INTELLIGENT TRANSPORT SYSTEM (ITS) FOR THE MANAGEMENT OF BUS OPERATIONS IN SUB-SAHARA AFRICA: THE PUBLIC PRIVATE PARTNERSHIP APROACH

Abstract

Bus transport operations in Sub-Saharan African urban centers are sub-optimized as a result of poorly maintained rolling-stock, poor fleet scheduling, revenue leakages amongst others leading to poor travel experience. Though, there are weak institutional issues as the operations are dominated by informal sectors, introduction of Intelligent Transport System that is scalable would enhance the efficiency of operations. The stages of delivery Intelligent Transport System should howerer follow adequate planning, design, deployment and evaluation processes to ensure that it does not focus on technology, but it is able to meet the transport objectives of the city. The implementation would require the support of decision makers towards necessary private sector participation to support infrastructure provision, capacity building and post-delivery maintenance. The architecture should be simple and domesticated to address local travel needs of the city.

Key Words: Sub-Sahara Africa, Intelligent Transport System, Public Private Partnership

Introduction

Prior to the 1990s, the governments of some African cities initiated various transport schemes which, albeit failed as a result of political and structural inconsistency and changes. This however has made the urban bus operations to be controlled by un-organized informal sector and introduction of two-wheeler motor cycles with its safety and security implications in most urban cities. In Africa, billions of dollars have been spent on improving and rehabilitating transport infrastructures, but it has been long recognized that the poor performance of the transport sector is due to far more than merely inadequate finance or technical capacity constraints (Angela, Don, Kate, 2013). There are challenges from inadequate data for planning, political inconsistency, improper coordination of transport projects, lack of investment appraisal to determine key transport project investment required to solve a particular mobility needs both in the urban and inter-urban transport operations etc.

However, considering the volume of transport facilities needed in the Sub-Sahara African region, it is imperative to consider complementary solution that could improve the users' travel experience despite the current transport situation. The political history of colonialization has had profound influence in bequeathing a distorted legacy of structural and institutional drawbacks which is common to almost all African cities. These shortfalls are reflected in lopsided route networks to primarily exploit natural resources, emphasis on rail development for heavy bulk movements over long distance, and as a result the transport sector was poorly prepared for urbanization. Consequently, almost all the African cities shared similar transport structure and characteristics.

Despite the pervading political, socio-economic challenges facing the Sub-Sahara African region, some cities like Lagos in Nigeria, Johannesburg and Cape Town in South Africa have implemented the Bus Rapid Transit System which is a major stride towards advancing the course of transportation in the region. Some other cities in the region are at various stages of planning and implementation of bus transport reforms with the assistances of donor agencies and off-shore consultants.

A Synopsis of Sub-Saharan Africa

Sub-Sahara is, geographically, the area of the continent of Africa that lies South of the Sahara desert as shown in Fig1. Politically, it consists of all African countries that are fully or partially located south of the Sahara. For the past few decades, African cities have been experiencing huge population increase. The population of Sub-Saharan Africa was 800 million in 2007 and the UN predicted that by 2050, the population would be nearly 1.5 billion (UN 2006). It is estimated that by 2020, about 55% of the African population will be living in urban centres (UITP, 2010). The implications of such population drift on transport infrastructure that are fast depleting are enormous.

The economy of Sub-Saharan Africa is dependent on trade, agriculture and human resources of the region. The region is expected to reach a GDP of $29 trillion by 2050. There is high level of income inequality which has implications on the transport mode choices particularly among the city dwellers. Poor transport infrastructures in Sub-Saharan Africa represents one of the most limiting factors to economic growth and achievements of the Millennium Development Goals (MDG). It has been argued that

infrastructure investments contributed to more than half of improved growth performance between 1990 – 2005 and increased investments is necessary to maintain growth and tackle poverty (Christian, 2011).

