Analyzing the Use of Output-Based Aid (OBA) in Urban Transport

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Final report

The Global Partnership on Output-Based Aid

This report is the final output of a study conducted by a consortium led by Nodalis Conseil, and including Setec International and Setec ITS. It was commissioned by the International Bank for Reconstruction and Development and funded by the Global Partnership on Output-Based Aid.

This report and the recommendations it makes solely reflect the conclusions and views of its authors and of the consortium led by Nodalis Conseil. Nothing in it should be construed as representing the views or recommendations of the World Bank Group, its staff, or the Global Partnership on Output-Based Aid.

The study also produced draft OBA project concept notes for the cities of Thimphu, Dakar and Addis Ababa.

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Note on the data: All monetary amounts are in U.S. dollars unless otherwise specified.

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Acronyms and abbreviations

AFC	Automated Fare Collection
AFD	Agence Française de Développement (French Agency for Development)
AFTU	Association de Financement des professionnels du Transport Urbain (Sénégal)
BRT	Bus Rapid Transit
CAPEX	Capital Expenditure
CETUD	Conseil Exécutif des Transports Urbains de Dakar
DLI	Disbursement-Linked Indicator
DDD	Dakar Dem Dikk
ETB	Ethiopian Birr
ERR	Economic rate of return
FCFA	Franc CFA
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GPOBA	Global Partnership on Output Based Aid
GoE	Government of Ethiopia
GPRS	General Packet Radio Service
IBRD	International Bank for Reconstruction and Development
ICT	Information & Communication Technology
IDA	International Development Association
IRR	Internal Rate Of Return
ITS	Intelligent transport solutions
IVA	Independent Verification Agent

LRT	Light Rail Transit
M&E	Monitoring & Evaluation
MENA	Middle East and North Africa
MIS	Management Information System
MPI	Multidimensional Poverty Index
NFC	Near Field Communication
NHR	National Household Registry
Nu	Ngultrum (Buthan's currency)
OBA	Output Based Aid
OCPF	Opportunity Cost of Public Funds
OPEX	Operating Expenditure
PAD	Project Appraisal Document
PCN	Project Concept Note
PID	Project Identification Document
PforR	Program-for-Results Financing
PSNP	Productive Safety Net Project
PSA	Public Service Agreement
PTA	Public Transport Authority
PTB	Petit Train de Banlieue (Dakar)
PW	Public Works
RBF	Results-based financing
RTB	Road and Transport Bureau
SDSL	Symmetric Digital Subscriber Line
TOD	Transit-Oriented Development
TPG	Transports publics genevois

UPSNP	Urban Productive Safety Net Project
WB	World Bank
WTP	Willingness to Pay

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A. EXECUTIVE SUMMARY

This report discusses the applicability of output-based aid (OBA) to the urban transport sector in cities of developing and emerging countries, and draws recommendations for the design of OBA-financed projects – and, more broadly, of output-oriented pro-poor projects – that address the issues that typically affect the sector.

Urban transport in developing and emerging countries often suffers from strong inefficiencies and an ineffective use of subsidies. Because the OBA approach focuses on mechanisms that incentivize a more effective and efficient use of public funding, it has the potential to bring much needed improvements.

However, the specificities of urban transport are such that they require taking a step back from how OBA operations have been designed in other sectors, and build urban transport OBA concepts by focusing on the logics and final objectives of OBA principles rather than trying to transpose the step-by-step identification and preparation methodologies used elsewhere.

We summarize below the key take-aways from this exercise.

Maximising pro-poor impacts often needs to take precedence to narrow targeting

The classic approach of focusing on reducing inclusion and exclusion errors when targeting the poor has shortcomings that are amplified in the case of urban transport:

- The implementation cost of narrow individual targeting can be very high in proportion to the contemplated subsidy, which would not make sense;
- Reaching the poor with a grant does not necessarily mean solving the primary problems they face (for example: a subsidy to take the bus makes no sense if all buses are already overcrowded);
- The poor's mobility barriers can usually not be addressed without modifying the overall sector equilibrium, thus requiring that they be considered within the wider scope of the sector's structure and challenges.

For these reasons, targeting should be, like other project aspects, focused on maximizing the project's pro-poor impact. This can be achieved by:

- First, identifying precisely what are the main transport-related barriers preventing the poor from accessing essential services and economic opportunities (affordability of motorized transport, availability of supply – generally or in specific locations, physical access, comfort, information…),
- Second, designing efficient and effective ways to help overcome these barriers.

The approach to financial sustainability needs to go beyond cost recovery at the operator's level

Almost everywhere in the world, publicly-provided or regulated urban public transport is subsidized in one way or another. This may be due to a variety of reasons and more or less effective policy decisions, but as a principle makes sense on economic optimality grounds

(internalizing positive and negative externalities, increasing returns to scale, etc.). This means that the "classic" OBA approach of ensuring project financial sustainability through adequate user charges cannot always be possible. Instead, OBA projects can have better impact on sustainability by incentivizing institutional reforms that will increase the financial autonomy of the transport service, such as contractualizing subsidies against clear public service obligations.

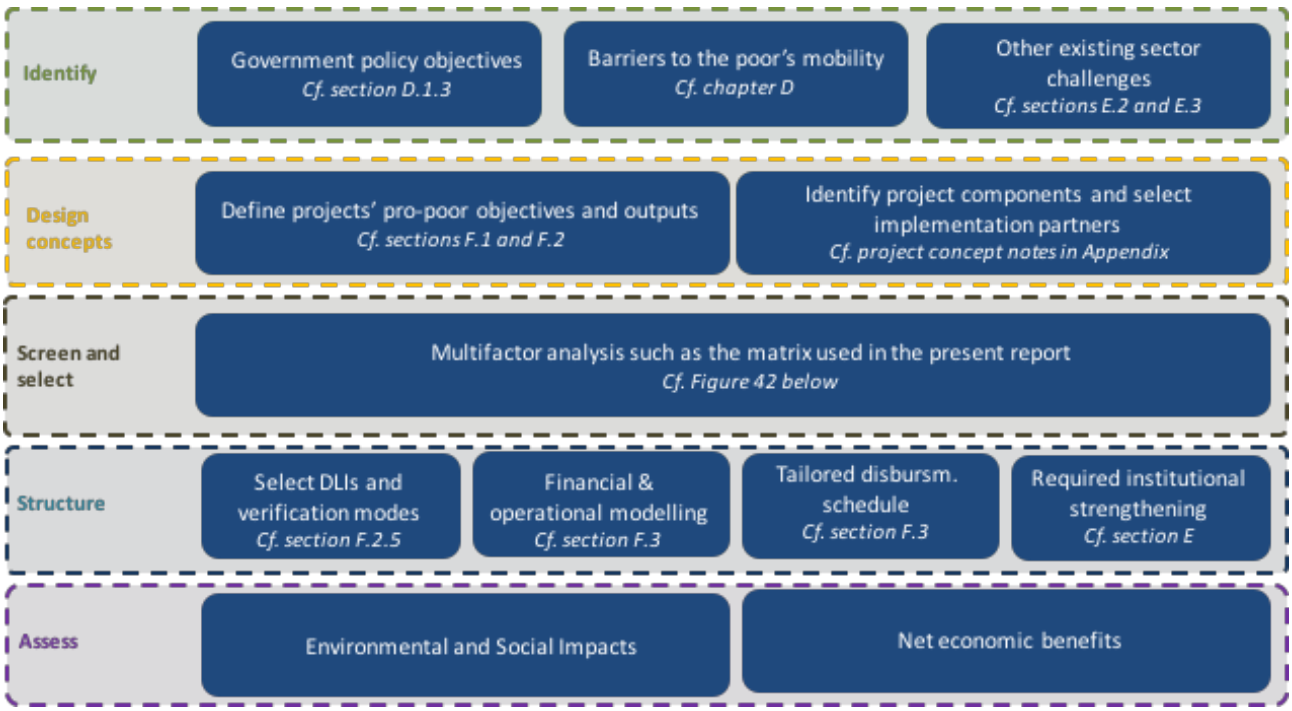
Output monitoring may require rolling out ICT systems, with potentially large co-benefits in terms of service efficiency and quality

As much of the effectiveness of OBA comes from the idea of verifying outputs rather than inputs, and because marginal costs of increasing service maybe be higher than marginal income, when possible it is preferable in urban transport to use service-based DLIs (for example, bus-km supplied or capacity available at peak) rather than investment DLIs (for example, number of buses purchased). In urban transport, measuring such outputs requires to have a system that monitors operations closely. This is normally quite acceptable to operators, because it also offers them substantial advantages for their own management purposes.

"Light" Fare Collection Systems and Fleet Monitoring Systems, smartphone-based and supported by even patchy 3G or 4G network coverage have been flourishing lately thanks to their low cost and service-based implementation models. OBA projects are a good opportunity to foster the development of these technologies.

Roadmap for OBA project identification and preparation in urban transport

Based on the identification and concept-level design of three pilot OBA projects, this report draws a general roadmap for the identification and preparation of urban transport OBA projects, as illustrated in the diagram below, where each block refers to a specific section of this report for "how-to" recommendations:



The wide variety of pre-existing contexts and possible interventions requires specific analysis and original design in each case, making it impossible to represent the first three steps (identify – design concepts – screen and select) on a mechanistic decision tree. However, the above roadmap can be further detailed as follows.

