compounded by the poor quality and level of service of the transit service. A hierarchy-based on commuter preference exists within the transport system where private transport occupies the highest rung and transit occupies the lowest. Residents have been found to be discouraged from using the transit service due to its failure to function properly and adequately. The responses received from commuters indicate that improvements in the overall performance are not enough to shift ridership from personal vehicles to transit usage. The need for new ideas is evident. This paper provides recommendations with strategies that were derived from careful consideration of the current economic climate, as well as the culture and lifestyle of the residents of the Diego Martin communities. This paper concludes that the value of transit to the sustainable development of communities and the society, on a whole, is of great significance and must no longer be ignored.

Keywords: Public Transport; Transit Connectivity; Sustainable Transit

1. Introduction

Anyone who has ever travelled either out of Diego Martin, Trinidad and Tobago (T&T), on a regular weekday during the hours of 6am to 8am or into Diego Martin during the hours of 4pm to 6pm will be very familiar with the horror story that is public transport commute. Among the daily complaints of the commuters are severe traffic congestion, overcrowded transport stands, and extensive waiting periods for accessing transportation services and lengthy journeys. These challenges are not recent. However, the authorities ostensibly believe that roadway capacity expansion and infrastructural upgrades can solve all of the region’s transportation problems. To this date, such attempts have been to no avail.

Consequently, the absence of an efficient and reliable transit system continues to act as an impetus for the purchase and use of private vehicles. Over the years, commuting via public transit became characterised by unreliable and inconsistent service, lengthy waiting times at dilapidated bus stops and terminals, long hours of commute via heavily congested roadways aboard a painstakingly slow vehicle with a high probability of shutting down. This has repelled a large faction of commuters, encouraging those who can afford to do so, to gravitate towards other transport modes, especially the private car.

The proliferation of private vehicles induces roadway congestion and further retards the operating efficiency of the transit service. Although not the sole cause of congestion, private vehicle overuse is a major contributor. As congestion builds, the average commuter’s daily trip is lengthened and the frustration of the population is heightened. Overall, Diego Martin’s transportation system is in a state of severe crisis. Innovative solutions and a new holistic approach is desperately needed to address the issues.

In the T&T context, the bus service is the only mode which fits all of the transit criteria, hence it is the mode referred to as ‘transit’ in this paper. Transit is the only mode of transport that can be afforded by all groups of society. Any obstruction in its effectiveness or ability to
operate efficiently disrupts a large faction of the population’s ability to conduct necessary daily activities, which in turn affects the quality of life for many individuals. Article 11.2 of the United Nations’ 2030 Sustainable Development Goals (SDG’s) declares that countries are to work towards providing access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons by the year 2030.

This paper advocates for the improvement of transit connectivity as a possible solution to the current transport woes, and as a step in the right direction towards sustainable transport and development. Ensuring sustainable transit connectivity satisfies both the land use and transportation planning agendas as it requires sensible land use development along with proper transportation planning measures of which a main component is improvement in the transit service. The sustainable transit connectivity notion can possibly serve as a means via which the well sought after Land Use-Transport Planning integration can be effectuated.

A shift in ridership from private transport to transit is necessary for achieving sustainable transport. This will serve to reduce competition for road space which in turn will allow for better flow of traffic and thus better operating efficiency of the transit service and increased population mobility. However, in order to effect a shift towards transit, the overall image of the service needs to be significantly improved to attract members of a car-loving society. The aim is to provide overall better transit service, not only to the transit dependent population. Strategies for achieving such are presented within.

2. Literature Review - Transit Connectivity

Transit, often referred to as ‘public transit’ or ‘mass transportation’ is a term which describes public transportation for the carriage of passengers and their incidental baggage. It is further defined by Walker (2012) as any transport mode which consists of regularly scheduled vehicle trips, open to all paying passengers, with the capacity to carry multiple passengers whose trips may have different origins, destinations and purposes.

Transit connectivity ensures sustainable means of connecting persons to places via a viable transit system that is a major facet and supporting tool of a wider concept - Transit Oriented Development (TOD). Essentially, the ultimate aim of both is to create wholesome transit villages- dense, mixed-use communities that, by design, invite residents, workers and shoppers to drive their cars less and use transit more (Cervero, 1994).