Figure 1: Map of Africa

Major Trends in Bus Operations in Sub-Sahara Africa

The Sub-Sahara African cities share similar characteristics and conditions in bus operations which include:

1) Lack of Regulatory and Institutional framework

An institutional weakness is one of the observed failures of urban transport in Sub-Sahara African cities (World Bank, 2002). With the exception of few cities, public transport in Africa is under the direct control and supervision of the Ministry of Works and Transport. In which case, the concentration is on road construction and maintenance. In some cities, where there is a sole Ministry of Transport in charge of transportation, the expertise for transport planning is grossly inadequate. The administration of transport activities is also often performed by the local communities. Cities that have professionally and legally constituted transport authorities include Senegal (CETUD), Lagos in Nigeria (LAMATA), South Africa, and Cote D'Ivoire (UITP, 2008). The challenges emanating from lack of regulatory institutions are obsolete transport laws, poor coordination of urban transport sector, overlapping responsibilities that distort reform framework.

2) Road Transport Infrastructure

One of the lingering weaknesses of land transport in Sub-Sahara Africa is the obsolesce of transport infrastructure. Some of the transport infrastructures in the Su-Sahara African cities were built in 1960/70s without timely and appropriate maintenance. There is no axle loading legislation and where any exist, enforcement of axle legislation is often difficult due to biased incentive because individual road users benefit from overloading at the expense of other road users (Richard, Uno and Martin, 1998). Defective road transport infrastructure accounts for about 43% of various vehicles malfunction as a result of poor maintenance, and lack of pavements (UITP, 2008).

3) Poor Public Transport Financing

Public transport operators receive no financial support from the government in Sub-Sahara Africa. Operators acquire the rolling-stock either from private savings or bank loans which are expensive to access under harsh condition and terms of payments. In essence, operators are not able to maintain their vehicles appropriately which adversely affect schedules, reliable service amongst others. They are also unable to replace their fleet optimally thereby resulting to higher cost of operations due to the number of vehicles that are over-aged in the fleet.

4) Dominance of informal operators

As a result of government ineptitude in responding to providing adequate infrastructure as well as lack of policy guide in investing in urban public transportation, unorganized bus transport operators operating under various unions emerged in different cities in Sub-Sahara Africa like Matatu in Kenya, South African National Taxi Council (SANTACO) in South Africa, National Union of Road Transport Workers (NURTW) in Nigeria etc. Though they have filled a gap by providing public transport services, their operations are largely unsafe.

5) Public Transport Subsidy

Globally, urban transport operations' financial returns are very lean as a result of high costs of operations. Except with few countries like South Africa, Abidjan where buses are assembled, other Sub-Saharan Africa cities depend heavily on importing buses from Europe or Asian countries, which pose some financial pressures to the operators. Paradoxically, there exist no formalized provisions of subsidy for urban bus operations.

APPLICATION OF INTELLIGENT TRANSPORT SYSTEM IN BUS OPERATIONS

Private car ownership and its associated problems of traffic congestion, air pollution and safety challenges have increased proportionately with economic development and high rate of urbanization. Measures adopted so far like road construction, demand management, introduction of high-volume carrying capacity rolling stock have not completely addressed the challenges. There is the need to complement current measures with the application of information and communication technologies, hence the imperative of Intelligent Transport System.

Intelligent Transport System is an advance application which aims to provide innovative services relating to different modes of transport and traffic management to enable various users to be better informed about services and make safer, more coordinated and smarter use of transport networks. The purpose of Intelligent Transport System is to maximize the operational efficiency of road infrastructure, rolling-stock, reduce travel time through predictable travel information and improve drivers' convenience and safety (Jin, Dongjun 2013).