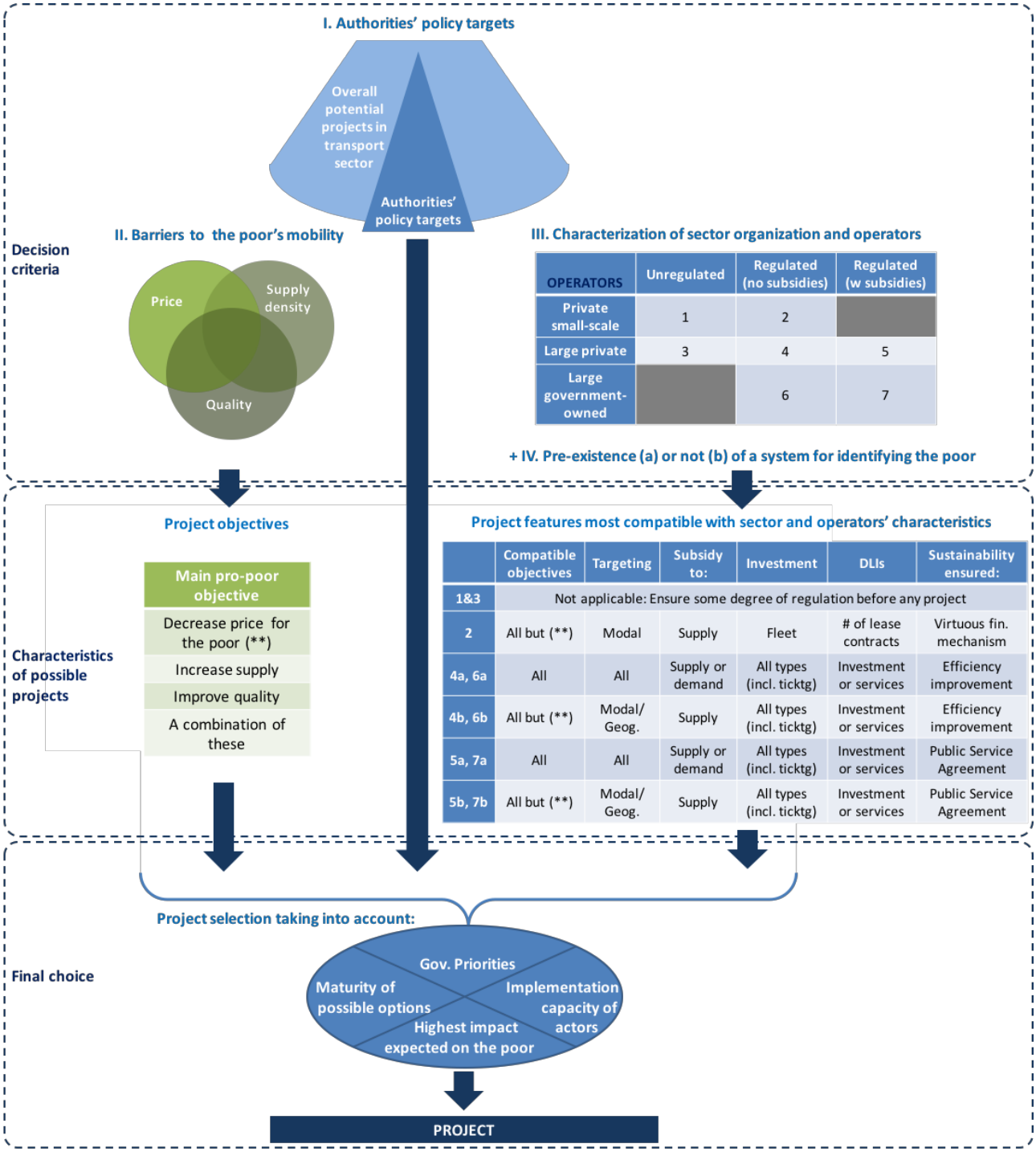
Three parallel processes need to take place:

- Identifying, among all possible interventions in public transport, what the authorities' policy targets are;

- Identifying, through quantitative analysis, which barriers to mobility prevent the poor from accessing essential services and economic opportunities, from which one can derive a project objective;

- Identifying which project features are compatible with key characteristics of service providers (on one hand, small-scale private, system-wide private or system-wide public; on the other hand, regulated or unregulated, subsidized or not).

Crossing the results of these three identification processes through a multi-criteria analysis (of which we provide examples in Appendix 4) allows for the selection of the urban transport OBA concepts most likely to succeed in a given environment. The figure on the next page represents this approach.



OPERATORS	Unregulated	Regulated (no subsidies)	Regulated (w subsidies)
Private small-scale	1	2	
Large private	3	4	5
Large government-owned		6	7

	Compatible objectives	Targeting	Subsidy to:	Investment	DLIs	Sustainability ensured:
1&3	Not applicable: Ensure some degree of regulation before any project					
2	All but (**)	Modal	Supply	Fleet	# of lease contracts	Virtuous fin. mechanism
4a, 6a	All	All	Supply or demand	All types (incl. ticktg)	Investment or services	Efficiency improvement
4b, 6b	All but (**)	Modal/ Geog.	Supply	All types (incl. ticktg)	Investment or services	Efficiency improvement
5a, 7a	All	All	Supply or demand	All types (incl. ticktg)	Investment or services	Public Service Agreement
5b, 7b	All but (**)	Modal/ Geog.	Supply	All types (incl. ticktg)	Investment or services	Public Service Agreement

B. INTRODUCTION

Context

Increasing access to basic infrastructure and social services is critical to reducing poverty and achieving economic development. However, increasing access is a challenge because of the gap between user fees and the cost of delivering the desired level of service. Output-based aid (OBA) is a form of results-based financing (RBF) that is designed to enhance access to and delivery of basic services, such as water and sanitation, through the use of performance-based subsidies to fill this gap. OBA links the payment of aid to the delivery of specific services or "outputs," which are verified by an independent verification agent prior to subsidy disbursement. The subsidy is explicitly targeted to the poor, for example by focusing on areas in which poor people live.

The Global Partnership on Output Based Aid (GPOBA) is a partnership of donors and international organizations working together to support OBA approaches. It was established in 2003 as a multi-donor trust fund administered by the World Bank. GPOBA's mandate is to fund, design, demonstrate and document OBA approaches to improve delivery of basic infrastructure and social services to the poor in developing countries. Through a portfolio of 38 projects with US$164 million in subsidy funding and ongoing technical assistance activities (as of 2015), GPOBA is demonstrating that OBA can deliver a diverse range of services and sustainable results for the poor. Altogether, GPOBA-funded pilot projects have reached over 6 million beneficiaries.

As the use of OBA schemes has proven to be successful to extend the access to basic services and improve the living conditions of the poor, donors are interested in extending the use of OBA to new and less tested sectors. Technical assistance and a global study have been carried out for solid waste management, leading to the implementation of a few pilot projects in this sector. Additional global studies are being considered or carried out in other sectors such as irrigation and education, to analyze the feasibility of using OBA schemes and develop pilot projects. In the same context, donors expressed interest in exploring the use of OBA schemes for urban transport, which has been the focus of the study that this report concludes .

Beyond OBA projects defined in the stricter sense, this study also makes recommendations on how to identify and design pro-poor, output-oriented projects in urban transport.

Study objectives

The objectives of the study were twofold:

- Preparing OBA pilot projects in three cities, while developing the conceptual framework required to apply OBA's principles to urban transport (learning-by-doing approach);
- Identifying and highlighting the lessons learnt from these pilot projects in order to foster future replicability of OBA projects in urban transport.

Previous steps of the study

The approach retained for the study is one of « learning by doing », where the preparation of actual projects constitutes the ground for more general, conceptual analysis and drawing lessons learnt regarding applying OBA to urban transport.

Accordingly, two prior phases of the study lead up to this report:

- A scoping phase during which:
  - The consultant laid out a conceptual framework for OBA projects in urban transport;
  - Based on a series of criteria including technical, institutional and political aspects, the consultant established a longlist of cities where OBA projects could be of interest in the short to medium term;
  - Through preliminary research and exchanges with stakeholders, the longlist was narrowed down to two cities, Addis Ababa and Dakar;
  - Thimphu, capital city of Bhutan, was selected as a third pilot city due both to its characteristics that were complementary t Addis Ababa and Dakar, and to the fact that an OBA project in urban transport was already under preparation (which allowed the study to consider issues that appear only post-concept stage in the project cycle).
- A project identification phase during which:
  - The consultant carried out two missions to each pilot city and met with all stakeholders;
  - In the first series of field missions, the consultant identified a shortlist of potential in Dakar and Addis Ababa, and contributed to project preparation in Thimphu;
  - Local authorities in Dakar and Addis Ababa, with support from the consultant, have each selected one final project concept, and the consultant provided inputs into the final Project Concept Note for Thimphu;
  - Based on the local authorities' stated objectives and preferred project options, the consultant prepared concept notes for Dakar and Addis Ababa;

Presentations of the city selection and project selection processes can be found in Appendix 4.

Content of the present report

The present final study report presents the lessons learnt from the above phases, drawing recommendations for using OBA in Urban Transport, both from conceptual and practical standpoints.

The report concludes with recommended key steps for the preparation of successful urban transport OBA projects, and outlines an OBA project preparation roadmap.

C. THEORETICAL AND ANALYTICAL FRAMEWORK

A global review of urban transport policies reveals that this sector is most of the time subsidized, through different modalities (investment subsidies, operating subsidies to operators, subsidies to users…).