This notion of transit villages is not a newly created one. In fact, it is an adaptation of similar ideologies of the “garden city” concept developed by Ebenezer Howard, an earlier planner. However, within recent times, TOD and all of its components has gained notoriety worldwide, even being lauded as the ‘future of urbanisation’ (Shankar, 2017). Transit development has been particularly significant to the development of Indian cities like Delhi, Ahmedabad, and Mumbai. It continues to be high priority on the sustainable development of India who has undergone a nationwide effort to implement TOD measures (Sinha, 2017). Other prominent cities such as Curitiba in Brazil, Bogota in Colombia, and Stockholm in Sweden attribute much of their success in transportation development to the implementation of TOD measures. Due to the mandatory integration of land use planning and transport network improvements, they were able to create healthier, viable communities and provide a better quality of life for their citizens. For instance, Table 1 shows a comparison of transit improvement measures implemented in India.

### Table 1. Comparison of Transit Improvement Measures Implemented in India

<table>
<thead>
<tr>
<th>Location</th>
<th>Characteristics</th>
<th>Measures Implemented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi, India</td>
<td>Population: 11 million (2011) Density: 11.3 persons/ sq. km</td>
<td>1) 500m belt applied along transit corridors which covers 20% of Delhi's urban area. 2) Mixed use- reduced travel needs. 3) Better light, ventilation and quality of life. 4) Redistribution of land to cater for open green spaces, walkable land area and roads. 5) Fine road networks created for shortcuts on foot. 6) Multi-modal integration with pedestrian priority.</td>
</tr>
<tr>
<td>Mukai, India</td>
<td>Population: 12.4 million Density: 31,700 persons/ sq. km</td>
<td>1) Increased Floor Space Index. 2) Land amalgamation. 3) Increased density from 400D/He/ha to 1000D/He/ha. 4) Mixed use- at least 20% to be non-residential. 5) Inclusionary housing- at least 30% to be for lower income earners.</td>
</tr>
</tbody>
</table>

Source: Abstracted from Sinha (2017)

Thus, TOD, but more specifically, transit connectivity can be considered the lynchpin to sustainable transport development. Studies have shown that the task of linking people and places requires an understanding of what drives and influences travel activity. Three (3) principal elements of transport activity highlighted by Transport Canada (2012) serve as the framework for this paper - land use, transportation demand and transportation supply (see Figure 1).

It is evident that a direct relationship exists between land use and travel behaviour Acker et al (2009) and Litman (2014). This has emerged because the spatial arrangement and design of an urban settlement influences transportation demand and accessibility (people’s ability to reach desired services and activities (Litman, 2014)), which in turn affects mobility (the amount and type of travel activity). Transport demand deals with the factors that influence whether, why, when and where people travel.
Transportation supply in terms of transit is concerned with satisfying the demand for transport with the quantity required to adequately cater to the population size, as well as the desired quality and level of service. Public transit is currently considered as the ‘effective and pragmatic solution to urban transport’ (ITDP, 2016), but a bus that is deadly slow will easily become unreliable and both of those characteristics are clearly inconvenient (Philipsen, 2015).

Seeing that both other elements – land use and transportation supply – are influential on travel behaviour/demand, efforts in transportation development tend to focus on integrating land use and improving transit service. Foremost on the Transit Sustainability Guidelines (Feng, 2010) list of recommended best practices of the transit industry is improving mobility via improved and enjoyable transit services. According to Transport Canada (2012), there are five categories that should be targeted when seeking to improve the bus service:

1) Network Planning and Services
2) Branding and Marketing
3) Right-of-Way and Transit Priority
4) Bus Stop and Bus Station
5) Vehicle

Once done correctly, the entire transit system stands to be upgraded to a higher level of efficiency. The commuter’s main goal is movement from one destination to the next with the greatest ease and least disruption possible. Within the transit planning society, it is believed that a transit service should aim for more than just providing the user with a bare minimum service. Rather, ensuring a comfortable and attractive experience, should be of greater concern. The strategy to attract people to transit focuses on increasing convenience, affordability and the promise of performance. Retaining riders is based on reliability and on the many other aspects of a customer’s experience that influence feelings of safety, trust and ease-of-use (OC Transpo, 2011).