Transport Functions and Intelligent Transport System Applications

The deployments of Intelligent Transport System should be tailored towards addressing the transport functions. The transport functions need to be analyzed to determine the specific Intelligent Transport System technology to be deployed that would be able to address the priority of the urban passengers as well as institutional needs. The transport function comprises:

i. Broad-based plans which includes framework for private sector participation in transport investment, general public transport service characteristics, economic regulation, institutional framework, funding and cost recovery. If the objective is to address the broad-based transport plans functions, Intelligent Transport System would have no direct applications, rather, data generated from Intelligent Transport System could facilitates in achieving such objectives.

ii. Methodical planning consists of network and mode option planning, service specification and planning, franchising and management, pricing management amongst others. In designing the service plans and specifications, it would require time-tabling, service numbering, route delineations which would indeed require the applications of Intelligent Transport System. However, all of other functions in the methodical planning would not justify the investment on Intelligent Transport System, though data generated from would assist in taking decision on Intelligent Transport System applications.

iii. Service Delivery embraces vehicle and crew scheduling, vehicle maintenance management, performance and productivity management, service control and monitoring, incident management, fares collection, passenger information, security and general customer services. The application of Intelligent Transport System would facilitate these functions and would therefore justify the investment on Intelligent Transport System.

iv. Overall Support domain of the public transport functions include traffic and demand management, public transport priorities, operation control center, system payment management, inventory management, fleet renewal, infrastructure management, human resources management amongst others. The application of Intelligent Transport System to address these functions is justified. However, the transport functions should be delivered within the public transport range to meet the Finarr six transport objectives as provided in Table 3

Intelligent Transport System Implementation Stages

The implementation of ITS solution will follow four-stage implementation which comprises:

I Planning: Planning for ITS solution would start with need assessments and development of goals that the Intelligent Transport System is meant to address. The needs in operations may vary from one organization to another. Generally, it may comprise reduction in travel time, safer operations; offer service information, integration etc. It is when needs are gathered that the type of Intelligent Transport System to address the

needs are determined. The goal setting would require the involvement of various stakeholders i.e. the operators, the public, the transport authority etc.

Another key element in the ITS planning stage is to redefine the operational business processes and structure upon which the ITS is meant to operate. A major failure in ITS implementation is when ITS solution is deployed to function on poorly organized business structures. For example, where there is none or weak scheduling system or fleet maintenance regime, these have to be addressed before deploying any ITS solution. The Users' and Functional Requirements, existing and emerging practices in the Transport sector, current ITS schemes, installation environment, available means of communication, data transfer, available IT system, cost, development risks will influence the ITS technical concepts that would be considered.

II Design: At the design stage, the specific technology solution, the device types, where they would be located, the distribution of functions and intelligence system and how the various elements will communicate with each is determined. The technology to be used need to be considered in four perspectives:

- System/sub-system: this covers the various functions performed by ITS i.e. scheduling, traffic management, incident management, precision docking, and surveillance
- Location: the point of location of the technology i.e. bus, bus stop, control centre
- Technology type: the type of the device i.e. customer facing equipment, sensor, data processor, communications device, data storage unit
- Role: Generate data (sensor), process data (card reader), display (information display), analyze data (dispatch support), optimize resources (scheduling).

ITS consist of many components that are required to be interfaced. To achieve this, the design need to comprise an ITS architecture for exchange of information as shown in figure 2. ITS is highly dependent on data and would therefore need a back office support like hosting of server, human resources amongst others.