There are economic and social considerations that can justify these subsidies, in particular for collective transport modes:

- Due to increasing returns to scale and club effects, the free market equilibrium (which leads to marginal cost pricing) does not result in an economically optimal level of supply;
- Positive externalities (additional activities allowed by proximity) and negative externalities (noise, pollution, congestion, etc.) are not taken into account by economic actors, hence the authorities have to intervene to reward positive externalities and penalize negative ones;
- Giving the poor access to economic opportunities in the city can be considered to be a policy priority, which requires supporting cheap transport so that they can afford to move around.

However, subsidizing transport can have disruptive effects: if operators receive gap funding without a corresponding obligation to produce additional or better services, the subsidy becomes captured by particular interests and functions in practice as a disincentive to productivity and/or quality.

Therefore, institutional choices (contractual vs. regulation-only relationships between transport authorities and operators, attitude towards non-regulated small-scale operators, mandate and means of the transport authorities, etc.) play a key role in the performance of the transport sector.

Because OBA principles aim at introducing pro-poor subsidies while at the same time limiting the potential perverse effects of these subsidies, they should be, at face value, a very relevant tool for the improvement of urban transport services in emerging and developing countries.

C.1. GENERAL CONSIDERATIONS ON URBAN TRANSPORT POLICY INTERVENTIONS

C.1.1. Defining an urban transport subsidy policy

Levels and forms of urban transport subsidies

A global review of urban transport subsidies reveals a great variety of forms of subsidy according to their objectives, terms, recipients and beneficiaries, including:

- Supply-side investment subsidies (CAPEX subsidies) for part or full funding of infrastructure, fixed equipment or rolling stock;

- Supply-side operating subsidies (OPEX subsidies) such as subsidies paid to operators per unit of service produced; balancing subsidies to cover losses from below-cost fares; contributions to certain costs; and tax exemptions, particularly on fuel for road-transport operators;

- Demand-side (user) subsidies such as those paid per consumed unit of a good or service: fuel-related subsidies in the case of individual transport (whether tax exemptions or price subsidies); full or partial coverage of employees' transport costs imposed on employers; subsidized fares for all or certain categories of passengers.

Intervention by the public authorities is not necessarily financial. They can also act by implementing regulations that lead to a public-transport monopoly, or price regulations (such as the price of fuel in some countries).

General impact of a given subsidy level

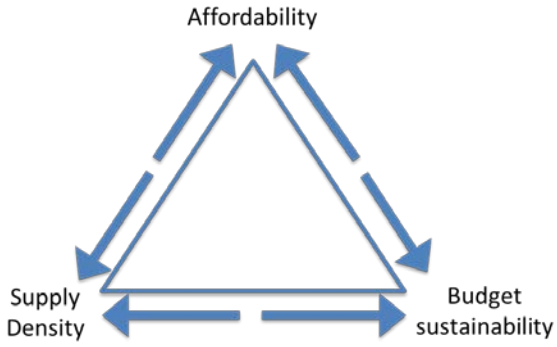
Assuming near-constant efficiency of operators, public transport policies can be understood through three main objectives which conflict with each other in pairs:

- Affordability, i.e. the cost of transport in relation to users' income

- Supply density (quality and quantity)

- Budget sustainability for the authorities

Figure 1: Equilibrium of supply and demand in the presence



of externalities - Setec International

For example, making transport more affordable (i.e. lowering fares) without injecting more public funds into the system, all other things remaining equal (in particular cost efficiency), requires reducing supply so that the resulting reduction in income is matched by a resulting reduction in costs. Moreover, increasing supply or improving its quality without additional subsidies requires increasing fares (assuming that the departure situation is an equilibrium, i.e. the marginal profit from increasing supply without changing unit fares is zero).

Implementing an additional subsidy therefore results in a shift of the overall equilibrium towards increased affordability, increased supply density (quantity of supply), or a little bit of both:

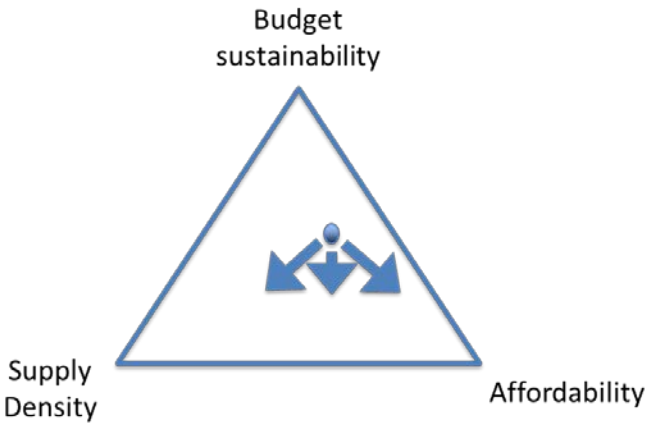


Figure 2 – Shifting the policy's point of equilibrium

This approach assumes that other sector characteristics, in particular the efficiency of operators, remain unchanged when the level of subsidies varies. However, as explained further below, operator efifciency may vary depending on the manner in which such subsidies are provided.

C.1.2. Micro-economic rationales of urban transport subsidies

Micro-economic rationales justifying subsidies to urban transport are usually based on the existence of increasing returns to scale and of urban transport-induced positive externalities. These effects distort the micro-economic equilibrium, which does not occur at the optimal level of supply. Subsidies (or taxation) are required to fully or partially restore this optimal equilibrium.

Increasing returns, "Mohring effect" and coverage effects

Increasing returns are one of the usual rationales for public financial intervention. Such increasing returns, particularly for urban public transport, are due:

- to the fact that there is a high share of fixed costs (mostly infrastructure), which increase with capacity,
- to a club effect called the "Mohring effect",
- to a coverage effect whereby a service on any given line (or at a given time) will increase ridership on others lines (respectively at other times).

Increasing returns

One of the bases of economic theory is that, under certain conditions, adjustments in the price of a good or service (which reaches marginal cost, i.e. the cost of producing one additional unit of it) will allow for its supply and demand levels to equalize at the economically optimal quantity level.

However, in the presence of private increasing returns, i.e. when the cost function has a high share of fixed costs, this marginal-cost pricing (which corresponds to the optimal quantity of supply and demand) is not viable because it means losses for the operator. Hence, subsidies are

used to allow the operator to actually perform marginal-cost pricing, with the associated level of supply.

However, this typical rationale for subsidies has several limits:

- It does not apply to bus transport, which cannot validly be considered to have a cost function that creates increasing returns;

- It is hard to defend in large developed cities, where the existing system is already extensive and often saturated, which technically and financially constrains its expansion and the possible decisions regarding "marginal equipment".

The hypothesis of increasing returns is therefore chiefly valid for cities where the transport system is growing but not saturated, and for infrastructure-intensive modes.

Mohring effect

The Mohring effect may occur as follows: when, for a given trip, an operator quantitatively increases the means of transportation (buses, for example, but also rail vehicles) in order to meet demand, service frequency also rises, making it more beneficial for all users to use these means of transport (because waiting time is shorter). This is a sort of club effect through an intermediary operator.

Mohring (1972), then Jansson (1979), concluded that this effect justified the subsidising of urban public transport because private operators, in the absence of subsidies, would have a rational interest in running buses less frequently. The increasing return here comes from reducing the cost borne by the user (time cost). Yet the argument of Mohring and Jansson, based essentially on micro-economic modelling, is subject to debate. If the marginal increase in traffic causes an increase in frequency, it produces a benefit for the existing users. But it all depends on the operator's reaction: if he keeps supply unchanged, there is no impact.

The "Mohring effect" rationale for subsidies, induced by urban public transport, must be put in perspective and imperatively take into account the trade-off between the frequency of service and the unit capacity of vehicles. This trade-off is a major subject in a context of cohabitation between formal and small-business transport in some developing cities (the partial or total elimination of subsidies to the formal carrier would increase the market share of small-business vehicles, which operate at higher frequency thanks to low salary costs).

Coverage effects

Spatial coverage effects, when a line is not in itself profitable but feeds other profitable parts of the system, justify subsidies in a competitive market. In an uncompetitive market they take the form of equalisation effects: financial support provided should amount to cross subsidies from profitable modes/parts to non-profitable ones.

Spatial coverage effects can justify subsidies in a competitive market when a line is not profitable in itself but feeds other profitable parts of the system. In an uncompetitive market they act like equalisation effects: financial support provided should amount to cross subsidies from profitable modes/parts to non-profitable ones.

The same applies to the effects of time coverage. These may also justify subsidies in a competitive market: to keep public transport attractive during off-peak periods, it is necessary to implement a minimum frequency level, which will probably be higher than the one required only to cover demand during these less busy periods.

Likewise, in the case of a competitive market without equalisation, the introduction of fare integration across a whole public transport system, with multiple operators, can be considered as a rationale for public subsidies: the development of intermodality in particular requires fare harmonisation (a single ticket for all modes, ticket validity for one hour's travel, etc.), which induces price drops for each participating operator. As the traffic induced by this enhanced system coordination does not generally offset revenue losses, subsidies become necessary.

Internalisation of positive and negative externalities

Identifying externalities

Urban transport, whether individual or collective, generates positive and negative impacts on the overall economic welfare of the city which are not captured directly by the costs paid by the users and producers. Such externalities go beyond the increasing return effects identified in the previous section, which affect directly the cost functions of users and producers, and impact other actors of the economy.

