LAGOS BRT-LITE: AFRICA'S FIRST BUS RAPID TRANSIT SCHEME

Scheme Evaluation: Summary Report

ABSTRACT

Africa's first Bus Rapid Transit (BRT) scheme became operational on 17th March 2008 in Lagos, Nigeria. Termed 'BRT-Lite', it is a form of BRT, but is not of the highest specification such as TransMilenio in Bogotá or the Brisbane South East Busway both of which cost in the region of $6 million per kilometre. It is a new form of BRT, focused upon delivering a system to meet key local user needs, with the aim of improving quality of life, economic efficiency and safety within a clearly defined budget. The implementation programme, which saw conception to operation collapsed into a 15 month timeframe, together with its delivery at a cost of $1.7 million per km make its development unique and as such its experience is relevant to the many cities throughout the world seeking to develop BRT. BRT-Lite is now carrying almost 200,000 people per day despite a capacity that does not allow it to satisfy all forecast demand. After 100 days the system had carried 9.7 million passengers and within its first 6 months of operation had carried a total of 29 million.

BRT Lite consists of a 22km route that is 65% physically segregated and 20% separated by road markings but its success is not purely down to its infrastructure but a holistic approach that involved re-organisation of the bus industry, financing of new bus purchase, creating a new institutional structure and regulatory framework to support it, together with the training of personnel to drive, maintain, enforce, and manage BRT. Whilst these technical and organisational challenges were being met the public were engaged and sold a system of which they had no previous knowledge to the extent that take up was immediate and praise was plentiful. All this has been achieved within an extremely challenging environment and spanning an election for the new State Governor!

Evaluation of BRT Lite completed during Autumn 2008 showed that users were saving journey time, had less interchanges, were travelling cheaper and felt safer. Businesses within the corridor saw it as positive; improving accessibility and aiding their access to staff and the ability of their staff to travel on employees business. Negative comments primarily relate to the need for more buses and more routes. Problems exist and improvements can be made but the over-riding factor is that it has been delivered and is having a beneficial effect upon the quality of life of a large part of the travelling population of Lagos.

Evaluation has declared the scheme an unprecedented success defining the critical success factors as being; significant and consistent political commitment, the presence and abilities of a strategic public transport authority in LAMATA, scheme definition that concentrates on essential user needs and deliverability within a budget and programme, the work undertaken to engage key stakeholders and ensure that those that benefit are multiple, a community engagement programme that has ensured that BRT-Lite is seen as a community project created, owned and used by Lagosians.

TRANSPORT IN LAGOS

BRT Lite was born into challenging circumstances. The Lagos metropolitan area has a population variously estimated at between 15 and 18 million, and projected (conservatively) to grow to more than 25 million by 2025. This would place it as the third largest agglomeration in the world, after only Tokyo and Mumbai. Already it has expanded well beyond the boundary of Lagos State into Ogun State, and this reality was formally recognised by the former President of Nigeria, HE Olusegun Obasanjo, in launching the Lagos Mega City Project in 2006 with the respective Governors of the two States.

However Lagos was then the only mega-city (defined by UN Habitat as having a population in excess of 10 million) without any organised public transport system (though those in Karachi and Dhaka had largely collapsed by the end of the last century). As such, personal mobility relied on a large fleet of approximately 75,000 minibuses (danfo) together with much smaller numbers of midi-buses (molue) and shared taxis (kabu-kabu). Local journeys employed motor-cycle taxis (okada). Danfo and molue are of low quality, fares are variable, journeys are slow and uncomfortable. They ply relatively short distances in the interests of maximising profit rather than serving demand, and their drivers (and mates) have a reputation for aggression.

The inadequacy of the road network (low lane length in relation to population, limited number of multi-lane arterial roads, and generally poor maintenance condition), and the relatively high level of car ownership for a developing country (encouraged by subsidised petrol prices and unrestricted import of second-hand vehicles) exacerbated the traffic congestion inherent in this form of public transport provision. As a result the typical journey for commuters to Lagos Island from the main residential areas to the north and west of the city could take in excess of two hours, especially when vehicle breakdowns, accidents, and flooding acted to block the roads.

LAUNCHING THE LAGOS URBAN TRANSPORT PROJECT (LUTP)

When the new administrations at Federal and State levels were elected in 1999 transport was identified as one of the most pressing issues in Lagos State. Accordingly the then Governor, HE Bola Tinubu, appointed a Special Adviser on Transportation and sought development assistance from the World Bank group.

Taking forward concepts from earlier studies, the Lagos Urban Transport Project (LUTP) was prepared on the basis of building capacity to manage the transport system, and identifying the priority actions, investments and enabling measures for its improvement. A multi-modal transport approach was taken, recognising the potential for development of rail and inland waterway mass-transit in integration with the core road passenger transport network.

From the outset, enhanced provision of bus services was a core component of LUTP, and included the development of busway priority – though primarily as a complementary measure to the mass-transit railway proposal. Direct financing of new buses by the Bank was also given due consideration, but the main failures of the earlier Federal Mass Transit Programme (finance defaults, and short vehicle lives) suggested caution in this domain.

It was also recognised that it would be necessary to exercise regulatory control over the private sector bus operators, and to introduce some order in this market where demand responsiveness in terms of fare level and routing had been taken to extremes. Initial actions were taken to exercise existing powers for the registration of route licences, effectively on demand, but a policy decision was taken to introduce 'controlled competition' for market entry once the appropriate legislation was in place.

Whilst Phase 1 of LUTP focused on fast-return investments, such as road maintenance/ rehabilitation and junction improvements, it also included the preparation of technical, environmental and social measures for possible future mass transit development that might be supported in a private-public financing framework.

CREATING THE LAGOS METROPOLITAN AREA TRANSPORT AUTHORITY (LAMATA)

Analysis of the transport situation in Lagos highlighted the lack of any mechanism to co-ordinate the plans and actions of the various agencies at Federal, State and Local Government levels for managing, maintaining and developing the transport network in a holistic and integrated manner. Further, most of these agencies lacked a secure financial basis for their operations with their budgets at risk from fiscal pressures and higher political priorities.

Accordingly the creation of an appropriate authority for this purpose was placed at the heart of LUTP, together with measures to ensure its sustainability through a lien on transport user charges. The LAMATA Law of 2002 established and empowered the authority, which was given jurisdiction over the conurbation in Lagos State and a declared network of primary and secondary roads that carried the large bulk of road traffic and powers to plan and co-ordinate public transport and make recommendations on route planning. LAMATA was staffed with highly motivated individuals with world experience in transport and management largely derived from the Nigerian Diaspora.

TACKLING PUBLIC TRANSPORT

The implications of introducing a controlled competition regime for the core road passenger transport in Lagos were explored in a detailed study undertaken in late 2003. This identified *inter alia* that the structure of the road transport industry was not then readily amenable to regulatory control, and held the power to block any attempts at reform.