This view is consistent with the concept that the Victoria Transport Planning Institute refers to as transit encouragement. According to VTPI (2015), transit encouragement incorporates various strategies aimed at giving discretionary travellers (those who have the option of driving) reasons to choose transit. Inter alia, such strategies include improved transit service, upgraded bus stops and stations, improved rider information and marketing programmes, Transit-Oriented-Development and TDM programmes for commute trip reduction (VTPI, 2015a, b; Transport Canada, 2012).

Similarly, some of the key attributes of Curitiba’s Bus Rapid Transit (BRT) system to which much of its world renowned success is owed, includes a simple route layout, frequent service, less frequent stops, bus signal priority, uniformity in buses and stations, coordinated land use planning and higher-capacity buses (Philipsen, 2015). Mimicking this strategy involves assessing the current state of the transit service and proposing measures for its improvement with the assistance of user surveys (current and potential riders).

3. Diego Martin, Trinidad – A Case Study

Diego Martin is a flourishing suburban region, a short 12.4 kilometres in distance westward of the capital city of Port of Spain. It spans a land area of 127.53 square kilometres (DMRC, 2010) and is comprised of 46 integral communities according to the Central Statistical Office. The administrative boundary of Diego Martin stretches from the western Chaguaramas peninsula, eastwards to Cocorite, which straddles the Diego Martin / Port of Spain border. Diego Martin is physically bounded by the mountainous terrain of the Northern Range and the calm waters of the Gulf of Paria to the south. These geographical features influence whether, how, and the level of transit service that is supplied.

This region is home to a resident population of 102,340 persons (CSO, 2011). Of particular importance to this research is the large vulnerable population (51% women, 27% children aged 19 and under, 17% elderly and 4% disabled) for whom special requirements are necessary. The main land uses in order of prevalence are residential, commercial, and to a lesser extent agricultural and industrial. Settlements follow a linear pattern along the region’s arterial roads with noticeable evidence of outward sprawl into the environmentally sensitive hillsides.

There is a high level of unemployment within the region. The last census recorded that less than half of the population (44%) was employed. Unemployment has been shown to be directly related to the level of perceived and actual crime and violence in these communities. Evident are vast disparities in socio-economic background...
amongst the communities of Diego Martin, varying from tremendously wealthy to extremely poor. Similarly, there are communities known to be “hotspots” for crime and violence juxtaposed to areas of no or low-risk criminal activities. Hence, this region is served by a multimodal public transportation system inclusive of buses, maxi taxis, and taxis. Table 2 provides a comparative description of the transport modes.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Features</th>
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<tbody>
<tr>
<td>Bus</td>
<td>state-owned</td>
</tr>
<tr>
<td></td>
<td>fixed-schedule (time and route)</td>
</tr>
<tr>
<td></td>
<td>maximum carrying capacity= 40 seated, 20 standing</td>
</tr>
<tr>
<td></td>
<td>lowest fare ($3.00 to general public, senior citizens and uniformed school children free)</td>
</tr>
<tr>
<td>Maxi taxi</td>
<td>privately owned</td>
</tr>
<tr>
<td></td>
<td>no fixed schedule</td>
</tr>
<tr>
<td></td>
<td>maximum carrying capacity= 25 (large) and 13 (small)</td>
</tr>
<tr>
<td></td>
<td>second highest fare ($4.00 from Diego Martin to Port of Spain and vice versa)</td>
</tr>
<tr>
<td>Taxi (Hired “H” and Private-hired “PH”)</td>
<td>privately owned</td>
</tr>
<tr>
<td></td>
<td>no fixed schedule</td>
</tr>
<tr>
<td></td>
<td>maximum carrying capacity= 4</td>
</tr>
<tr>
<td></td>
<td>highest fare ($5.00 from Diego Martin to Port of Spain and vice versa)</td>
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The only state regulated, fixed schedule, high passenger capacity mode is the bus/transit. A total of 17,626 persons, 17% of the population, were recorded as having vehicles for private use. Thus, 83% of the population is public transport-dependent.

3.2 Research Approach

Adhering to the principles of positivistic research, inferences made within were derived from data obtained via experimental testing and analysis of information retrieved.