Positive externalities include:

- Agglomeration effects: gain in GDP enabled by a reduction in the commute time between home and workplace, as well as between workstations, thanks to an improvement in the transport networks;
- Restructuring effects on the labour markets: return to work of some people due to variations in the generalised costs of transport, and productivity gains generated when individuals decide to change jobs, favouring areas where productivity is higher;
- Cost savings for public services and utilities related to better land use;
- Other effects: facilitated knowledge sharing and education, higher attractiveness of the city as compared to others, etc.

Negative externalities include:

- Environmental costs: noise, CO_2 and other GHG emissions, particle emissions and other local pollution, threats to wildlife, destruction of landscape and heritage, use of space, vibrations;
- Social costs for neighbouring dwellers: health, severance effects, reduction in quality of life;
- Economic costs: safety (accidents, police), congestion, maintenance and repairs of infrastructure.

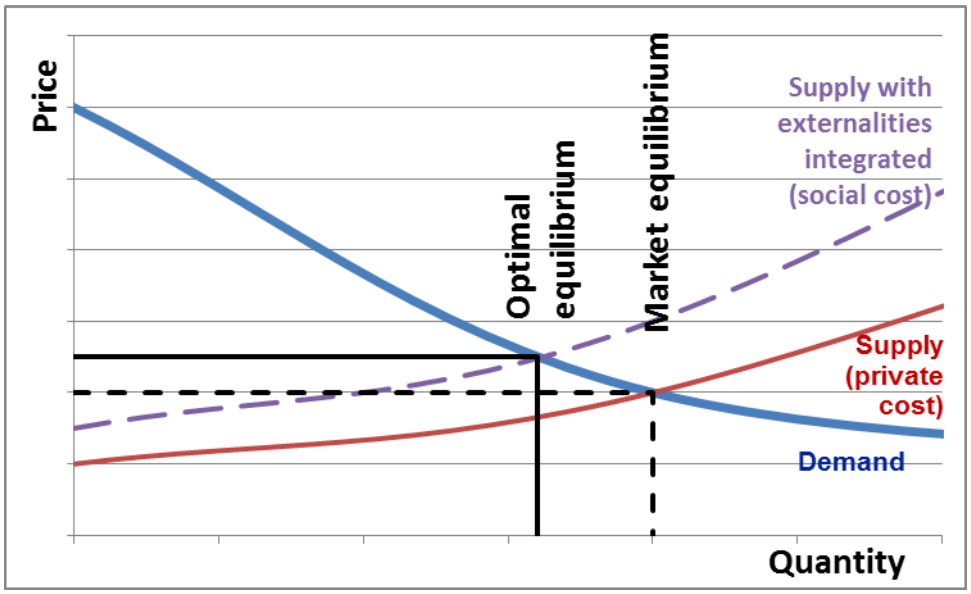


Figure 3: Equilibrium of supply and demand in the presence of positive externalities - Setec International

Correcting prices to take these externalities into account

The search for the optimal supply-and-demand equilibrium requires these effects to be internalised through a price-correction process. In theory, therefore, negative effects should be taxed and positive ones should be subsidised.

However, taxation of negative externalities is often politically difficult to implement. In particular, individual urban transport generates a high level of negative externalities (especially congestion and the resulting greenhouse-gas emissions and pollution). The most economically viable solution to this issue would be to tax it, in order to internalise these costs to collective welfare. However, applying this theory often encounters acceptability barriers within the population, which must be considered in the decision-making process.

For this reason, policies often focus, as a second-best option, on subsidizing modes that present comparatively more positive and less negative externalities, i.e. high-capacity formal collective transport. Policies are therefore rather geared towards limited taxation of individual transport (road pricing, for example) and broad-based subsidization of collective transport, in particular in developed cities. But this model, rooted in the theory of welfare economics, is difficult to implement by the book.

However, the increase of the costs of private car uses compared to collective modes can have a very limited impact on consumers' behaviours, as the price-elasticity of public transport[1] for car users is often very low.

[1] Toner 1993, Wardman 1997, Paulley et al 2004, Litman 2015.

Dynamic impacts of transport policies on the urban form: taking into account future externalities

One aspect to be taken into account in the long run is the impact of transport on the urban form, which in turn is associated with the externalities generated by future transport activities. This notion is associated with a growing objective for parts of civil society and the political class: achieving sustainable urban development that is energy-efficient and produces less greenhouse gas, which is best achieved through more compact cities.

Does the promotion of public transport favour a more compact city? On the contrary, what if subsidising public transport distorts the decisions of people and businesses to settle in the city, and what if it actually encourages urban sprawl, and the segregation of activities, by reducing the economic obstacle of transport?

Whereas the heavy implicit subsidies to individual modes of transport observed in many cities of the world are thought to result in inefficient urban sprawl, there is a growing trend in favour of "transit-oriented development" (TOD), which, by encouraging public transport investments in cities, is thought to enable high densities to exist around high-capacity transport corridors. In this concept, and contrary to an idea that is widely held, it is not primarily the promotion of public transport that creates compactness: it is primarily a land policy encouraging density around a corridor, through building rights made available, land assembly and subdivision, revised zoning and well-adapted infrastructures and facilities. Counting on transport policy alone to change the density of the conurbation would be inefficient and expensive. Public transport is only a technical means of enabling such densities to exist. Indeed, individual modes of transport occupy space in such a way that they do not enable a city to operate smoothly above a certain density.

Modern analyses such as those conducted by Glaeser, and illustrated for example by Bertaud (2002-1) consider that what determines the density of a city, is first and foremost land markets and the housing policy. Transport policies either facilitate or prevent the full realisation of agglomeration effects, and thus economic efficiency, in a given urban structure; but they only play a minor role in shaping this form itself. The promotion of a compact city, when it is still possible (see the lock-in considerations above), requires above all adequate land policies.

The low expansion rates of cities in the developed world suggest that urban transport subsidy policies have no real influence on urban sprawl. In the cities of emerging and developing countries, however, which are characterised by high growth rates, new neighbourhoods essentially organised around individual modes of transport spread quickly and widely over land that is currently inexpensive. This use of land can have very long-term effects. Current economic incentives for modal choices, which can have consequences for decades to come (land used by road infrastructure), take no account whatsoever of the much higher future value of the occupied land.

C.1.3. Main challenges to subsidizing urban transport

Financial balance of operators versus perverse incentive effects

When modal competition between individual transport and collective transport is distorted because external costs are not internalised, or when the public authorities, in order to meet access and social-equity objectives, impose excessively low fares, urban public transport

operators often suffer a recurrent financial imbalance that generally leads to public financial intervention.

But such a near-guaranteed support creates bias in decision-making and reduces the participants' pursuit or profitability improvements. This perverse effect then leads to economically suboptimal subsidy levels and subsidy terms, which sometimes the public finances cannot sustain. Savage (2004) has shown that the Chicago Transit Authority suffered long-lasting efficiency losses due to excessive subsidies in the 70s. Obeng (2009) shows, on a sample of US transport systems, that subsidies result on average in a 73% input increase (with a great variety of impacts, from near-zero to 220%), as part of the subsidies' "lumpsum" impact is wasted by losses in inefficiency and increased costs of inputs. Counterintuitively, he identifies empirically a stronger impact from operating subsidies than from capital subsidies.

Therefore, authorities have to find ways to reduce risk and optimally allocate subsidies on clear and credible terms, thus encouraging operators to be more efficient. Contractualized subsidy mechanisms that ensure operators and that are rewarded or penalized depending on their performance are part of the solution, as will be see later in this report.

Challenges in measuring externalities and therefore in quantifying the impact of subsidies

Some externalities are very difficult to evaluate, forecast and measure. While reference values are applied in developed countries for some externalities (noise nuisances, local nuisances, greenhouse-gas emissions, etc.), they are mostly not available in developing countries.

Economic benefits from agglomeration effects, in particular, are a key positive impact of transport projects. This externality has been estimated for the Crossrail project in London, and there is a growing body of work on the subject. However, such evaluations are complex and require data that is not readily available in developing countries, not only due to low level of statistics, but also to the fact that a large part of the economy is informal, hence very difficult to measure.

Economic costs of subsidies

The payment of public subsidies requires taking into account a specific externality, the opportunity cost of public funds (OCPF). Generally funded by taxes, public subsidies induce a loss of efficiency related to the cost of public resources: a certain amount levied as tax has a negative effect on collective welfare that is greater than the nominal amount. According to studies done in France, one euro of "average tax" costs about 1.3 euros, i.e. a subsidy of X euros corresponds to a loss of collective surplus of 0.3 euros. The impact of the subsidy therefore has to present an advantage greater than this loss in order to be justified. It is likely that the OCPF is even greater in developing countries.

C.1.4. Non-subsidy policy choices

As highlighted, incentive effects are key to the performance of the sector. This underlines the necessity for the authorities to both:

- set a virtuous institutional system where operators with good performance, both in terms of service level and of limiting negative externalities, are rewarded (it can be through contractualization of services from both major regulated operators and small-scale non-regulated ones, associated or not with competitive tenders for new or existing operators, through better policing, etc.),

- when implementing complex sector transformations, take proper account of the existing situation, in which existing operators are usually reluctant to change out of fear for their financial equilibrium.

Given the complexity of the above, adequately regulating the sector and implementing significant reforms requires the existence of a dedicated Transport Authority with appropriate mandate and capacity (both in financial and technical terms).