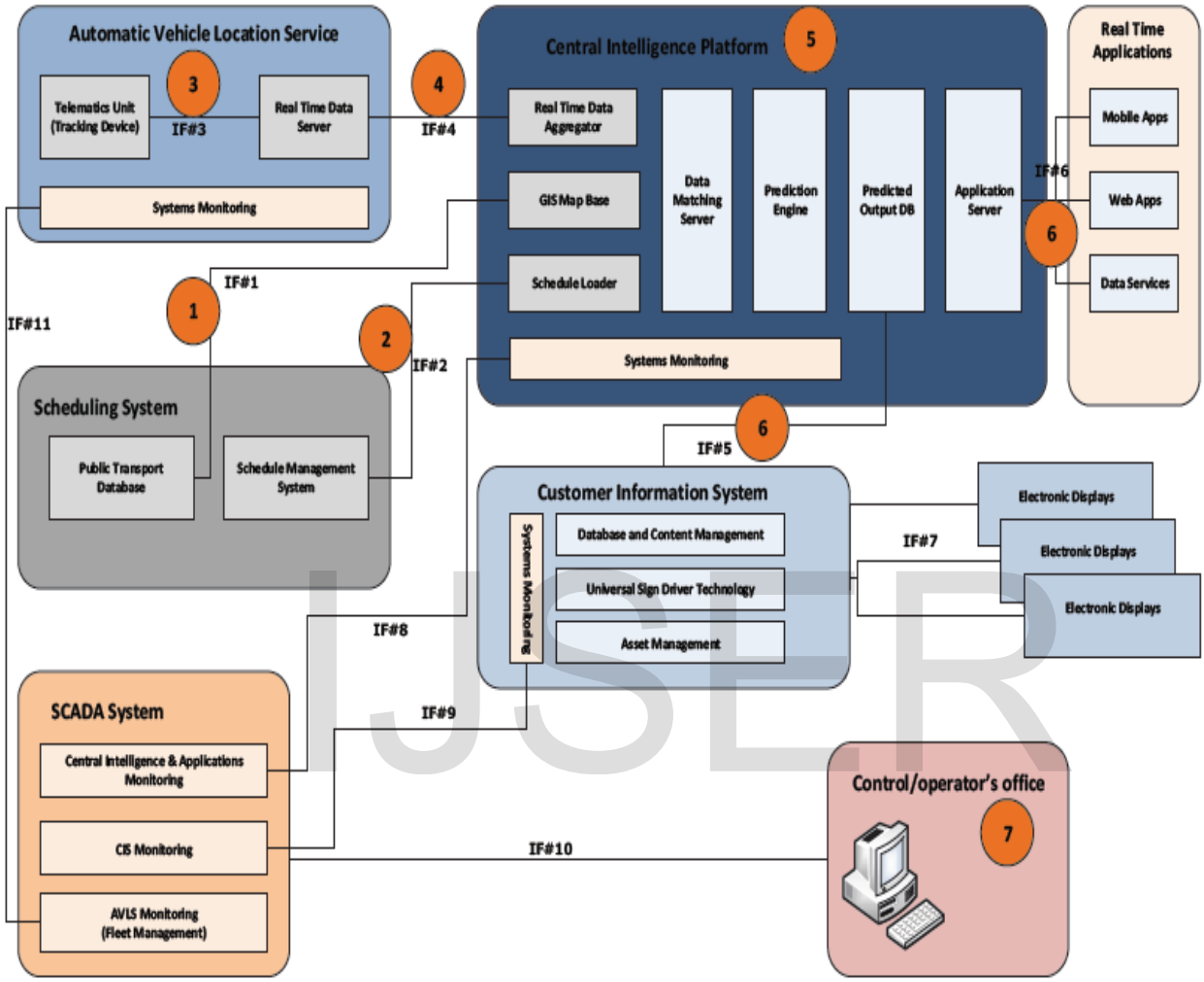

Figure 2: ITS ARCHITECTURE FOR BUS OPERATIONS

III ITS Deployment: The deployment stage is the actual implementation which comprises tendering and contracting, supply and installations, equipment testing and commissioning. This is a critical stage as the ITS equipments being supplied must comply with specification and within budgets. Installations of equipments would comprise the vehicles, bus-stops, corridors and integrate with existing or parallel systems.

IV Evaluations: There should be defined criteria for measuring the performance of the ITS against specified technical functionality and business objectives. The criteria has to be set before the implementation of the ITS which has to be followed up with post implementation monitoring and evaluation of the actual performance of the ITS equipment. The performance of the various ITS modules i.e. LED display, control centers, voice announcements amongst others should have a benchmark of 98% performance level.

Generally, ITS deployment should support the transport functions of planning, fare collection, field control of operations, vehicle maintenance, inventory management, traffic demand and management, payment systems etc.