Whilst quantitative data (traffic data, travel time data and statistics) is generally used to substantiate claims and theories, persons’ perceptions and feelings toward the transit service is of major relevance to this research. Thus, in order to carry out a comprehensive study that encapsulates all issues related to transit connectivity, a combination of both quantitative and qualitative data was collected, employing appropriate methods to acquire such. Research for this study was accomplished via both primary and secondary data collection, utilising a combination of both qualitative and quantitative data collection methods in efforts to produce a holistic study. Secondary data collection involved the review of land use plans, maps, reports and other relevant material concerning land use and transportation development for the study area. Primary data collection targeted three main categories—traffic data, the transit service, user perception of the overall transportation system. Table 3 provides a brief description of the methods employed in the acquisition of primary data.

### Table 2. Description of Diego Martin’s Public Transportation

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4. Findings and Analysis

This study seeks to improve the overall efficiency of the existing transit system by effecting modal shift from private vehicle to public transit. In order to recommend suitable strategies, it is important to understand 1) the influence of land use on sustainable transport development, 2) the bus service (transport supply), and 3) the commuters’ travel behaviour (transport demand).

4.1 Land Use and Transport

As made evident by national document in the form of the National Physical Development Plan of 1984, in earlier times, land use planning was focussed on decentralisation strategies in the form of developing “growth poles.” The objective was to lessen the physical and economic burden of human and vehicular congestion in and around the overcrowded capital city of Port of Spain. Three basic spatial strategies were employed - Planned Concentration, Dispersal and Dispersed Concentration (NPDP, 1984). This tending outward spread and ‘leap-like’ action of communities resulted in two things worthy of mention: - 1) the proliferation of urban sprawl and 2) increasing distance between communities and the central public transportation system. Disadvantaged persons residing in areas where public transport was not available become ‘forced’ car owners in order to facilitate their mobility needs. This created difficulty for the provision of transportation as communities became increasingly isolated. Additionally, informal settlements through squatting have spiralled out of control, exacerbating sprawl and further challenging the public transport system’s ability to provide accessibility and mobility.

At present, primarily functioning as a dormitory settlement, Diego Martin generates numerous home-based trips. This has resulted in the development of three peak periods of traffic flow during the day - with two of considerably heavier traffic flow. Given these peak periods, the length of time taken to enter and exit vary according to the time of day. It was detected that even
within the morning (i.e., from 6:00 to 8:00 am) and evening (i.e., 4:00 to 6:00 pm) periods, which are the heavier times of traffic, there are variations in the intensity of traffic congestion experienced. The shortest periods of travel are within the earliest and latest segments of the morning and evening peak periods. Interestingly, the main cause of transit delay service was found to be vehicular congestion.

4.2 The Bus Service

Survey data shows that Diego Martin’s commuting population is primarily comprised of school students and employed persons. An average of 85% of the commuters’ destination is Port of Spain and beyond. Furthermore, 83% of the population do not have access to a private vehicle. This indicates that public transportation demand is highest during the peak morning and evening period which coincide with the standard hours of operation for most schools and places of employment. Transit is the only mode that will sufficiently provide easy mobility for such a magnitude of persons. However, the region is currently underserved by transit.

Diego Martin’s population is 102,340 (CSO, 2011). The general public: private vehicle usage ratio in T&T is 30:70. This means that an average of 30,702 persons rely on public transport. The bus service operates on an hourly basis along one central route (Port of Spain – Diego Martin). A total of 16 trips are made between the operating hours of 6am and 9pm. At maximum carrying capacity, the bus transports 65 passengers (45 seated, 20 standing). Thus, the maximum number of passengers that can be transported daily is 1040. This translates to a mere 3% of public transport commuters, thus showing that the current service is unable to adequately provide for the mobility needs of such a population size.

In terms of the quality of the service, the bus was found to be punctual but inconsistent in its operations. Sore points of the service include limited accessibility, low frequency, poor service area coverage, slow service, malfunctioning vehicles and poorly maintained bus stop facilities. In comparison to other transport modes, the bus has the lowest fare which makes it the cheapest and thus most affordable of modes. However, this feature does not work in favour of the bus service.

Being the cheapest mode compounded by having the lowest ridership makes the bus service unprofitable and more of a financial burden borne by the state. Being a service of high economic loss makes it difficult for the responsible authority to justify further financial investments and often undergoes budget cuts instead. Without financial resources to carry out upgrades to the service, the state of the bus service suffers continuous deterioration. In order to secure investments for upgrades, the transit ridership has to increase. However, commuters will not gravitate towards the bus service in its current dysfunctional state unless the love for the automobile is broken or they are faced with no other option. All of these factors combined have created a long-lasting negative image of the bus service which pervades despite attempts to improve the system. This is reflected in the survey results which showed that 83% of the respondents were unsatisfied with the current level of service. However, there seems to be hope in the fact that 78% of the survey respondents stated that they would make transit their preferred transport mode if the punctuality, frequency and speed issues were rectified.