C.2. POVERTY, AFFORDABILITY OF TRANSPORT AND ACCESS TO ECONOMIC OPPORTUNITIES

C.2.1. Social equity and access to opportunities (jobs, services…) – the cost of transport

Mobility is sometimes presented as a primary good[2] in the sense of Rawls[3], i.e. a good to which access is considered a fundamental right and must therefore be guaranteed by the public authorities. Above all, transport is an intermediate good, necessary to gain access to most activities, goods and services: work, education, culture, health, leisure and community life.

This creates a responsibility for the public authorities who must facilitate the mobility of various categories of people without socio-economic, geographical or physical segregation.[4]

Therefore, a common rationale for public transport subsidies is the need to make transportation affordable for the poorest, by limiting its cost. This notion of affordability is very present in the literature. But subsidising transport is not necessarily the most efficient way to reduce poverty: there can be more efficient or easier ways, such as direct payments of allowances[5] to the poorest households, which can then use this money for their various needs, including transport. Nonetheless, if the goal is actually to improve the mobility of certain categories of people, such as women, children and the elderly, through affordable fares, transport subsidies may appear much more justifiable, provided that they do not generate major inefficiencies, that they are well targeted, and that they help redistribute incomes.

However, it is important to note that what defines the pro-poor impact of a policy is not only the subsidy amount allocated to the poor, but also whether the policy actually addresses the

[2] However, in developing countries, due to limited budgets, this right is often in competition with other primary goods: access to drinking water, access to electricity, education, a healthy diet, etc. The amount of effort that the public authorities put into transport thus depends very much on the context of each country.

[3] A Theory of Justice, John Rawls, 1971

[4] Regarding persons with reduced mobility, the measures are taken on a case-by-case basis through government actions (example in France, the SDA: transport accessibility guidelines) or by associations (example in Hong Kong of the HKSR: Hong Kong Society for Rehabilitation).

[5] In Chile, between 2004 and 2006, the rise in transport prices linked to the rise in the price of oil was offset, not by subsidies on fares, but by direct allowances to households, paid to nearly 40% of the population.

barriers that prevent the poor from using the service, and whether the policy's benefits will be retained by the poor over time:

- As with any project, a poorly designed scheme risks turning into a waste of resources. For example, a demand-side subsidy to a mode that is already overcrowded will have no impact if the operators do not have the capacity or incentives to increase the supply in order to serve the increased demand.

- A subsidy granted to an economic agent does not necessarily correctly represent the advantage that this agent will derive from the measure targeting him. The economic interdependencies at play between markets may transfer all or part of the advantage to other agents. For example, when transport is subsidized in favour of an area inhabited by low-income residents, it is likely that the advantage granted to the inhabitants of this area will lead to an increase in the area's land values: the inhabitants will move around more, but they will lose part of the benefit to the property owners.

These aspects will be addressed further in the report.

How should the degree of affordability of transport be defined for the poorest?

In many cases, the indicator chosen to measure affordability is the share of a poor household's monthly income dedicated to transport. It is compared to threshold values obtained from benchmarks, which range from 6% to 15% in the literature. However, as highlighted further in this report, this indicator may be difficult to analyse: it is possible that a very small share of the budget of the poorest households is dedicated to transport (and so remains below the limit of the benchmark) precisely because motorised transport is too expensive and so the primary mode of transport of poor households is walking, which restricts access to services and opportunities located in a small radius.

Another issue affecting the above measure is the trade-offs households tend to make between housing and transportation costs. The H+T index[6] seeks to address it by combining costs of housing and transportation (including with private vehicles). This is an interesting approach but we will not use it here, because it would be very complex to calculate the index accurately in developing cities (it is not relevant as a city-wide aggregate, but rather would need to be considered for different types of areas within cities), and because it would need to be adapted when considering only the poor.

When defining "discriminatory fares" in his landmark 1986 paper[7], Alan Armstrong-Wright states that "*A fare structure discriminates against low-income people when cost makes it impractical for them to use the transit system. One reasonable criterion is the cost of a week's transit fares for trips to work in comparison with the total weekly income of the household. If the cost exceeds 10% of income for more than 15% of the population, the fare structure can be considered to be discriminatory.*" It is therefore the comparison between price and income, not considering actual expenses, that allows quantifying affordability. This approach is useful in that it addresses directly the affordability issue and that it allows comparisons between conurbations. However this criterion has a shortcoming for the purpose of this study: it does not tell us what the fares represent in relation to the income of the 15% who may be unable to use

[6] http://htaindex.cnt.org/

[7] Urban Transit Systems - Guidelines for Examining Options; Alan Armstrong-Wright; World Bank technical papers; 1986

transport for commuting purposes but may still need it less frequently to access services and opportunities.

From the same perspective (comparison between price and income), but in an easier-to-use version, the indicator developed by Carruthers, Dick and Saurkar (2005) is based on the direct comparison between the cost required to take sixty 10-km trips by public transport[8] per month and per household, and the per-capita income. This indicator is calculated for the average population as well as for the poorest 20% (bottom quintile). It can be used for measuring the effects of a pricing policy, or be compared to other cities' indexes or to a reference value.

	City	Per Capita Income U$PPP	Bottom Quintile Income as Percent of Average	Fare for 10 km Travel (PPP U$cents)	Affordability Index	
					Average	Bottom Quintile
1	Bangkok	20,386	31.0%	32.2	1%	4%
2	Prague	32,757	52.0%	88.0	2%	4%
3	London	53,057	30.5%	116.4	2%	5%
4	Shanghai	20,814	30.0%	55.1	2%	6%
5	Cairo	7,117	43.0%	26.1	3%	6%
6	Budapest	22,106	50.0%	89.3	3%	6%
7	Beijing	14,379	30.0%	55.1	3%	9%
8	Seoul	16,784	40.0%	85.5	4%	9%
9	Singapore	38,797	25.0%	130.3	2%	10%
10	New York	51,739	27.0%	200.0	3%	10%
11	Los Angeles	42,483	27.0%	160.0	3%	10%
12	Chicago	483	7.0%	180.0	3%	10%
13	Warsaw	26,024	36.5%	142.5	4%	11%
14	Guangzhou	9,165	30.0%	55.1	4%	14%
15	Moscow	16,154	24.5%	84.6	4%	15%
16	Amsterdam	2,817	36.5%	223.3	6%	16%
17	Manila	9,757	27.0%	63.0	5%	17%
18	Krakow	15,579	36.5%	130.6	6%	17%
19	Mexico City	982	15.5%	39.3	3%	19%
20	Chennal	3,717	41.0%	39.3	8%	19%
21	Kuala Lumpur	18,351	22.0%	121.6	5%	22%
22	Mumbai	8,585	41.0%	112.2	9%	23%
23	Buenos Aires	15,493	15.5%	87.6	4%	26%
24	Cape Town	14,452	10.0%	75.8	4%	38%
25	Brasilia	12,985	10.0%	106.8	6%	59%
26	Rio de Janeiro	14,325	10.0%	125.4	6%	63%
27	Sao Paulo	8,732	10.0%	130.1	11%	107%

Figure 4: Transport affordability index – Source: Carruthers, Dick and Saurkar, 2005

The social rationale criteria: redistributive effects

A subsidy of a social nature follows a logic of reallocating resources from the rich to the poor. Assuming that the policy is merely a monetary transfer from some categories of income to others[9]:

- when the poor's financial situation is improved, the subsidy is said to be progressive,

[8] Sixty is an estimate of the number of trips necessary to carry out basic activities (work, school, healthcare and other social services) plus a few additional trips (family or urgent visits, etc.).

[9] This assumption does not take into account the opportunity cost of public funds (OCPF), discussed at the end of C.1.3 above.C.1.2

- when the rich are the ones benefiting, the subsidy is said to be regressive.

After ranking households from poorer to richer, and calculating the cumulative benefits for the poorest x% (x ranging for 1% to 100%), two indicators can be used to estimate the redistributive nature of the subsidy:

- For measuring the impact specifically on any given x% poorest of the population: the indicator Ω is the ratio between the % of cumulated benefits for this population and this x%. If greater than one, it means that the subsidy is progressive for this given x%.

- For an aggregate measure of the overall redistributive impact: the quasi-Gini coefficient corresponds to the area between the cumulative benefit curve and the first bisector (positive when above the bisector, negative when below), divided by the entire area below the bisector.

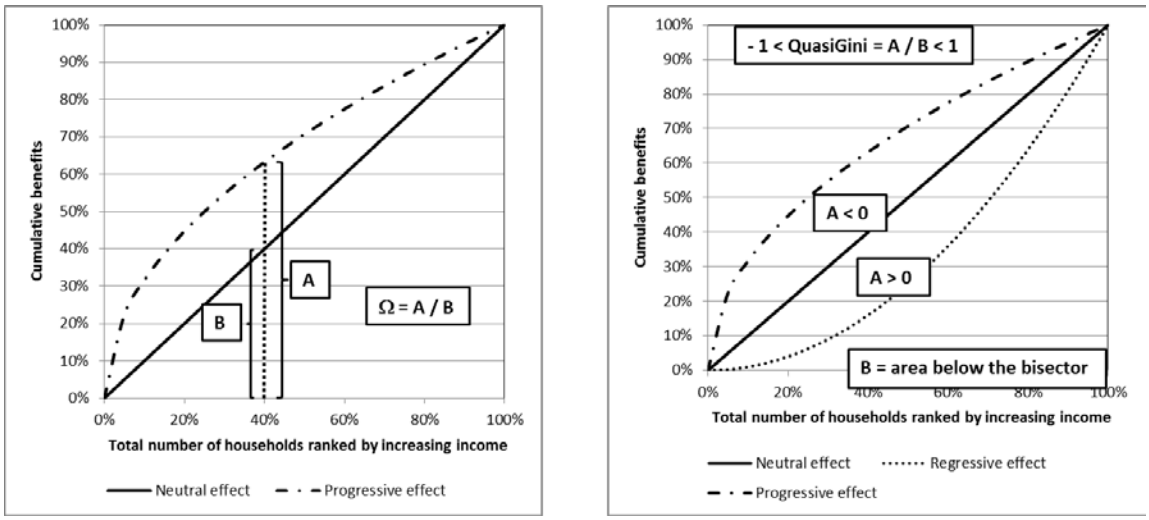


Figure 5: Indicators of redistributive effects: Ω and quasi-Gini – Source: Setec International

The social rationale criteria: targeting

In order to be progressive, the subsidy must effectively reach the poor. Hence the project/policy design should take into account a targeting mechanism that minimizes the following errors:

- Inclusion errors are the fact that non-poor can also benefit from pro-poor policy, either because:
  - the targeting mechanism misidentifies them for poor people, or
  - as a side effect of the policy.