Further, the private operators were also not in a position to make the necessary investments in larger buses, whose reduced numbers (in comparison with minibuses) would act both to reduce congestion and whose greater capacity would raise productivity and hence offer the potential of lower fares and/ or enable scheduled services (as opposed to traditional fill-and-run) at the same fare.

After an extended period of consultation with, and education of, the leadership of the operator unions and associations, agreement was reached to test both the regulatory reform and the fleet investment in a pilot scheme using the private-public financing framework envisaged in the establishment of LUTP. LAMATA would provide the enabling framework, including traffic systems management measures in the corridor and the provision of passenger terminals and a depot / workshops complex for the new fleet, whereas the operators would accept the regulatory enforcement and commit to the procurement of appropriate buses.

LAMATA LAUNCH BRT

Integrated Transport Planning Ltd (ITP) was appointed in August 2006 to undertake a "Feasibility Study for an Initial Corridor for the Lagos Bus Rapid Transit (BRT) System". The study encompassed infrastructure, operations, regulatory and institutional reform. The aim of this study was to develop a BRT system that has the following characteristics;

- efficient level of service (low cost, high frequency, high speed, high occupation, high safety, low emissions),
- adequate institutional framework and regulation,
- high socio-economic benefits, especially for low income population,
- maximum level of private participation
- minimum level of public expenditures and liability, and
- adequate mitigation of environmental and social impacts of the BRT system.

This challenge had to be met with an open mind informed by worldwide BRT experience, and guided by an understanding of local transport context (opportunities and constraints), locally based user needs and key issues surrounding deliverability. BRT was taken as a flexible concept, implying a system based approach to public transport provision but one that is defined according to local user needs, context and deliverability.

BRT-Lite Corridor

BRT 'users' were considered to be the travelling public together with system providers, stakeholders that were key to delivery and those that are guardians of wider policy objectives. As such each party

that had either an interest in BRT and its delivery or an investment (financial or emotional) in its achievement had to be represented within its definition. This approach demanded that the consultant worked closely with LAMATA drawing upon its efforts to harness and guide the wider stakeholder groups, developing their role within and understanding of BRT implementation, bring international expertise in BRT approaches that might meet local aspirations and seek to understand local traveller issues.

The Needs of the Traveller

The needs of the traveller were determined through:

- Ethnographic observation – consisting of discreet observation of travellers access to transport, their contact and relationship with the various actors involved in transport provision, their demeanour and actions.
- Quantitative/qualitative surveys – to determine formal data such as fare elasticity, values of time but also detail the relative importance of walk, wait and travel time, transport choice issues and key obstacles to adopting the ideal use of transport.
- Focus groups – a series of focus groups were held in order to explore in detail issues related to travel in Lagos by different demographic groupings together with the testing of features that may or may not be applied within a BRT systems

Key traveller concerns identified were:

- Safety – the incidence of crime on vehicle and whilst waiting for a vehicle to arrive is high ranging from theft to physical abuse. The disorder and chaos around public transport was seen as giving opportunity to criminals and, where crime wasn't present, the almost constant intimidation and general chaos leads to undue stress for travellers.
- Fare levels – public transport fare levels often vary according to demand, weather conditions and the whim of the conductor. A significant proportion of the travelling public are highly fare sensitive with some who make daily decisions as to whether to travel based upon available finance.
- Long and unreliable journey times – the practice of a vehicle not leaving until full, operating short services that require interchange and the lack of penetration into residential areas, together with widespread and variable congestion ranging from high to intolerable means that public transport journeys are both long and uncertain.
- Comfort – the state of the buses in many cases are so bad, with lack of upholstery on seats and the danger of rusted metal edges, that ripped clothing or injury is common. Therefore travellers place value on a basic level of 'comfort' which will avoid these problems.

In satisfying traveller user needs BRT must, above all else, be seen as:

- Safe – both on vehicle and accessing the vehicle
- Affordable – with constant and easily understandable fares
- Reliable – offering improved and reliable journey times

DEFINING LAGOS BRT-LITE

The pilot BRT corridor was chosen through the feasibility study and today BRT-Lite runs along Ikorodu Road, Western Avenue and Eko Bridge, a key radial highway that makes the 22Km connection between Mile 12 and Lagos Island (the traditional Central Business District). Before implementation, the highway enjoyed a wide dual carriageway varying between two and three lanes in each direction. For approximately 60% of its length it has service roads. It crosses over one of the three bridges that connect the mainland with Lagos Island, and as such the route effectively connects extended suburbs, satellite centres to the traditional Central Business District of Lagos.

The creation of BRT-Lite emanates from an open discussion on scheme concept with the BRT Steering Committee, chaired by the then Commissioner for Transport Dr Muiz Banire and made up of key stakeholders. The group was presented with artist's impressions of median operation and bilateral operation on the chosen corridor, both equipped with physical segregation. There was a quick recognition that BRT was not necessarily a long term grand aspiration but something that was readily deliverable, the visualisation showing immediately what benefit it would bring to bus run times and consequently those travelling along the corridor. From that point on, and in parallel to the development of 'BRT-Classic', a project was launched to define BRT-Lite.

Artist Impression: 'What BRT Could Look Like'

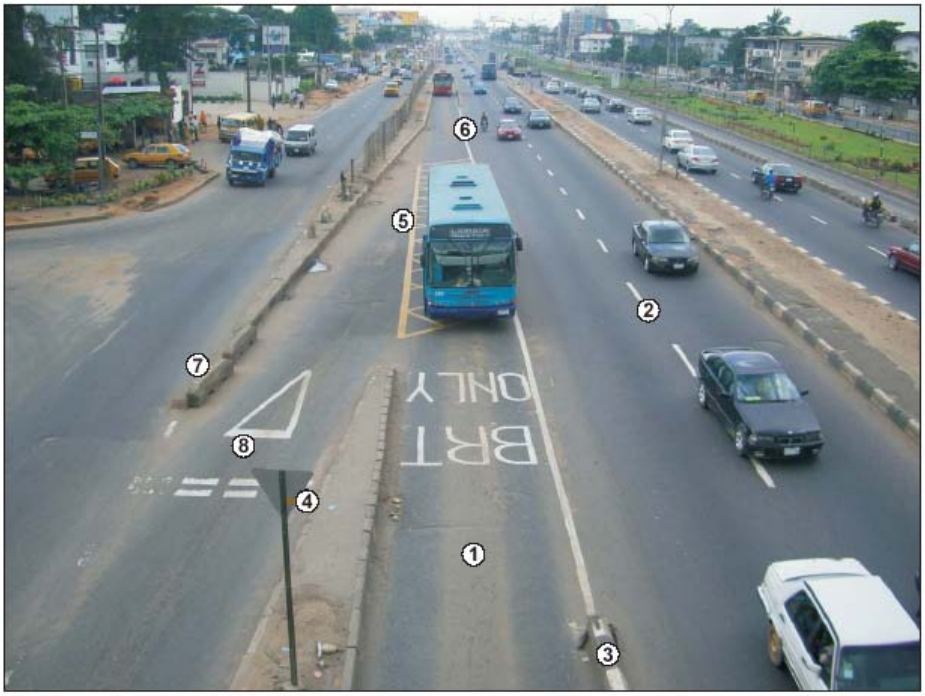
Preliminary engineering designs for the corridor recommended virtually continuous bilateral segregation. Breaks in segregation were made where merges and diverges were allowed to/from service roads, other breaks were provisionally recommended on viaducts and overpasses where