4.3 The Commuter

A hierarchical structure in relation to transport mode prevalence and preference was detected within the transportation system. Private vehicles occupy the highest rung while the bus, which accounts for 10 percent of the modal split, occupies the lowest. Interestingly, as shown in Figure 2, the preferred mode of transport was found to be directly related to the age of the commuter.

The most popular transport mode (taxi) is shown to be preferred mainly by persons between the ages of 26 to 45 years old while the least popular mode (bus) is generally used by persons over 65 and under 18 years old. It must be noted that the 26 to 45 age category is the young working population who are more inclined to purchase personal vehicles for varying reasons and thus have the potential to further contribute to transport challenges. It would therefore be necessary for transit to attract such commuters in order to prevent further increase in private vehicle usage.

5. Discussions

Three (3) major factors have led to the downfall of the transit system. These are:
1. Uncontrolled growth of dispersed low density, single-use residential communities, thus increased population, physical size and number of communities;
2. Failure to upgrade the transportation system to match the rise in population, as well as the change in form and function of the region;
3. Increased automobile ownership among the population due to lowered vehicle purchasing cost.

In order to sustainably provide transit connectivity, a major hindrance in the form of the population’s travel culture, must be changed towards becoming more accepting of, and open to transit usage. Hence, the culture, must be changed towards becoming more major hindrance in the form of the population’s travel culture, must be changed towards becoming more accepting of, and open to transit usage. Hence, the average commuter’s needs are simple. The commuter must:
1. be able to get to their destination quickly with minimal interruptions;
2. be assured that transport can be accessed when required; and
3. be allowed the ease of usage of any transport mode.

However, Diego Martin’s population has been conditioned into erroneously believing that automobile travel is the best option. This misconception and aversion to public transit has been driven by a few factors which include:
1. experience(s) of poor transit service quality,
2. difficulties in accessing public transport, and
3. cultural influence and the possession of a car being revered as an indication of economic success.

It is recognised that non-transit modes have filled a void created by the lack of proper public transportation. To fixate on the apparent competition between public and private transport is to overlook the numerous benefits transit has to offer. However, despite upgrades to the transit service, the inability of the authorities to improve in areas that matter to the public has been unable to secure commuters’ buy-in, upon which the success of achieving sustainable transit connectivity is hinged. Commuters gravitate towards the mode of transport that guarantees what are most important to them—speed, reliability and convenience in this case. Their unwillingness to change is attached to the transit service being considered less than the existing preferred mode of transport.

The very low regard with which the bus system is treated by the authorities is doing a disservice to the population; since transit is the best mode of transport to cater to such a large population. There is also a social value that is provided by transit that ought not to be overlooked. More than a mechanism facilitating mobility, the transit environment represents the colourful cosmopolitan society that is T&T. Improved transit connectivity is in no way a panacea for all transportation ills, however this paper strongly argues that it is definitely a move towards sustainable transportation and development.

5. Recommendations

Previous failed attempts at fixing transport problems have proven that there exists no single solution to the multifaceted dilemma that is the current transport system. The future of sustainable transit connectivity and achieving the highly desired sustainable transportation depends largely on the integration of land use and transportation planning. Thus the strategies developed and presented herein are designed with such goal in mind. Some of the strategies deal specifically with the land use aspect while others target the transit service. However, the proposed strategies were developed based on the practicality, ability to be implemented, and their relevance to the current economic climate in T&T.

5.1 Land use

5.1.1 Plan creation and update of old plans

A long-standing hindrance to T&T’s development is the prevalence of and reliance on outdated plans. Both national legislative documents relating to transportation development – the 1984 National Physical Development Plan and 1967 National Transportation Plan have been in existence in excess of thirty years and have not once been officially updated. Due to the existing plans no longer reflecting the current development trends, use of these plans to guide development are as impractical as it is counterproductive. Such archaic plans, while they are not entirely obsolete, are insufficient to guide the development at the rapid rate at which it is occurring, far removed from the time of the plans’ adoption. In order to have better manage development going forward, a firm commitment to plan revision and creation, as well as policy formulation must be established and adhered to. Additionally, a local connectivity plan should be developed for Diego Martin to further address issues specifically related to the realisation of sustainable transit connectivity.