Table 1: Intelligent Transport System Applications in Bus Transport Operations

Operation Management	**Drivers Aids**	**Fare collection**
- Automatic Vehicle monitoring - Route condition monitoring - Schedule Adherence support - Service contract compliance - Driving – standards compliance - Emergency/incident management - Dynamic rescheduling	Schedule Adherence support Collision warning and avoidance Precious Docking Economic driving assistance Vehicle condition monitoring Passenger surveillance	– Travel sales and payment – Fare calculation and charging – Travel authorization and evidence – Interchange/transfer authority – Interchange/ transfer rebate – Revenue accounting and distribution
Traveler information	**Traffic management**	**Security**
- Traveler information on pc/ internet - Traveler information on phones/PDAs - Real time information at	- Traffic signal priority - Access control - Interface with adaptive traffic control systems - Public transport lanes/ facility	- In-vehicles surveillances - At-station surveillances - Running-way surveillances - Infrastructure/facility surveillances

station terminals - Real time information at bus- stops - Real time information in vehicles - Vehicle -stop announcement - Dynamic journey planner - Alert services - Emergency/incident advice	violation monitoring	Demands Responsive Transport - Booking and Reservations - Traveler assignment - Routes optimization - Customers pick-up/drop-off management - Revenue recovery and administration management

Source: World Bank, 2012

Intelligent Transport System and Sustainable Transport

Sustainable Transport is one that; 1) allows the basic access needs of individuals and societies to be met safely and in a manner constituent with human and ecosystem health, and with equity within and between generations; 2)is affordable, operates efficiently, offers a choice of transport mode, and support a vibrant economy and 3)limits emissions and waste within the planet's ability to absorb them, minimizes consumption of nonrenewable resources, reuses and recycles its components, and minimizes the use of land and production of noise(Centre for Sustainable Transportation, 1998). Following this definition, Intelligent Transport System is an enabler to improving access through travel information, mode choice, efficient transport system and reduction in the consumption of energy avoiding congested routes through advance highway warnings.

Finnish National Road Administration or Finnra (Kulmala and Noukka, 1998) established and prioritized six transport objectives from Finland long-term transport plan for 2010 on which ITS would play pivotal roles in helping to achieve the objectives as shown in Table 2. Finnra followed the prioritization for its objectives for ITS by sending a list of specific potential ITS objectives to numerous experts in the field. The experts were to score from (-1 to 3) each potential ITS objectives in terms of the perceived capability of ITS to successfully address each of the six objectives; the median score (usually rounded) on each assessment appears in Table 2 Objectives are ranked in order by the overall scores they received. Incident management was viewed as the most accomplishable ITS objectives, especially as it relates to safety and efficiency. Several objectives are

important in the safety area which include weather information, smart cars (technology embedded in speeding up or slowing down) to avoid potential hazards (William, 2010).

Table 2: The Weights of Finnra's Objectives for Intelligent Transport System

1. Ensure efficiency of traffic transport	30%
2. Improves traffic safety	30%
3. manage demand more efficiently	15%
4. use infrastructure more efficiently	15%
5. improve cooperation between modes	5%
6. Ensure mobility and accessibility	5%

Source: reprinted from Kulmala and Noukka (1998). Copyright 1998 by UKIP Media & Event Ltd. Reprinted by Permission

Table 4 Potentials of ITS functions to fulfill Finnra's objectives (median scores)