concern over structural integrity, together with width constraints, made physical segregation using concrete kerbs impossible. This resulted in a BRT system that is approximately 65% physically segregated from other traffic, 20% separated by bus lanes (marked in paint) and 15% mixing with other traffic. Whilst total segregation may have been preferable the overall need for delivery and the concentration upon improved run time by concentrating infrastructure on where it had best effect with respect to third party impact meant a pragmatic solution was defined. Periodic breaks in the segregation, to allow for merge/diverge across the BRT way, ensured that any broken down vehicle could be readily towed out and that approaching BRT vehicles were able to divert around any potential blockage. This level of flexibility is important in a system where demand can potentially exceed supply.

Lanes are typically 3.3m wide and are separated from other traffic by concrete kerbs that are 400mm high. Lane widths are the minimum that could support unconstrained and safe operations and kerb height is the minimum that would deter lateral intrusion. Gaps of approximately 0.2m were left in the kerbs were required to allow storm water to drain negating the need to reposition road drainage.

Standard detail drawings, cross sections and other areas of relative complexity (such as merge and diverge locations) were produced. Detailed design and construction contracts were let in packages with contractors (working largely from preliminary engineering design produced by ITP) and liaison between ITP and contractor to ensure that concept was carried through to construction. This approach, managed and guided by LAMATA, effectively collapsed the scheme design period by removing a detailed design phase and achieved continuity ensuring that concept was not lost through subsequent design.

New shelters were provided that gave order and structure to vehicle boarding. Tickets are purchased upon entry to the stop and queuing is in order before entry. The shelter gives protection from the sun through an obscured glass canopy. A similar design style is used at the terminals where more capacity is provided for boarding and alighting.



1. BRT Running Lane
2. Carriageway Lining
3. Type 2 Concrete Segregation
4. Warning Signage
5. Yellow Box Area
6. Merge Area from Main-Line Carriageway
7. Extension of Diverge 'Nose'
8. Give Way Marking

BRT Lane: Typical Merge/Diverge Arrangement

1. 'Pedestrian' Warning Signage
2. Pedestrian Crossing Points
3. BRT Stop Structure
4. BRT Entry Taper and Layby
5. Type 2 Concrete Segregation
6. BRT Stop Landscaping Features
7. BRT Running Lane
8. BRT Stop Lighting
9. New Lighting Along Main Carriageway

BRT Stop: Typical Arrangement

BRT-Lite runs seven days a week, 06:00-22:00 weekdays with reduced hours of operation at weekends. Vehicles are dispatched from terminuses when available to accomodate almost constant demand. As such headways are not part of operational planning but a product of vehicle availability, and the desire to meet demand in the context of journey time variability en route. The out turn headway typically lie between 30 and 60 seconds. A new terminus was built at Mile 12 utilising the underneath of the highway flyover. The existing terminus at Tafawa Balewa Square on Lagos Island was modified. A new depot was built alongside the route to garage the 100 new vehicles and now garages and maintains over 200 vehicles. A driver training programme was instigated to retrain existing bus drivers in use of the infrastructure and customer care. Part of the incentive programme was to nominate them as 'pilots'. The concept is widely adopted with users referring to whether they will, or will not, 'fly' BRT!

INSTITUTIONAL AND REGULATORY CONTEXT

The delivery of BRT-Lite involved the co-operation of multiple agencies:

Firstly, BRT-Lite development needed to sit within the context of land-use and spatial development in the State. Ongoing master plan development was to feed from, and BRT feeds off, this plan. To ensure that synergy was maximised, appropriate representation was made within the BRT Steering Group.

Secondly, transfer of the control of the Federal highway over which BRT-Lite operates to Lagos State now involves the relevant Ministries of Transportation and of Works. Despite BRT-Lite being a Lagos State Government (LSG) initiative, the co-operation of these bodies could not be taken for granted. As a result, for example, the decision was taken for the BRT-Lite infrastructure construction to be contracted direct by LAMATA and not through the Lagos State Ministry of Works.

Powers for the primary traffic management and enforcement in the State lies with the Lagos State Traffic Management Authority (LASTMA), a body that reports to the State Commissioner for Transport. Co-operation with LAMATA has improved markedly in recent years, and LASTMA were prepared to commit the significant resource to the BRT-Lite scheme needed to protect the exclusive use of its infrastructure and to manage traffic conflicts in the box junctions at the various highway merges and demerges.

Finally, the support of a State initiative 'Kick Against Indiscipline' (KAI) could be called upon to help with public management within the BRT-Lite system, particularly at the stations and terminals. This covered aspects such as trading and hawking on the walkways / sidewalks, and orderly queuing at the bus stops and vehicle parks (terminals).

LAMATA as regulator and sector sponsor

The original powers granted to LAMATA in the domain of passenger transport had been limited to its planning and co-ordination and not to its actual regulation. However the revised LAMATA Law, passed by the House in late 2006, defined its function inter alia to 'plan, regulate and co-ordinate the supply of adequate and effective public transport in all travel modes and supporting infrastructure within metropolitan Lagos' and granted specific powers to make regulations (with the approval of the

Governor) with respect to its functions. This now made the role of LAMATA as the sector regulator unambiguous.

The Law also granted powers to the Authority inter alia to 'prepare plans for the management and development of transportation in metropolitan Lagos' and, in conjunction with the Ministry of Works, to 'construct, re-construct, maintain and manage transport infrastructure and facilities' necessary for the discharge of its functions. This legislation thus empowered LAMATA to act as the sponsor and promoter of mass-transit schemes in Lagos, and hence to develop the BRT-Lite system.

NURTW and the transport industry

Organisation of road passenger transport operations in Nigeria falls, by law, under either of two separate bodies – the Road Transport Employers Association of Nigeria (RTEAN) and the National Union of Road Transport Workers (NURTW). Over time RTEAN, which represents mainly owners' interests, came to dominate the inter-urban and large-bus sectors. NURTW, with a focus on drivers and workers in the transport sector, dominates the urban and small-bus sectors.