5.1.2 Revision and amendment of setbacks, zoning and development standards.

Some of the existing standards need to be reviewed in terms of their relevance to current development trends. It is recommended that amendments should be made where possible, for example, to those that can be tweaked to address the current situation. However, those that are found to be obsolete, counterproductive, or no longer applicable such as those that encourage traffic congestion should be revoked.

5.1.3 Design with transit in mind

Public transit should be promoted as the main transport mode in existing and future developments. Thus ensuring communities have simple, easy access to, and hassle-free use of the transit system. This must be given a high priority. Providing accessible transit has the potential to reduce automobile dependency which has been shown to be a major culprit in undermining the transportation
system and rendering it unsustainable. Ultimately, deciding between private and public transport is left entirely up the commuter. However, a notably reliable, well-working transit service can become the best alternative to private vehicle use. Future development in areas within close proximity to the transit route should favour mixed-use, medium-high density housing as opposed to uses that are less likely to generate transit usage. Prohibition of automobile-oriented uses in such areas.

5.2 Transit Service

The following strategies address the five (5) major areas that would influence on the quality of transit service provided.

5.2.1 Network planning and services

1. Re-alignment and expansion of route. A major drawback in terms of service coverage is that Diego Martin’s current bus route simply follows the arterial Diego Main Road entering and exiting the region with a minor switch from main road to highway along part of the route. In order to widen the transit supportive area and serve a larger catchment area, the transit route has to be re-aligned and expanded. Only then will it be able to cater for those communities that are completely isolated or partially connected to the service. Figure 3 presents a comparison between the current and proposed route re-alignment and expansions, from Map 1 to Map 2. It shows the increase in the transit supportive area (shaded white) as a result of the re-aligned and expanded route.

![Figure 3. Comparison of Transit-Supportive Area between Current and Proposed Bus Routes](image)

2. Rescheduling of service, increase in speed, and frequency. Presented in Table 4 is a proposed rescheduled three-tiered bus service comprised of a local, limited-stop, and all-stop bus. This strategy using three (3) bus types of varying carrying capacity and speed, along three individual routes simplifies the transporting while increasing the speed and frequency at which the population is transported. The maximum desirable waiting time for a transit service is 15-20 minutes, not 30 minutes and more as in the case of Diego Martin. In order to increase the frequency, the speed at which the bus travels has to be improved. The increase in total number of passengers transported per hour should provide a viable solution for overcrowded taxi stands and unavailability of transport modes.

<table>
<thead>
<tr>
<th>Time</th>
<th>Bus Type</th>
<th>Route</th>
<th>Speed</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:00 AM</td>
<td>Ciao</td>
<td>All-stop</td>
<td>Medium</td>
<td>Fewer persons commute at earlier hours, less demand for transport, adequate size of vehicle.</td>
</tr>
<tr>
<td>6:20 AM</td>
<td>Articulated</td>
<td>Limited-stop</td>
<td>High</td>
<td>Highest transit demand at this time, high capacity, high speed bus more appropriate to maximize ridership and transit usage.</td>
</tr>
<tr>
<td>6:40 AM</td>
<td>City service</td>
<td>Local</td>
<td>Low</td>
<td>Inter-community service extended to residential communities isolated from transit service.</td>
</tr>
</tbody>
</table>

5.2.2 Bus stops and stations

1. Renovation and uniformity of bus stops and stations. Bus stops, shelters, stations and terminals need to be enhanced to improve the image of the transit service and boost ridership. For increased visibility and easy identification, there should be uniformity in the design and style of the bus stop signs and sheds.

2. Strategic placement of bus stops for better traffic flow. Badly placed, as well as an abundance of bus stops between short distances would have adverse effects on traffic flow. The current locations of bus stops should be reviewed to determine whether they are necessary for the efficient functioning of the bus service. It is recommended that spatial analysis techniques be employed in identifying optimal locations for these stops.

3. Placement of schedule and route information at all bus stops and stations. Information about the bus service should be made readily available via possible means. This should allow captive and choice riders a clearer understanding of, and familiarity with the service and the routes taken. Persons are more inclined to use a service whose route they are familiar with.