- Exclusion errors are the fact that some poor will not benefit from a pro-poor policy, either because:

- the targeting mechanism fails to identify them as poor people or to include them in the targeted area/mode, or
- the policy may also, by design, leave some poor out of the target in order to concentrate on some of them.

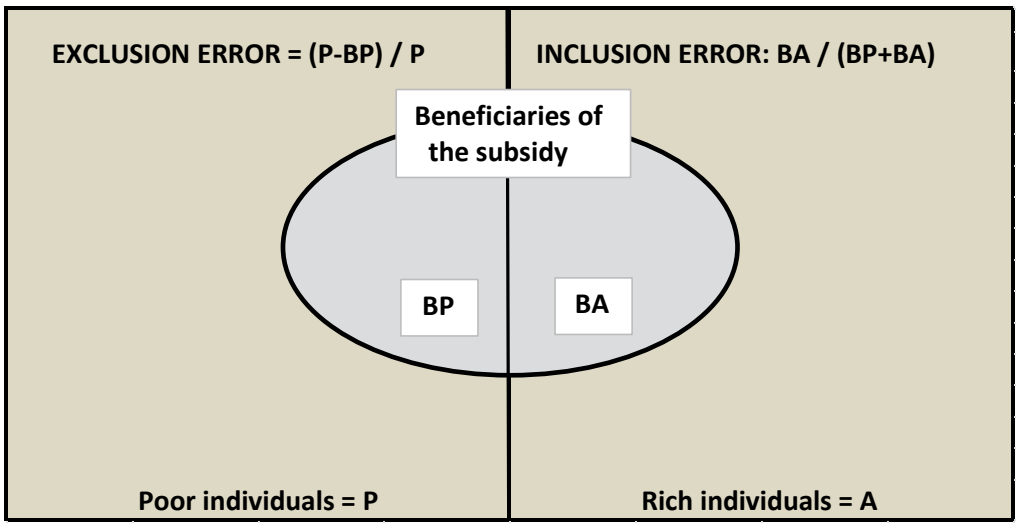


Figure 6: Exclusion error and inclusion error – Source: Setec International

	More gain than loss	More loss than gain
Poor	Desired effect of pro-poor project	Exclusion error
Non-poor	Inclusion error	Desired effect of pro-poor project

Type of impact:	Progressive	Regressive

Figure 7: Impact of policies per type of impacted person

Evidence on the social efficiency of Subsidies to Urban Public Transport

The 2007 World Bank policy research working paper "Affordability and Subsidies in Public Urban Transport: What Do We Mean, What Can Be Done?" by Estupiñan, Gomez-Lobo, Munoz-Raskin and Serebrisky, provides some data regarding subsidies and their social efficiency criteria in urban transport:

Year	City	Type of subsidy	Distributive effects: Ω	Distributive effects: QuasiGini	Exclusion error	Inclusion error
2006	Buenos Aires	Supply-side subsidy: train		0.06	68%	71%
2006	Buenos Aires	Supply-side subsidy: subway		0.48	92%	89%
2006	Buenos Aires	Supply-side subsidy: bus		0.20	60%	75%
2007	Mexico	Supply-side subsidy: subway	1.00		68%	52%
2007	Mexico	Supply-side subsidy: bus	1.14		68%	45%
2007	Mexico	Supply-side subsidy: trolleys	0.96		68%	54%
2007	Santiago, Chile	Student pass bus		-0.16	70%	51%
2007	Santiago, Chile	Student fare subway		0.13	97%	76%
2007	Santiago, Chile	Subway investment subsidy		0.27	89%	78%
2007	Santiago, Chile	Direct transfer to poor households		-0.34	52%	37%
2007	Mumbai	Supply-side subsidy: bus	0.72/0.83		10%	93%
2007	Mumbai	Supply -side subsidy: train	0.81/0.85		26%	86%

Figure 8: Redistributive nature and targeting of subsidies – quantitative approach

The results in the above table call for the following remarks and anecdotal explanations:

- In Buenos Aires, the operators of different modes have received direct subsidies since 2001-2002. Demand-side subsidies were not an option as they would have led to massive exclusion errors: the targeting would have had to be based on the social security system, and only 2 million of the 6 million poor people have access to it. The subsidy was shown in 2002 and 2006 to be mainly neutral or regressive, and worsening. The exclusion errors fell between 2002 and 2006, but at the same time the inclusion errors increased significantly.

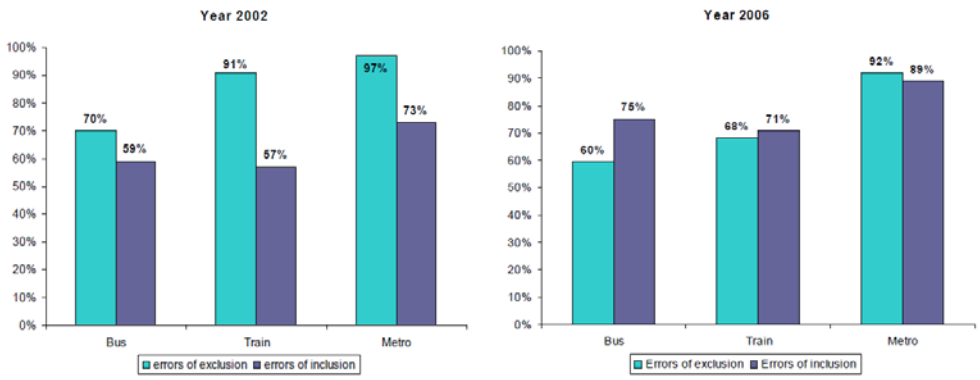


Figure 9: Exclusion errors and inclusion errors in the case of Buenos Aires between 2002 and 2006

- Supply-side subsidies in Mexico City: as can be seen, the various subsidies analysed are neutral in the case of the metro and trolleys and slightly progressive in the case of the buses. However, the exclusion errors are very high: this is explained by the fact that the small buses used mostly by the poor are excluded from the subsidy system.

- Various types of subsidies in Santiago: subsidies for students (passes for the buses, lower fares for the metro) appear slightly progressive or regressive when not taking into account the way the measure is funded (the figure shown in the table): when the funding mode, based on cross-subsidies, is taken into account, in both cases, the system is mainly neutral. It makes a transfer from rich or poor households without students towards rich

or poor households with students. The income criterion is not taken into account in granting student fares. This results in significant effects of exclusion. The investment subsidy in the case of the metro is less efficient still from a social point of view, doubtless because the very poor mainly use other modes of transport. The direct transfers by allowances that were mentioned earlier (see footnote 5 page 25) have the best social performance indicators, however they are a general subsidy and not a transport subsidy.

- In the case of Mumbai, supply-side subsidies have a regressive character regardless of the level at which the poverty threshold is established (the two figures of the Ω indicator). The positive point here is that the exclusion errors are very low.

There are also subsidies of a social nature that impact public urban transport even if they do not concern it directly: this is the case of fuel subsidies that, at one point, were a response to the various oil crises and were justified by social protection measures (importing countries) or wealth redistribution (exporting countries). However, this type of subsidy is very expensive for governments and it is clearly regressive and poorly targeted: the rich benefit more than the poor due to their higher consumption of fuel for private vehicles, generators and taxis. Furthermore, fuel subsidies subsidise activities with very negative externalities (in particular individual motorised transport) that, on the contrary, should be taxed.

Conclusions on the social rationale for subsidies

The cases described above show that transport subsidies rarely have a progressive and well-targeted impact. However, the issue of regressiveness is not directly linked with the concept of transport subsidies, but with the way they are designed and implemented. The funding of the measure itself may also be progressive or regressive, and has to be taken into account.

- In the case of general supply side subsidies (investment and/or operating subsidies), all users of the subsidized service benefit from the subsidy (provided that the subsidy is not completely cancelled by efficiency losses). The subsidy is progressive only if the poorest are the ones who use the operator's services the most, but this is rarely the case in developing countries.

  If supply side subsidies benefit particular areas, the progressiveness of the subsidy will depend on the profile of the dwellers of these areas. It can also be noted that when the accessibility of an area increases, this may translate into an increase of its land value, hence a share of the advantage generated by the subsidies is transferred to property owners.

- When subsidies are paid directly to beneficiaries:

  - Without any selection: the distribution effect is similar to that of general supply-side subsidies. It may be even worse, because there can also be deadweight losses.[10] This is the case of fuel subsidies, which are also detrimental because they encourage individual modes of transport that have high negative externalities.