Whilst NURTW is a national body, it is organised along State lines with each having its own Council and related administrative functions. The operational level of the Union is managed at its Branches, which divide the network into zones based on the principal terminals (known locally as vehicle or lorry parks). Routes (lines) are controlled by the relevant branch(es), with vehicles paying fees for registration and each terminal departure. Vehicles queue in turn for boarding, and only leave the terminal when full (in the direction of predominant travel, at peak times). NURTW exercises little control over operations once vehicles have left the terminal, and most services board and alight passengers on demand along the line of route.

The large majority of the small commercial buses that dominate the transport supply are operated not by their owners, but rather by individual drivers who pay a daily rental fee ('deliver') to the owner for the use of the vehicle. The driver meets all the direct operating expenses, such as hiring a conductor, buying fuel, making minor repairs, and paying system access fees (including extortion by enforcement agencies). The owner retains responsibility for maintenance and major repairs, and covers fixed costs such as finance, licensing and insurance. As such the relationship is analogous to an operating lease for the use of the vehicle, and is standard practice for the sector within the region.

NURTW were in recognition of the need for change to upgrade an ailing vehicle fleet and meet the challenges of increasing demand. This realisation was fostered by LAMATA through a process of education as to the options for an organised collective transport system and exposure to how such systems are organised and operated including tours of South American BRT systems in 2004 and 2006.

The need to actively involve NURTW and RTEAN in the development of BRT-Lite was seen as essential. Previous attempts at formalising public transport on Ikoyi / Victoria Island had failed through the inability to effectively engage with the unions, and bus franchising path-finding activities elsewhere in Lagos, being implemented in parallel with BRT-Lite, aided understanding about respective roles and benefits in public-private co-operation.

Road Traffic Regulations

Both Federal and State legislation set out standards for the use and construction of motor vehicles, but these are not consistent.

The Federal regulations are broadly appropriate for a standard single-deck bus or coach, but height and length limits effectively preclude double-deck or articulated buses. The specific standards in respect of omnibuses that relate to passenger access and comfort levels (height of steps, size and spacing of seats, etc) are well below international norms, but place no barrier to the implementation of a higher quality of service where desired. By contrast, the State regulations (based on a Road Traffic Law dating back to 1949) represent an obsolete set of standards.

Regulation of passenger transport services

The current LAMATA Law not only provided for the re-establishment of the Lagos Metropolitan Area Transport Authority with appropriate functions and powers, as reported above, but also repealed the Public Transportation (Commuter Buses) Registration and Restriction Law of 2004. That had been a very poorly drafted, and wholly unenforceable, Law that had effectively rendered all operators other than Lagbus Asset Management Ltd (Lagbus), a Lagos State Government initiative, as illegal. Not only had the coexistence of that Law and the Bus Franchise Regulation under s.21 of the first LAMATA Law led to confusion, it had also been interpreted to confer regulatory powers on Lagbus that would be in conflict with the establishment of LAMATA itself. Its repeal, therefore, had been an essential component in securing the exclusivity of operations required for the viability of the BRT-Lite scheme.

Bus Rapid Transit 'Lite' (BRT) Regulation

This Regulation was gazetted to coincide with the launch of BRT-Lite, but its content had been the subject of a public education campaign in the period immediately beforehand. Its application covered the complete Right of Way within the corridor, and so included not only the BRT-Lite running lanes but also the parallel general traffic and service lanes and the walkways / sidewalks.

The primary provision of the regulation was the prohibition of operation of vehicles other than those franchised for the BRT-Lite scheme (and certain emergency services) in the designated infrastructure. However other supporting provisions were designed to facilitate the free movement of traffic in the reduced roadway capacity alongside the BRT-Lite running lanes, principally the restriction of other commercial buses to the service lanes only and a total prohibition on heavy commercial traffic in the peak hours.

Whilst this regulation was made under the powers granted to LAMATA in its re-establishment, it was also formally approved by the Governor so as to preclude any challenge from other vested interests. It thus acted as the final regulatory security to the BRT-Lite scheme.

FINANCING THE OPERATING FLEET

Two contrasting approaches have been taken to the financing of the large buses needed for operation of the BRT-Lite system. On the one hand, 100 new buses were procured by the private sector without any direct public support. On the other hand, 120 buses were procured by a State-owned company and then leased to the private-sector operator, (with a further 40 buses operated directly by itself).

The Projects Officer of the Lagos State Council of NURTW was charged in 2005 with the identification of buses that would be suitable for operation under local road and climatic conditions whilst still being affordable both to the owner and the end user. This process led to the selection of a conventional truck-derivative passenger chassis from Ashok Leyland in India, with bodywork sourced in the same country despite the resultant shipping costs.

NURTW were able to prepare a credible business plan for the operation of these buses on inter-city routes to the States adjoining Lagos, and so attract the potential interest both of the vehicle supplier and of the financial sector that would be required to finance them. However reallocation of the buses to the unproven BRT-Lite scheme proved more challenging, though some banks and non-bank financial institutions (NBFIs) were still prepared to engage in the development process, and risk management measures were devised to allay their concerns. Principal amongst these was the security of repayment to the financier, and this was addressed in two ways:

Firstly the scheme design gave the bank the initial lien on revenues collected from services, with only the balance (after the deduction of financing costs) being passed through to the operator, the bank also being given the right to act as ticket distributor and security monitor.

Secondly the scheme design required the participating operators to accept collective liability for all the obligations that they had entered into. Any individual default, whether by peculation of revenues or through vehicle unavailability (perhaps as a result of an accident or mechanical failure), would be made good by an additional charge on all the remaining members. Where the default was fraudulent, the individual would also lose his deposit / collateral (though this was deliberately not set at a level that provided full security so as to avoid this being deterrent to participation in the scheme).

It had also been intended that the collective liability would enable the participants to self-insure against own damage and routine third-party risks (retaining catastrophe cover), but this proved unacceptable in the pilot implementation.

From the operator perspective, the two main risks to his participation in the scheme were that the new buses would not carry sufficient passengers to cover the high fixed costs of the vehicle finance, and that they would not provide the availability and reliability required over the finance tenor for that to continue to be the case over time. Clearly the first of these would be addressed through productivity gains arising from the segregated running ways of BRT-Lite, but the second required a commitment from the vehicle supplier to local spare-parts stockholding and technical support and training from a small team of expatriate service engineers.

Despite all of the above, still no financial institution chose to make good on its expression of interest in participating in the scheme. The vehicle supplier eventually resolved this matter by offering to

accept deferred payment over two years, provided that a local bank underwrote the counterparty risk. This arrangement was agreed to by Ecobank Nigeria plc, but it in turn then required the lodging of collateral personal guarantees from senior officers of NURTW in order to mitigate that risk exposure. Fortunately the levels set for these guarantees were proportionate to the affordability of those who had to provide them, covering less than 10% of the total transaction value, and so could be put in place.