5.2.3 Branding and Marketing

1. Social marketing. Changing the population’s travel behaviour has the potential to effect a reduction in transportation problems. Social marketing should be considered as an area for future research. This is proposed in light of the deluge of negative comments received from the population on the current transit
service, compounded by their unapologetic loyalty to automobile transport. Humans tend to gravitate towards the popular. Prominent persons in society such as radio personalities, local “celebrities” and other well-known public figures can be enlisted in the promotion of public transit. Their popularity can be capitalised on, to encourage others to follow suit. Several persons felt relatable to recent images of a current Minister of Government captured using the public ferry. This gave persons a sense of being able to relate to those in authority. Government officials, businessmen, regular people, families can all be involved in the promotion of public transit as the preferred transport mode. This should yield an increase in ridership.

2. Better dissemination of information. A major downfall of the bus service is commuters not having easy access to information for proper journey planning. The use of information technology for information dissemination should be implemented. Android phone applications and programmes can be created giving real-time information on the schedule, routes and location of buses at any given time. This would require buses to have Global Positioning System (GPS) devices installed to facilitate such information being retrieved. This should also be able to assist with determining and monitoring the efficiency of the bus system.

3. Advertising campaign and initiatives. Innovative measures to increase ridership should be sought and implemented. For example, catchy television commercials can be used to show the possibilities of an enjoyable side to transit. Any method being implemented must be tailored to the suit the culture and lifestyle of the population being targeted.

5.2.4 Right-of-way and Transit Priority

1. Road space reallocation - the creation of a reversible peak-period transit lane. During the peak morning and evening periods, the traffic lane of higher intensity on the Diego Martin main road should be transformed into a transit lane restricting usage of other types of vehicles during such time. The opposite should remain untouched and open for usage by different modes. The intention for such is to cater to the population at times of high demand in the direction of heaviest traffic flow. In the morning period between the hours of 6:00 to 8:00 am, all eastward bound (from within Diego Martin to outside Diego Martin) non-transit vehicles should be required to exit from the main road and proceed onto the highway. In the evening peak period between the hours of 4:00 to 6:00 pm the westward bound (into Diego Martin) lane should be strictly for transit usage. The lanes should be reverted to its normal use outside of peak hours. Traffic wardens should be used to supervise the usage of this lane and ensure compliance of drivers during such time.

2. Designated bus lane. The outermost right lane of the Diego Martin highway should be converted into a lane restricted to bus use. This should allow the free flow of the bus without competition for road space from other transport modes.

5.2.5 Transit Vehicle

1. Equip vehicles with Wi-Fi internet service. Business-type commuters can keep up-to-date with their daily happenings by having easy communication and access.

2. Equip buses with electronic card swipe or off-payment. This should reduce time spent in entry process. A Travel Card service has already been implemented for some routes. These cards should be converted to electronic payment cards and extended to the Diego Martin buses as well.

3. Disability-friendly buses to be used. Persons faced with difficulties towards physical activity should not be excluded from using the service. Buses with easier entry and exit procedures (no steps) should be used to save time. At-grade entrance should be considered as it has proven to reduce time spent boarding and alighting the vehicle.

5.3 Cost and Evaluation

This is by no means an exhaustive list of strategies. The recommendations were selected to address particular issues highlighted within the study, most of which relate to boosting the service quality of the transit system. The relevance of the strategies would be evaluated based on their potential travel impact on the system and the commuters.

The scope of this paper does not extend to monetising the cost of the strategies but rather evaluates them based on their qualitative value in order to highlight their importance. Conventional economic evaluation models are believed to overlook the social value and benefits of transit impacts. This paper focuses on enhancing the overall commuter experience, hence the chosen method of evaluation. Table 5 shows a summary of the evaluation of recommended transit improvements.

6. Conclusion

Diego Martin communities are in dire need of an efficient transportation system. This paper provides innovative yet practical and implementable measures to improve the sustainability of the transit system and thus alleviate the current transportation problems. It is argued that existing resources and facilities should be utilised before engaging in more expensive plans of action that are not guaranteed to achieve the desired outcome.

Recommendations and strategies were derived from careful consideration of the current economic climate, as well as the culture and lifestyle of the residents of the Diego Martin communities. The benefits of improved
transit are many. Among them is a better quality of life for citizens. The value of transit to the sustainable development of communities and the society is of great significance, and must no longer be ignored.

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