ITS functions	Efficiency	Safety	Demand management	Efficient use of infrastructure	Modal cooperation	Mobility and accessibility
Incident management	2	2	0.5	1	0	0
Pretrip information on other modes	1	1	1	1	2	1
Park-and-ride facilities	1	1	1	1	2	1
Guidance to alternatives routes	1	1	1	2	0	0
Pretrip weather information	1	2	0.5	0	1	0
Pretrip info on incident, congestion	1	1	1	1	1	0
Roadside information about the weather	1	2	0	0	0	0
Local warning about weather	1	2	0	0	0	0
Weather- controlled speed limit	1	2	0	0	0	0
Congestion / area tolls for motor vehicles	1	0	1	2	1	0
Information about congested location	1	1	0	1	0	0
Roadside info on incident, congestion	1	1	0	1	0	0
Demand-responsive public transit	1	0	1	1	1	2
Signal control at junction	1	1	0	1	0	0
Network signal control	1	1	0	1	0	0
Lane control at special location	1	1	0	1	0	0
Lane control in tunnels	1	1	0	1	0	0
Lane control on motorways	1	1	0	1	0	0
Terminal/stop timetables information	1	0	1	1	1	1
Alternatives mode information	1	0	1	1	1	0
Roadside dynamic parking information	1	0	1	1	1	0
Dynamic speed adaption	0	2	0	0	0	0
Intelligent headway control	0	2	0	0	0	0
Collision warning system	0	2	0	0	0	0
Collision avoidances system	0	2	0	0	0	0
Vision enhancement	0	2	0	0	0	0
Driver state monitoring	0	2	0	0	0	0
Automatic speed enforcement	0	2	0	0	0	0

Source: Kulmala and Noukka 1998

Key Considerations for Intelligent Transport System Implementation

Key considerations for implementing Intelligent Transport System comprises effective framework for transport operations in the city, improved or reformed transport system, budget allocations for ITS programme, setting of clear priorities in the transport operations, availability of management resources, ensuring planned ITS programme meet objectives within available resources. ITS is not an end on its own, it is only a means to an end. It is therefore important that the objectives and goals of the organization are clearly stated to be able to determine the type of ITS technology to be deployed. Intelligent Transport System cannot serve as an alternative to poorly organized transport operations. Elements of efficiency would have in the first instance exist before deploying ITS to improve the operations. For the effective deployment of ITS, poor certain operational procedures must be redefined to align with efficiency of the system. Intelligent Transport System is easily funded in the public sector where evaluation of its desirability does not focus only on profitability and economic gains but on social capital gains.

The decision to implement Intelligent Transport System should be based on business, social and regulatory considerations. The implementation affects the efficiency of the operators, improves the travel time of the public and enhances the regulatory function of the public transport regulator. Since there are types of Intelligent Transport System, care must be taken to ensure that the chosen one is fit for purpose, and that its procurement and use is cost effective for the management (Robinson and May, 1997).

The assessment of the public needs, cost and benefits of the Intelligent Transport System has to be carried out to determine its desirability. Needs are more likely to come from fields control of operations, public safety and safe operations and the need to meet certain regulatory requirements. Benefits will occur from predictable travel time, improved travel experience, secured data for planning whilst costs would be drawn from hardware and software acquisitions, staff training and retraining, maintenance and replacement.

The Public Private Partnership Approach in Intelligent Transport System Implementation

The term PPP came out of the commercialization and privatization processes initiated in the 1980s in countries such as UK, where increased private sector participation was seen as beneficial because it

1) removes conflict of interest between the government's role of defining policies, regulating industries, and providing outputs;

ii) allows the private sector to provide outputs in competitive markets because it has strong incentive to perform work based on the profit motive; and

iii) reduces government's expenditure commitments, which help to support macroeconomic stability, and allows public expenditure to be reallocated towards high priority outputs in sectors such health and education (ADB, 2008).

Investment on Intelligent Transport System can be pursued from the perspective of a public project, Public –Private Partnership or private project. The decision is a function of availability of financial resources, the urban city transport objectives, ownership structure, and the level of regulatory influence that the transport authority would want to exercise in the management bus operations

-Intelligent Transport System as a Public Project

Intelligent Transport System projects are usually implemented by the government. In this case, the government bears all costs burden comprising hardware, software, training and all associated costs. The government assumes full responsibilities of carrying out the feasibility study, design, specification, procurement/evaluation, construction, operation, management, monitoring and maintenance of the project. This represents the traditional business approach in social responsibility of the government. It would be required that the government provides the expertise for the running of the project as well as provides all the financial resources and the risks associated with it. The Singapore Intelligent Transport System and the EZ link card are good examples of public projects.