After all the financial arrangements had been finalised, the order was confirmed for shipment in the first half of 2007. Delivery was then made in two batches, arriving in Lagos in June and September of that year.

In parallel with the integrated transport sector development being led by LAMATA, the Lagos State Government had sponsored a parallel initiative for Lagos Metropolitan Priority Bus Services that was also intended to address the public transport deficit. Lagbus Asset Management Ltd was established as a wholly State owned enterprise for the purpose of procuring buses for lease to private operators, with the vision that this company would then earn revenue for the State in the near term and also develop a track record for flotation once its developmental role had been fulfilled. Lagbus' choice of bus led to high lease charges and consequently it was forced into the role of operator operating a radial service along a route that had priority through painted bus lanes. Performance was disappointing and further rollout over the intended priority network was delayed at the same time as the existing idle fleet at Lagbus increased further through the delivery of new vehicles. This presented an opportunity for Lagbus to augment the NURTW service on BRT-Lite, and it was agreed that they would provide express services from the outer terminal at Mile 12 and the intermediate terminal at Moshalashi under their own branding. 25 buses are deployed in this service, with a further 15 held in reserve.

SUPPLY MANAGING DEMAND

> *"Though there are still traffic jams on Ikorodu Road, especially during the rush hours, anyone caught in such traffic snarls is in such a situation by his choice because they have the option of keeping their vehicles at home and using the BRT buses, which are clean and safe."* (A commuter)

Initially only the 100 standard high floor buses newly acquired by NURTW were available to use on the corridor. Demand forecasts showed that over 300 buses would be required operating at 20 second headways would be needed to fully satisfy demand. This highlighted the clear fact that not all of demand could be satisfied and to fully regulate the corridor would overload the system leading to frustration and the loss of support. At launch, the 100 buses were allocated as stopping services and an additional 25 buses, owned and operated by Lagbus, were allocated to run express services. As theses were still too few to satisfy all demand, a further 120 buses have now been leased from Lagbus for operation as additional stopping services.

An innovative approach that allowed several issues to be solved was adopted. Existing molue and danfo operating along the corridor were not replaced by BRT outright but merely prevented through BRT regulation from operating on the main road. Their operation within the service roads ensured that the traveller had freedom to choose between public transport modes. The existing operators/drivers that did not retrain could continue operating, all demand could be met and main

road traffic flow speeded up through the removal of slow vehicles that, historically, had a habit of stopping in the carriageway and disrupting other traffic. The resultant effect is market segmentation through provision that allows freedom of choice through partial corridor regulation, ensures that no travellers are left un-served and, in the medium to long term, improves the quality of service of molue and danfo as the need to compete with BRT increases. This solution to a supply problem proved a significant benefit in securing political and community support.

CLEAR AND CONSISTENT POLITICAL SUPPORT

The LUTP was initiated during Asiwaju Bola Ahmed Tinubu's time as Governor for Lagos State. His commitment to an integrated transport system with bus transit as a first point of delivery gave context and support to the BRT feasibility study and was articulated by his then Commissioner of Transport, Dr Muiz Banire, who chaired the BRT Steering Committee. Governor Tinubu initiated BRT-Lite, committing funding, resources and the regulatory reform required.

Governor Tinubu's term as State Governor ended on May 2007 when Babatunde Raji Fashola was elected Governor. Governor Fashola came from the same political party and carried the same beliefs and commitment to the integrated transport approach advocated by Governor Tinubu. At a time of political change the commitment to supporting a movement away from a pro private car approach to one that emphasised public transport was a key factor of the success of BRT-Lite. In particular, Governor Fashola showed significant courage in his commitment to BRT-Lite in the face of the inevitable criticism through its construction phases. By providing unwavering support he ensured that political risk, often present in fledgling public-private partnerships, did not present a barrier to private sector participation. His decision to support operations by providing public finance for training, uniforms and welfare for drivers together with the commitment of public funds for maintenance under lined a commitment to public transport; a form of transport used by the many but, in the past, influenced by the few.

COMMUNITY ENGAGEMENT

BRT-Lite was developed within a city with little knowledge of LAMATA or what organised public transport might be like, a history of poor delivery of transport improvements, and systems that sought to ensure that profit was directed to the already rich. The potential for scepticism and suspicion of motives and intentions was therefore rife. The objective of the community engagement strategy launched by LAMATA at project commencement therefore was aimed at developing a similar level of ownership of BRT within the citizens of Lagos that exists within delivery orientated stakeholders.

There are approximately 6 million people within the catchment of BRT-Lite and within this corridor three target groups were identified:

a. Those that have no vehicles and are captive to public transport who will be primary beneficiaries of BRT (approximately 65% of total catchment).

b. Those that have cars but are reluctant users. Given the right set of conditions they would use BRT (approximately 25%)

c. Super rich. They will not be BRT users but have a strong voice and are able to spread influence and may benefit from the decongestion effects of BRT (approximately 10%)

Contact with each of these parties in order to develop knowledge of BRT, and the benefits to users, was essential. The approach was to build upon the same principles that gave birth to the BRT-Lite concept, that of developing engagement from receiving and not giving information. As such each group was consulted upon and the scheme explained as a means of solving their own problems; not those identified by others and not imposing alien solutions upon users. Through this approach a sense of local ownership was developed resulting in BRT-Lite being seen as a user project and not one of technocrats or bureaucrats. The influence of such an approach spread to the often sceptical press whose reports both through and after construction, whilst sometimes pointing out problems, where not overtly negative and were quick to emphasise the positives.

The public relations strategy through development and construction consisted of advertising within the corridor, in newspapers, radio and on TV. TV commercials included a 90 second demonstration on how to use BRT, getting and paying for a ticket, how to wait, board and alight. Third party advocacy was employed whereby those with a voice in the community (local government chairman, local chiefs and community leaders) were welcomed to discussions on BRT, how it would operate and how people might benefit. Road-shows were held at which handbills were distributed in a range of languages that explained BRT-Lite.

Community meetings were endorsed by local community leaders through the prior discussions and were attended by senior LAMATA officers. The intention was to ensure that LAMATA was not a faceless organisation, allow access to real decision makers and show accountability. The effect was to raise LAMATA's profile in general, but also as an organisation that listens and delivers.

In parallel, meetings continued to be held with NURTW and its members at a local level, as well as with taxi drivers and haulage operators. Through the consultation process it became more clear that all users had the potential to benefit from BRT-Lite and that the key objective was to:

'Return life back to the citizens of Lagos'

The approach to consultation as a means of gathering information made a genuine and meaningful contribution to scheme development. The project was not just about BRT-Lite but about facilitating movement within the corridor. As such works encompassed:

- Segregated BRT running way for the majority of the corridor to ensure better and more reliable run times achieved largely by part removal of median between main and service roads. This offered significant improvements to journey time and journey time reliability of direct benefit to group (a) and gives a realistic alternative to the car for group (b).
- Narrowing of the median to ensure main carriageway widths remained, largely, unaltered. This ensured support of group (c) together with hauliers.
- Banning of Molue and Danfo from the main carriageway. Increasing capacity of main carriageway and ensuring that travellers have an option of using BRT or other forms of public transport. This form of self-balancing 'partial regulation'. Ensured that the limited capacity of

BRT-Lite in early operation had a release valve but also allowed some freedom of choice for captive users, group (a).