[10] A deadweight loss occurs when the person receiving a benefit had already planned on acting the same anyway, even if the benefit had not been granted.

- On the basis of income (or standard of living): this is generally progressive but often difficult to implement.

- On the basis of other socioeconomic criteria (such as reduced or free fares for the youth, students, large families, veterans and the disabled, the unemployed): this may not be progressive if users within this criterion are not the poor (as in the case of Santiago de Chile's student metro fare).

However, public transport subsidies can have serious side effects:

- Public transport fares that are too low can result in deadweight losses and in overconsumption of public transport.

- Public resources being limited, their allocation on transport means that they are not allocated somewhere else where they could have had a greater impact, in particular from a redistribution point of view.

C.2.2. Social equity and access to opportunities (jobs, services…) – Geographic access

The place of residence (influenced by the price of land, social segregation, housing policies of the authorities, etc.) has a direct relationship with the need for transport. The poor often reside in cheap, isolated areas (isolation due to distance, topography, or lack of transport infrastructure and/or services). Social equity can require equal access to transport for all, as insufficient accessibility to services and economic opportunities is discriminatory and is a major factor of social exclusion.

Helping the poor get access to transport does not only require making transport affordable, but also ensuring that transport is actually available (and of acceptable quality). Positive effects can be extensive: in Bogotà, Colombia, the municipality's investment programme to improve mobility in poor isolated neighbourhoods, which enabled the inhabitants of the city's hilly areas to reach the centre more easily, resulted in a drop in crime rates.

The following components of an urban transport policy have direct impact on geographic access:

- Road infrastructure: this investment is usually financed by the general budget of the government or local government; hence it is an implicit subsidy to the people living in the area where road are constructed or rehabilitated. All types of non-rail transport modes (private, collective, non-motorized) benefit from good road infrastructure, but in many cases most of the investment is observed in rich neighbourhoods where private vehicles are dominant.

- Public transport network: a well-organized, efficient multimodal system combines mass transport modes with dedicated infrastructure (Train, LRT, BRT…) on major corridors, with local bus/minibus services.

- Supportive integrated tariffs: as a consequence of this multimodal network, transfers are usually required to go from the periphery to the centre of the city. In order not to penalize inhabitants of the periphery, integrated tariffs can be put in place so that the price of a trip with connection(s) is not as high as the aggregated cost of all the segments of the trip. This tariff reduction is financed through cross-subsidies (users of shorter trips

pay more than the cost of their trips), or through dedicated subsidies from the authorities.

C.2.3. General critical conclusion on social rationales for subsidies

Case studies[11] have shown that despite often-stated social justifications, transport subsidies do not always translate into pro-poor impacts. This depends on implementation modalities, which need to be carefully designed as they entail many challenges:

- Transport subsidies are rarely among the most efficient way to redistribute income to the poorest, in particular when they are paid directly to the operators, because inclusion errors are high.
- A subsidized transport system may remain too expensive or geographically unavailable to the poorest, despite subsidies.
- When systems for identifying beneficiaries of targeted subsidies do not already exist, they are very costly to create.
- When beneficiaries are not defined directly by income levels, transport subsidies can have unexpected regressive impacts.

C.3. OBA PRINCIPLES AND THEIR RELEVANCE FOR URBAN TRANSPORT

The theoretical background identified above underlines the importance and relevance of pro-poor and output-oriented tools such as financing based on OBA principles.

C.3.1. What is OBA?

GPOBA gives the following definition of OBA on its website (https://www.gpoba.org/what-is-oba):

OBA is a form of results-based financing designed to enhance access to and delivery of infrastructure and social services for the poor through the use of performance-based incentives, rewards, or subsidies. OBA links the payment of aid to the delivery of specific services or "outputs" […]. Under an OBA scheme, service delivery is contracted out to a third party—public or private—which receives a subsidy to complement or replace the required user contribution. The service provider is responsible for pre-financing the project, and is reimbursed only after the services or outputs have been delivered and fully verified by an independent verification agent. The subsidy is explicitly targeted to benefit the poor, which can be achieved through several means, depending on the context of the project and environment.

OBA revolves around six fundamental core concepts:

[11] Nodalis Conseil and SETEC International, Study on the socio-economic rationale for subsidizing urban transport, 2014

- Pro-poor targeting (OBA projects should sharpen the targeting of development outcomes by minimizing inclusion and exclusion errors regarding the targeted population);

- Accountability (OBA projects should improve accountability for use of public resources in the framework of the transfer of performance and financial risks to the service provider);

- Innovation (OBA projects should foster innovative schemes both in terms of improvement of the quality, accessibility and affordability of services for the poor and of contractual design in order to structure OBA projects that can reach their objectives in the context of specific sector constraints);

- Efficiency (OBA projects should provide stronger incentives for cost-efficiency and keep per capita subsidy costs below a certain limit);

- Sustainability (OBA projects should bring out effects that last after the disbursement without requiring further subsidies);

- Output verification and monitoring (OBA projects should be closely monitored and the service provider shall be reimbursed only after the outputs have been delivered and verified by an independent verification agent (IVA)).

The fifth core principle raises an important preliminary question in the case of urban transport. In most cities around the middle-income or developed world, urban public transport is subsidized in one way or another – unlike other urban services like the supply of drinking water or electricity. A strict reading of the sustainability principle would therefore preclude almost any urban transport OBA project, save in the few (mostly very poor) cities where urban transport services are currently entirely left without any Government intervention.

Along a similar line of reasoning, a number of development economists and practitioners, especially in the 1980's and 1990's, have argued that sustainability required that urban transport subsidies be progressively entirely removed[12]. **We have argued in a previous study[13] that subsidies to urban public transport are often justified, even recommended**, provided their design includes a number of safeguards. OBA principles provide for such safeguards.

C.3.2. How can OBA principles improve urban transport subsidy schemes?

Because OBA was designed as a more effective way of injecting additional public funds into service provision, many common shortcomings of subsidies to public urban transport can be addressed by designing or reforming them according to OBA core principles.

If increasing focus on OBA principles can improve the existing or planned subsidy system, then it is also likely that OBA funding can be used as an incentive for such improvement. However, Output-Based Aid is financial assistance limited in time, while urban public transport typically benefits from permanent subsidies. This characteristic needs to be factored into the design to ensure that changes incentivised by OBA are sustained.

[12] "Urban Transport, a World Bank Policy Study", The World Bank, 1986
[13] Setec International and Nodalis Conseil (2015), op. cit.

Major, common shortcomings that reduce the positive impacts of urban transport subsidies are listed below, with an indication of which OBA core principle may help tackle each of these shortcomings.

Public transport subsidies often demonstrate a social targeting bias – ***pro-poor focus***

The degree of social efficiency (defined as revenue redistribution impact towards the poor) of subsidies varies widely and can often be opposite to what is assumed on face value. Subsidy benefits, such as across-the-board low fares, frequently reach the whole community without distinction, or worse, may be allocated based on criteria that make it pro-rich – for example, reduced or free fares for students in countries where most students come from upper-middle class or affluent families. This creates exclusion errors (poor people cannot benefit from the subsidy) and inclusion errors (non-poor people actually benefit from it). Inclusion errors can be particularly detrimental as they are most often regressive – they correspond to an income distribution from the poor to the rich. Subsidies well targeted on the basis of socio-economic criteria are generally progressive but tricky and costly to implement (as in the city of Bogota, where fares vary according to user income) and do not totally eliminate certain inclusion or exclusion effects. For example, in Brazil, the Vale Transporte scheme for commuter travel targets the poorest registered employees but "forgets" informal-sector workers.

OBA principles mandate looking at the actual impact of subsidies on the poor: either it can be demonstrated ex ante that the subsidy design will mostly if not only benefit the poor, in which case disbursement conditions can be strictly based on output; or the OBA disbursement mechanism includes conditions on the poverty level of the final beneficiaries. Careful design of pro-poor mechanisms in OBA projects aims at solving targeting issues.

While a large majority of subsidy policies in urban transport are regressive, it may not always be the case, and the review performed by Nodalis and SETEC for the above publication does not support that statement.

It is also not sure whether the supply-side or demand-side characteristics of subsidies are such a strong determinant of their regressive character. Implementation details are critical, and in some cases supply-side subsidies may be the most efficient way of targeting the poor. Two factors in particular must be considered:

- who the actual users of the subsidized system are (if they are mostly poor, and controlling for efficiency issues, the subsidy will be progressive);
- the feasibility, practicality and transaction cost of well-targeted supply-side subsidies.

Public transport subsidies often introduce decision-making biases that increase inefficiencies – ***efficiency***

Most financial support schemes, whether financed by external donors or from general budget resources, are cost-driven, and targeted at a certain type of cost:

- Investment subsidies (CAPEX) for part or full funding of infrastructure, fixed equipment or rolling stock;
- Operating subsidies (OPEX) in various forms.

CAPEX and OPEX-specific support introduces biases in the decision-making process: trying to optimize the size of the cheapest resources, the operator will make the choice to over-invest or under-invest depending on its sources of financing.

Results-oriented schemes such as OBA projects are key to ensuring that costs of investment and operations are sized to their optimal level.