Intelligent Transport System projects can be collectively funded and implemented by the public and private sectors. Such joint venture approach is a way of building of social overheard capital through joint utilization of public and private resources. Depending on the degree of private sector participation, and the transfer of ownership to the government, the approach can be sub-divided into the following methods: (1) BOT (Build, Operate and Transfer) (2) BOOT (Build-Own-Operate –Transfer) (3) BOO

(Build-Own-Operate). Under these various approaches, the government and the private sector share risks related to the project and through contractual relationship, conditions for investment costs recovery and responsibilities for construction, operations and transfers are outlined.

The above approach is further extended to Private Finance Initiatives (Kyu, 2008). Since the 1980s, the Private Finance Initiatives approach has been increasingly used amid a worldwide trend towards privatizations (EMRC, 2008). In the Private Finance approach, the public and private sectors collectively establish a Special Purpose Company (SPC) to enable the two sectors play complementary roles based on the government's long term project operation capability and the private sector dexterity as shown in table 5. It creates room for risks to be dissipated with regards to costs recovery of investment costs. Hong Kong's Octopus Cards represent a good example of a Private Finance Initiative project which was promoted through the setting up of an (SPC).

Public Private Partnership (PPP) projects are implemented by using the initiatives, resources and expertise of the private sector whilst the government provides the enabling environment, regulation and oversight functions. Public Private Project of this sort has short-term of investment costs recovery and prospects for profitability. Such collaboration enables the private sector to demonstrate the required competencies in project management and bear the entire burden of recovery investment costs. Seoul's integrated smart cards ticket project is an example of a Public Private Partnership based on the private sector's initiatives and investment with government supervision.

Table5: Private Finance Initiatives

PFI Project Types	**Characteristics**
Services sold to the private sector	Private sector contractor provide services by building, managing and operating facilities. The costs are mostly borne by the public sector
Joint project	Facilities are built with funds provided by both the public and private sectors and operated by the private sector. After specified period of time, the facilities are given a free-standing status
Free Standing project	Private sector contractors who have received

	government permission maintain, operate the relevant facilities, assuming full responsibility for the project and recovering the investment costs through collection of usage fees.

Source: EMRC, 2008

Table 6: Classification of Public Private Sector Project Types

Public sector ← Responsibility to recover investment cost → Private sector					
Classification	Public Project	Public–private partnership (third sector)			Private project
		BOT	BOOT (DBFO)	BOO	
Orderer(permit –issuing authority	Government	Government	Government	Government/privates sector	Private sector
Finance	Government	Joint investment by the government and the private sector	Private sector	Private sector	Private sector
Design	Government	Private sector	Private sector	Private sector	Private sector
Build	Government	Private sector	Private sector	Private sector	Private sector
Operate	Government	Private sector	Private sector	Private sector	Private sector
Ownership	Government	Transfer of ownership to the government after operation	Transfer of ownership to the government after operation	Private sector	Private sector

Source: Seong Ung HONG, "Economic of Social Overhead Capital'' 2006

RECOMMENDATIONS

Recommendations towards the implementation of Intelligent Transport System through Public Private Partnership in urban bus operation in Sub-Saharan African cities are:

i) Urban Bus Transport Reform

The implementation of Intelligent Transport System cannot be a substitute to an improved bus transport system. Apart from few Sub-Saharan African cities, the urban transport system are fraught with a lot of challenges ranging from weak institution, revenue leakages, poor management, poor infrastructure, lack of subsidy to support

operations amongst others. Reforms that would drive efficiency in operations and management are pre-requisite to attracting private sector participation in the investment of urban bus infrastructure comprising Intelligent Transport System. The informal urban bus sector is dominated by Workers' Association and Owners' Associations.

Areas where reform would be needed entails the professionalization of the informal sector through capacity building and management restructuring, route franchising management, establishments of Transport Authority and Institutions for the regulations of urban bus system, establishment of Road Transport Funds to make funds accessible to private sector investors in urban transport at lower interest rates etc.