Key to both stakeholder engagement and wider marketing was the engagement of NURTW. Whilst NURTW had become convinced that it was appropriate for the City to move to a more regulated form of public transport provision, its many members needed reassuring and developing into ambassadors of the new transport mode. A sense of status was created for BRT personnel whereby the best drivers of Molue were encouraged to retrain to become 'pilots' of BRT. The status amongst peers was greater and there was a feeling that they were engaged in the transport revolution that was sweeping across Lagos generated from local communities and ignited by LAMATA. It was also a case that there was now a need for more drivers than before and a change in working conditions; the previous tense, and often violent, atmosphere in vehicle and at stop was being replaced by a more ordered humane population of users. The relationship is synergistic in that more respectful drivers lead to a more compliant population leading to more respectful drivers. BRT was seen as the catalyst for change.

> *A private car owner, said, "It is the best thing that has happened in Lagos this year. From Palmgrove to Ojota, I used to spend one hour on the traffic jam, but now it takes me five minutes."*

The official lunch of BRT-Lite on the 17th March 2008 was preceded with the national anthem and the national pledge. The programme of events started at 10:00am and was overseen by the Executive and Deputy State Governors. The event was televised and a Launch booklet produced, it was portrayed as a major step forward in the development of the City.

Opening of BRT-Lite saw almost immediate take up with eager customers waiting in line to buy tickets and board vehicles reducing the passenger ramp-up period often observed with new public transport schemes. In order to continue to foster scheme support, take on board and improve services and increase still further knowledge of BRT-Lite, the following initiatives were launched to support the operations phase:

- BRT Parliament. When BRT-Lite was 100 days old the BRT parliament was established in order assess and debate performance and issues arising. The parliament consists of senior LAMATA officers, the lending bank, State Government representatives, user representatives (including physically challenged and commuters). It is moderated independently by a senior academic from the University of Lagos. It is attended by approximately 1500 people and televised.
- Customer relations management line was established whereby those with comments and/or questions can ring or text 24 hours a day 7 days per week. The line is manned by two operators. The nature of comment is logged and summarised in a Customer Relations Managers report and complaint tracking
- BRT Half hour TV. From May 2008 a live TV programme shown on Sunday (repeated Tuesday) was established to examine BRT issues. The programme often consists of an interview with

someone involved with BRT-Lite and/or someone who has an opinion on it, or its operation. The programme has a weekly audience of approximately 5 million.

BRT and LAMATA branding was used prior to implementation and intensified post implementation with all BRT related staff, and many others, issued with BRT-Lite polo shirts and baseball caps. This has ensured that BRT and LAMATA are brands that have a high awareness throughout Lagos.

"I live in Ikorodu but work in Marina. When I closed from work by 5pm, I decided to try this BRT because people had been talking about it. I boarded the bus at CMS and there was no problem at all. But it was from Fadeyi that I began to appreciate the advantages of the BRT. When I looked out of the window, all the other vehicles were caught in the go-slow and the BRT bus was just moving smoothly. From CMS to Mile 12, it took me just about one hour. Before the BRT, I sometimes spent more than four hours in the Ikorodu Road traffic jam. I pray to God that they can sustain it." (A commuter)

PERFORMANCE

A full evaluation of BRT-Lite was undertaken seven months after first operation to assess the performance of the scheme both operationally and in the perception of users. From this evaluation, a series of key performance indicators have been derived to measure the success of the scheme and allow benchmarking against other BRT-Lite or other transport systems worldwide. This evaluation was supported by a comprehensive quantitative and qualitative data collection exercise. The following operational characteristics provide an overview of the BRT-Lite service.

- Operating headways were observed to range from an average of 30 seconds in the morning peak, to around 45 seconds in the off peak, and 40 seconds (1.5 buses per minute) in the evening peak.
- The average journey time from Mile 12 to Lagos Island is just under one hour, with the minimum and maximum journey time in this direction ranging from 40 to 70 minutes.
- Average journey times in the northbound direction from Lagos Island can be significantly shorter, with minimum recorded journey times on the express services of 20 minutes. The average journey time is recorded as 45 minutes, although this varies by time of day, with average morning peak journey times of around 40 minutes, rising to 55 minutes in the evening peak when the main traffic movement is away from Lagos Island.
- Round trip times considerably exceed the journey times because of terminal capacity problems and driver layovers (drivers stay with their bus at Breaks), and so operating speeds are well below commercial speeds.
- Queuing varies noticeably by stop, direction and time of day, with significant queues of 200 or more people recorded in the peak periods at some stops, particularly the Mile 12 terminal. However, with the high vehicle frequencies, this relates to an average (median) queuing time of 10 minutes. Peak queuing times are greater, approaching 15 minutes, falling in the inter-peak, with no queuing then recorded at many stops.

In addition to the performance indicators, evaluation has provided information to allow an understanding of the nature of the ridership and the impact that BRT-Lite has had on travel behaviour along the corridor as well as Lagos as a whole. This is presented in relation to key questions below

How many passengers take the new system?

Patronage of BRT-Lite has been observed through a series of boarding surveys and records the following figures:

- 195,000 passengers on an average weekday
- Over 1,150,000 passengers in a full week. Applying locally derived annualisation this means that the system may carry around 60 million over a year of operation.

The daily volumes carried by BRT Lite already place it as one of the largest bus systems in the world in terms of passenger numbers. Whilst not approaching the ridership of the TransMilenio system in Bogotá which employs dual lanes and an extensive network of local end express services across the city, BRT-Lite patronage is comparable to many of the individual lines in Curitiba, Brazil, and approaching that of the Metrobus in Quito, Equador.

Name	City	Country	Length (km)	Pop	Peak hour one way	Daily two- way
TransMilenio	Bogotá	Colombia	84	7 m	45,000	1,300,000
Assis Brasil Busway	Porto Alegre	Brazil	4.9	3.7 m	28,000	290,000
Metrobus ! El Trole	Quito	Ecuador	16.1	1.8 m	7,000	240,000
9 de Julho Busway	Sao Paulo	Brazil	7	10 m	35,000	196,000
BRT Lite	**LAGOS**	**NIGERIA**	**22**	**15 + m**	**10,000**	**195,000**
Sul Busway	Curitiba	Brazil	10.1	2.7 m	13,000	156,200
Blok M Kota Line 1	Jakarta	Indonesia	12.9	9.8 m	6,500	100,000
SE Busway	Brisbane	Australia	17	1.7m	18,000	150,000
Megabus	Pereira	Columbia	16.7	0.7 m		45,000
Adelaide O-bahn	Adelaide	Australia	3	1.1 m	4,000	30,000

What is the mode share for BRT-Lite?