The adoption of Public Private Partnership is an approach that would assist the Sub-Saharan African cities to implement Intelligent Transport System for urban bus operations. Though there are no direct financial benefits to the governments, yet, it is the government's responsibilities to ensure that urban bus users have reliable travel experience, and that the concessionaire that run the urban bus operations are able to sustain and maintain their operations to the public through the provision of transport infrastructure considering that urban transport services are social services.

ii) Private Sector Participation in Intelligent Transport System

There are paucity of funds in the Sub-Saharan Africa, and in the same vein, many infrastructure projects are competing for the meager funds. As a result, budgets for capital projects are usually low whilst the chunks of the budgets are devoted to running recurrent expenditures. In the light of these, one of the ways to develop transport infrastructures like Intelligent Transport System is the involvement of private sector. In developed countries, urban transport operation is viewed as social services. Therefore, the governments of such countries are by law made to subsidize transport operations and invest on infrastructures. Since there are various Private Public Partnership options, participation in the implementation of Intelligent Transport System should follow the framework as shown in table 7. It is therefore imperative that various governments of Sub-Saharan governments evaluate the options that would best suite their country needs.

iii) Country Transport policy

The national Transport Policy of any nation is what dictates the direction for development and objectives of the transport system of the country. It is from such policy that the National Transport Master Plan that spells out investment plans and priority of the government is derived. Without a transport policy, transport investment programmes would remain obscure to private investors. Private sector would not be able to determine the type of transport projects that are in the government priority lists and the government would not be able to set investment objectives without the transport policy and the transport Master Plans to guide private sector participations.

I. Public Private Partnership Policy

The Public Private Partnership Policy is what would define the broad based objectives and the specific objectives of any Public Private Partnership options in any country. Investments through Public Private Partnership are mis-applied without defining from the onset the broad based and specific objectives of Public Private Partnership. For private sector participation in the investment on Intelligent Transport System, the broad-based objectives could be to: i) improve urban travellers' experience, ii) implement a reliable transport urban transport system with optimum returns through revenue protection to sustain operations iii) Effective control of field operations amongst others. The specific objectives could be i) Enhance fleet operations, ii) introduction of electronic ticketing to eradicate manual ticketing and associated revenue leakages, iii) Enhanced travel information amongst others. When these objectives are clearly defined to the understanding of participating stakeholders, a sustainable platform could be built for Public Private Partnership. As part of the PPP policy, an SPC (Special Purpose Vehicle) should also be established to coordinate and work with participating private sectors to guarantee revenue protection and cost recovery.

II. Legal Framework

There are complexity in the initiation, design and implementation of Public Private Partnership contracts. There are risks sharing and allocations to the participating stakeholders comprising the public, private sector and or the funding institutions.

Therefore, a legal framework would be required to draw the confidence of all the various stakeholders in the implementation of Public Private Partnership programmes. The legal framework will involve the establishment of a Public Private Partnership Office with a team of experts that would handle the negotiations and implementations of PPP projects.

Table7: PPP Framework

PUBLIC SECTOR	PRIVATE SECTOR		
	ITS VENDOR	**BUS OPERATOR**	**SPECIAL PURPOSE VEHICLE (SPV)**
Set legal framework	Acquire ITS equipment	Recoup cost of equipment through box fare and advertisement	Share revenue and risks between participating stakeholders
Initiate ITS project	Operate and Maintain ITS system		
Procure design and specifications consultants	Recovery of equipment cost through SPV		
Advertise the procurement process			
Procure supply and installation contract			

III. Political Championship

For any Public Private Partnership to strive in Sub-Saharan African cities, there has to be political consistency and championship. There have been cases where successive government did not respect agreement that were entered into with previous government. In such circumstances, Private investors' funds were jeopardized, confidence was lost and infrastructure developments were terminated prematurely.

VI. Collaboration with Transport Regional Bodies and Policy Makers

There are transport regional bodies like UATP (Association for Public Transport in Africa), Owners' Transport Unions, Workers' Transport Unions playing different roles affecting transport policy and investments in Sub-Saharan African. Involvement of transport bodies and policy makers would create room for Public Private Sector synergy and partnership.

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