BRT-Lite currently carries over a quarter of trips recorded along the corridor despite BRT-Lite vehicles representing just 4% of vehicles on the route. This represents 37% of public transport trips made along this route. As a means of access to Lagos Island, the commercial heartland of Lagos and a main destination on the route, BRT-Lite carries nearly a tenth of all trips inbound to the Island.

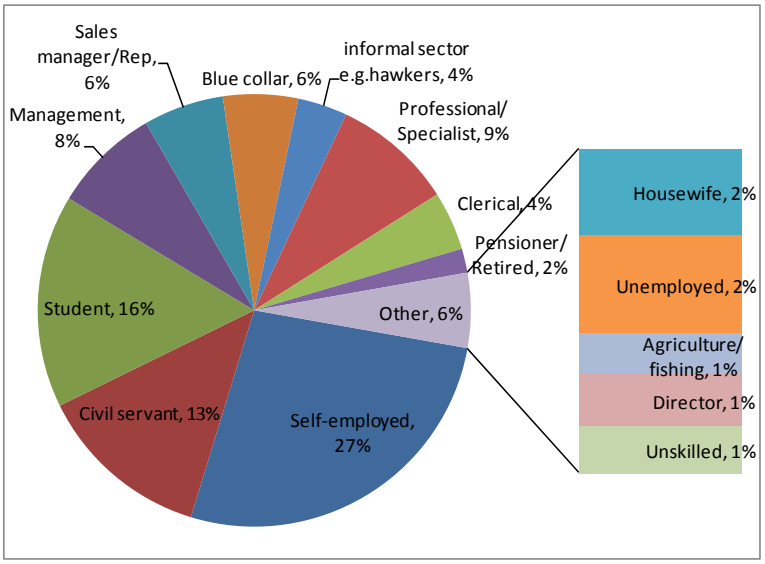
The level of demand is currently constrained by capacity in the peak periods, so potential to tap the demand currently served by other modes means that further patronage growth could be realised through capacity enhancement.

Who uses BRT-Lite?

Analysis of the occupation of BRT-Lite users demonstrates that a broad range of different travellers use the system.

A large majority are self-employed, reflecting the local prevalence of entrepreneurs running their own-business.

Civil servants and students also form a significant proportion of the BRT-Lite ridership.



There is evidence of ridership among the higher-ranking employment categories including management, professionals and directors.

Where have the passengers been attracted from?

The majority of BRT-Lite passengers were existing public transport users abstracted from other public transport modes.

- 85% previously took danfo, the small commuter buses.
- A further 8% used the larger molue or commercial buses.
- 4% of passengers previously travelled by car, with a further 2% travelling by Taxi, Okada or Kabu Kabu.

> *"My husband drops me at TBS and I get BRT to work most days." (A commuting lawyer)*

Modal shift from private transport is observed to be relatively low. However, evidence that even a small proportion of previous car users have been willing to use the new system pays testimony to a change in thinking in a society in which car ownership is an aspiration, seen to mark a change in status from which people would rarely move 'backwards'.

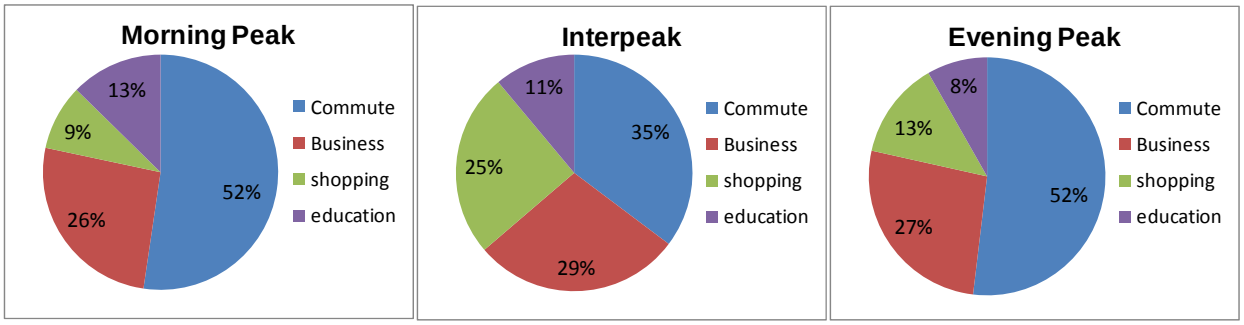
What is the main travel purpose of BRT-Lite users?

> *"I am happy for my children to use BRT to go to school. There used to be too much risk with danfo". (A mother)*

Survey data shows that in the morning (0600-1000) and evening (1600-1900) peaks the majority of travellers are commuters travelling to or from their place of work. However, business users account for over a quarter of all trips, with this proportion remaining fairly consistent throughout the day. The majority of shopping trips occur in the inter-peak, accounting for a quarter of the trips in this period, compared to under 10% in the morning peak and 13% in the evening.

Education trips account for around 10% of trips across the day, with a slight bias towards morning and inter-peak periods as the main proportion of return school trips are likely to take place before the specified PM peak period.

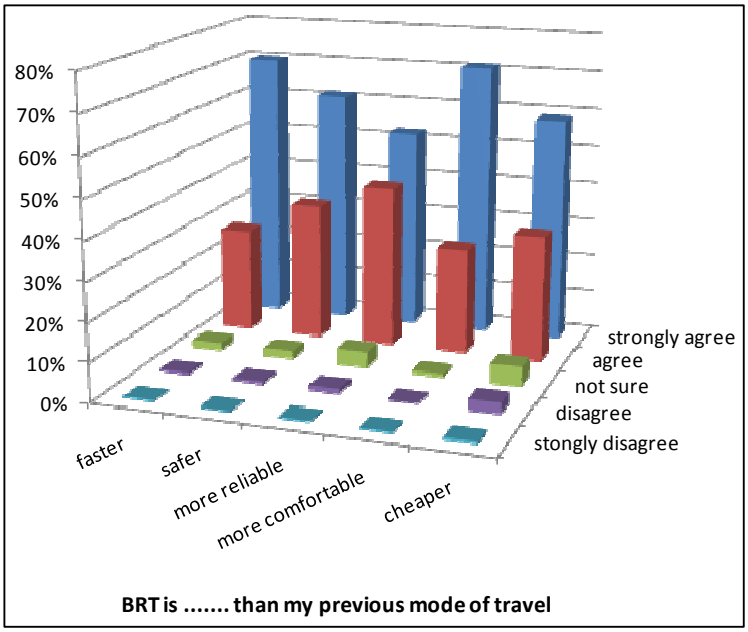
Journey Purpose of BRT-Lite passengers by time of day



What do BRT-Lite users think of the new system?

User opinion of the new system is shown to be strongly positive in comparison to the alternative modes of transport. A majority is recorded to strongly agree that BRT-Lite is better than other modes in all the journey attributes mentioned. In particular, respondents find BRT-Lite particularly to be faster and more comfortable than the alternatives.

In all attributes the proportion of respondents who would agree or strongly agree that BRT-Lite is better than the previous mode of travel amount to over 90% of respondents.



BRT-Lite is clearly considered to be superior to other modes by the vast majority of users.

How does the BRT-Lite journey compare to alternative travel options?

The reasons for the popularity of the BRT-Lite service become clear when comparing the relative journey attributes of the system with that of the alternative modes of transport available to people. As other public transport vehicles have been regulated off the corridor into the service lanes, those that still ply the route tend to focus on the shorter journeys attracting passengers who are travelling shorter distances or from intermediate stops where BRT-Lite capacity is limited. It is therefore necessary to interchange to make an end-to-end journey from Mile 12 to CMS if travelling using the corridor on other public transport modes. An example would be a two-stage trip from Mile 12 to Ojuelegba, then on to CMS. The alternative from Mile 12 is to access the Island via 3rd Mainland

Bridge, although the majority of services using this route terminate at Obalende from which a further short stage is required to reach CMS. The journey attributes for the two alternative journey options compared against the BRT journey are as follows:

Mile 12 to CMS	Other public transport on corridor	Via 3rd Mainland Bridge	BRT-Lite
Total in-vehicle Journey time	78 minutes	64 minutes	**55 minutes**
Fare	230N	120N	**100N**
Interchange	1	1	**0**
Total Wait time	45 minutes	10 minutes	**15 minutes**

For end-to-end journeys, the advantages of travelling by BRT-Lite are clear. The journey is faster than the other route options, saving about 10 and 20 minutes in vehicle time compared to the other options. Journey time advantages are further increased compared to other on-corridor trips by avoiding the need to interchange to access the Central Business District.

Despite offering a premium service in terms both of run-time and vehicle quality, fares are actually preferential to other travel options. The BRT-Lite fare is particularly preferential to competing modes along the corridor, where the requirement to interchange and high fares for shorter journeys lead to a significantly higher fare for the full journey. There is evidence of other operators attempting to profiteer form the demand which does not choose BRT-Lite, potentially due to capacity constraints of the system.

So, with every aspect of the BRT-Lite journey comparing favourably against competitive modes, what do BRT-Lite users state as their most important factor behind choosing to use the system?

- The quicker journey time is the decisive factor for 35% of respondents
- One fifth state that comfort is the main reason for choosing BRT-Lite
- Just under one fifth use BRT-Lite because it is cheaper than alternatives
- 13% cite safety or the improved security of the system
- 5% use the system because it is more reliable

Has BRT changed passengers travel patterns?

Apart from providing the new mode option to travellers, the introduction of BRT-Lite has also influenced some travellers to change travel pattern. Nearly a quarter of travellers questioned said that their use of BRT-Lite had led to a change in the time that they travelled. 80% of these said that the increased speed and/or reliability of BRT-Lite allowed them to travel at the time they wanted rather than having to leave early to ensure reaching the destination in time. Just 6% changed their time of travel for negative reasons of avoiding the queues for the service.

15% of travellers stated that they changed the number of trips they made, of which four fifths made more trips using BRT-Lite for positive reasons such as the reduced journey time, cost, comfort or improved accessibility. Of the respondents who said they made fewer trips, some of these were due to the reduced requirement to interchange, which again is positive, if not strictly constituting a change in the number of trips (as opposed to trip stages).

13% of travellers have changed their destination, mainly changing to destinations served by the BRT route, although a couple of respondents mention that BRT allows them to travel to locations further out than was practical previously. This is a clear indicator of the potential of BRT-Lite to influence land use decisions.

How does BRT fit into the full journey pattern of travellers?

Analysis of trip making patterns has shown how BRT-Lite is placed as part of a series of travel modes between origin and destination. Only around a third of travellers use BRT as the sole means of making the journey.

A large proportion of BRT users take danfo for a leg of the journey whilst okada is also a popular mode, used as a means of access to the transport network and the BRT corridor. On average, the number of stages to make a single trip for BRT passengers is 1.96.

Mode taken	Proportion of travellers
BRT only	31%
BRT, Danfo	41%
BRT, Okada	17%
BRT, Danfo, Okada	7%
BRT, taxi	1%

CONCLUSION AND CRITICAL SUCCESS FACTORS

Evaluation has shown that BRT-Lite has had a significant impact upon those travelling along the Ikorodu Road corridor in Lagos. It has defined a new interpretation of BRT that is rooted in established BRT practice but is grounded in a detailed understanding of local user needs with the key requirement of effective delivery. As such it has been able to improve the quality of lives of not only users of BRT but also those who travel along the corridor by other modes and those who choose to locate their businesses there. It also provides a platform on which to develop a network of BRT routes as part of the integrated transport network of the City. In its current form it is both proof of a delivery mechanism and a pilot scheme from which improvements can be made. It is also a demonstration of focussed delivery in challenging circumstances and as such is an important reference case for those seeking to develop BRT elsewhere. The success is evident in the wide spread interest in developing similar approaches in the Nigerian cities of Port Harcourt, Ibadan, Calabar and Kano as well as cities elsewhere in the world that have visited and reviewed BRT-Lite.

Key challenges in implementing BRT in Lagos were: high levels of demand to be accommodated within dilapidated infrastructure of limited capacity; the absolute need to ensure that operations are sustainable through appropriate delivery structures; establishing appropriate regulations and ensuring compliance; and winning the support of the people of Lagos.

This report has summarised the definition, process and performance of BRT-Lite. In doing so the critical success factors are considered to be:

1. LAMATA. A public transport authority with apropriate expertise, energy and desire to succeed, that is able to plan, regulate and form relationships to ensure the delivery of public transport services.
2. Political commitment and suport with clear focus upon outcome when difficult decisions are required and opposition is felt.
3. Ensuring that transport organisations were supportive, together with a stakeholder engagement programme that educates, defines roles and demonstrates the benefits and linkages in cross sectroral delivery involving public and private participation.
4. The definition of a form of BRT that meets key user needs, is apropriate to the context in which it is placed, and is affordable and deliverable in its widest sense.

Beautification

Empowerment

Safety

This report is a summary of the Lagos BRT-Lite Evaluation Final Report, January 2009, produced by Integrated Transport Planning Ltd and IBIS Transport Consultants Ltd for LAMATA. We are extremely grateful for the assistance of Dr Dayo Mobereola, Mr O Dairo and Ms K Efunshade of LAMATA for assisting in the production of this and the final evaluation report.

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