In addition, network externalities and imperfect markets may also result in the need to correct decision incentives but this requires particularly well-tailored subsidies to reach an optimally efficient system.[14]

Public transport subsidies are often captured – ***accountability and verification***

The costs of the service do not depend exclusively on the level of supply or even on the proper allocation of production factors. They also depend on the operator's financial and operational performance. Subsidy mechanisms (while needed to ensure that the overall system is adequatley funded) can, themselves, have an impact on operator performance, which will be unfavourable if they are poorly designed. It is often difficult to determine which portion of uncovered costs is attributable to the inefficiency of the operator, and which portion corresponds to the gap between the recommended fares and the recommended service if the operator were actually efficient.

Faced with this situation, public authorities have little room for manoeuvre. In most contexts, the risk of financial collapse of public transport (formal or informal) represents such a threat to the political credibility of the authorities in charge that it introduces moral hazard in the decision-making process.

In the case of a state-owned or insufficiently regulated monopolistic operator, this often results in management lacking a profitability imperative, and in production stakeholders receiving unwarranted benefits, or locked-in advantages. The employees, in particular, form groups which apply pressure to get more income or benefits than strictly necessary. This can result in higher salaries or various benefits, or, in cases where the salaries are strictly controlled (in particular when public-sector pay scales apply), by the hiring of more employees than are actually needed.

This often leads to a downward spiral: due to the inefficiency of the operator, the public authorities accept to compensate for the deficit, because they have no choice, but they refuse to add resources to fund additional investments. Rolling stock deteriorates due to aging and progressive cannibalisation. The level of service then worsens, which reinforces governmental decisions to not allocate more resources than strictly necessary to the company. This has been the sad story of many public bus companies in Africa…

Reducing this deadly inefficiency typically requires:

- The terms of the contract with the operator,
- The way the subsidies are allocated – according to clear and credible methods, incentivizing the operators to be efficient,

[14] Setec International and Nodalis Conseil (2015), op. cit., section 3.1.2

- The credibility of the actual enforcement of subsidy conditions.

In other words, it requires applying OBA principles.

Public transport subsidy schemes often lack proper consideration of long-term ***financial sustainability***

This is another shortcoming most often linked to the two described above. Funding mechanisms to support public transport subsidies are most often left unspecified and subject to annual decisions. In case of budget crises, governments can find themselves in a position of having unsustainable obligations, which may lead them to default or cut back on their financial support commitments, causing the sudden or gradual collapse of the service. Or subsidies may fund investments that worsen deficits by unsustainably increasing maintenance costs. In these cases, in the medium or long term, the subsidy will have had an effect opposite to what was intended. It is crucial to avoid basing the system on subsidies placing future excess financial burden on the public authorities. Sometimes this may imply dedicating specific, buoyant fiscal resources (such a tax on more polluting or congestion-causing modes).

Looking at OBA subsidies, an issue is that they are themselves not permanent. The question at hand is thus how to use them to provoke financially sustainable, permanent changes.

A simple answer is to use OBA to fund one-off investments (essentially, infrastructure or equipment with a reasonably long life-cycle); in many cases this will be very useful, and what is needed for financial sustainability is to ensure that operation and maintenance will be funded.

However, the study has also explored whether in some cases the impact of OBA might not be higher if used in different ways, for example:

- to incentivize stakeholders to improve an existing subsidy scheme,
- to improve the overall organization of the system (institutional but also operational),
- to demonstrate the feasibility of a new subsidy/contractualization scheme.

Keeping in mind the transitory nature of OBA and the requirement for sustainability beyond its disbursement, OBA could be used to reach these objectives in different ways:

- funding a transition (ramp-up fare deficit, one-off incentives, etc.),
- funding a demonstration pilot,
- used as co-funding, providing an incentive for a larger project to better target the poor and in general to be more in line with OBA core principles, which are aligned with issues that the sector faces.

Public transport subsidy schemes often favor formal operators over "informal", unregulated ones, without looking at respective efficiency – ***innovation***

The expansion of the formal transport sector is often seen as a desirable outcome in itself, regardless of the developmental impact it may generate or, in some cases, prevent. Since unregulated operators operating at low quality and full cost recovery constitute the bulk of the

available supply in many cities in our study area, there is likely value in leveraging the resources and energy of these operators, and in improving the service they provide, rather than subsidize less efficient competitors and distort the market. Conventional subsidy schemes often have limitations for supporting such transformations. More innovation is required, and the parallel with the ICT-supported transformations occurring in urban transportation in rich cities (sharing schemes, transport on demand, car hire schemes, etc.) may point to different, yet as transformative, solutions.

C.3.3. What are the specific challenges of applying OBA principles in urban transport?

In many cities, the specificities of the urban transport sector will create new challenges to the OBA approach:

- The lack of transport integration: A necessary step in OBA design is to simulate and compare the project's impacts with other potential projects. In the case of urban transport, this task is complicated by the fact that different modes of transport, operated by different actors, are often partially complementary and partially competing. Therefore, when analysing policies supported by potential OBA projects, urban mobility must be analysed as a whole.

- The difficulty of individually characterizing users: Unlike other public infrastructure services, for which some form of registration or subscription is typically needed, the identification of users is not a prerequisite for delivering transport services. Even in centralized systems that provide for the identification of users, targeting them according to their characteristics may prove challenging.

The specificities of the urban transport sector will also exacerbate the cross-cutting challenges usually faced by OBA projects:

- A fragile and multi-faceted financial equilibrium: In many cities, urban transport is already heavily subsidized through different types of financial flows attached to different conditions and aimed at different actors. Therefore, any additional subsidy, including OBA, must take into account the broader picture of the sector's balance in the long term, including the impact on the level of recurrent subsidies needed when the number of trips is increased or the network is extended.

- An important presence of informal operators: In the countries which are the main target of the study, compared to other infrastructure sectors, urban transport shows a high share of informal services and/or micro-enterprises, and a high fragmentation of actors. Furthermore, in many cases, services available to the poor are mostly concentrated in the informal sector. Even for OBA where payments are made against verified outputs, directly rewarding operators with which there are no contractual or regulatory links raises many issues that need to be addressed. A key objective of OBA here could be to start formalizing the relationship with informal operators and micro-enterprises – in other words, contractualizing their services – to improve quality for the poor.

- A significant dichotomy between subsidizing CAPEX and OPEX: urban transport modes have a very wide range of CAPEX to OPEX ratios, from services dominated by OPEX (old vehicles where gas is the single largest expense) to highly capital-intensive mass rail

transit infrastructure. Correspondingly, operators bear very different risks, which will require differentiated OBA scheme design.

- A continuum of service characteristics: Essential characteristics of transport include the availability of a means of transportation (between given points of departure and arrival), cost, comfort, time spent, reliability of schedules and prices. In most infrastructure sectors, quality and reliability also matter, but they may be more easily defined with standardized "minimum requirements". In transport, these characteristics (with the possible exception of safety) are partially interchangeable, as demonstrated by the concept of "generalized cost of travel", which is the standard metric used in transport models.[15] This complicates the analysis of the "value offered" to the poor user.

- Gender-related challenges deeply linked with the quality of service: As highlighted by the World Bank's 2012 report "Making Transport Work for Women and Men: Challenges and Opportunities in the Middle East and North Africa (MENA) region": "*Service quality may affect poor women disproportionately. Personal safety comes immediately to mind. Other factors may be important and less obvious, such as connection fares. For example, a 2012 World Bank study on gender and transport in the MENA region shows that women using public transport often pay higher fares per trip because they more often need to change buses and pay several fares.*" However, transport is a key factor of women empowerment, which in turn is a key factor for reducing poverty. Therefore, gender-related challenges correctly addressed by OBA projects may be significant for project success in the field of urban transport, and must be carefully considered.

- Access to service that may not be easily measurable by "coverage" or "connection" figures: The physical access of the customer to the good or service provided (geographical access to networks, in the case of transport) is not as predominant as an output metric as it is for other utilities, since it is not a black or white situation: it depends how much walking is considered acceptable. Therefore "coverage" or "connections" (used in the sense of connection to a water or electricity network) may be a satisfactory measure of outputs only in rare, specific, and justified cases. This, added to the previously-mentioned challenges of characterizing users, will require other metrics.

- Transport infrastructure as a key structuring feature of the urban space[16]: new transport infrastructure can have very long-term impacts on urban development. Often for good reasons, authorities typically do not transfer to operators the choice of location for new infrastructure and the selection of a new mode. This will limit the possibilities of schemes transferring risks and rewards of transit infrastructure location choices from authorities to operators.

- Conflicting "desirable" outcomes: Challenges faced by urban transport go much beyond population coverage, be it for the poor or not. It includes environmental and economic considerations, linked to the important externalities generated by transport in general, and congestion in particular. In analysing inclusion-oriented projects, other potential

[15] The generalized cost of travel is a unified measurement that adds up fares paid, time spent, and the perceived value of quality factors such as comfort, waiting times, and transfers. Time is converted to a monetary value through values of time which may vary by user, and quality factors are typically converted into time (and further into a monetary value) through time penalties that result from preference surveys.

[16] See for example "Transport Subsidies, System Choice, and Urban Sprawl", Brueckner - UI Urbana-Champaign, 2003 for a model on the impact of transport subsidies on urban sprawl.

objectives must be taken into account, both at the political level (what are the priorities of the authorities?) and at the operational level (how can these other objectives be taken into account or simultaneously pursued by the project?)

C.4. POSSIBLE USES OF OBA FOR URBAN TRANSPORT

C.4.1. Expected development impact of an OBA project

Overall development objective

Final objective

The overall development objective of any OBA-based project in urban transport should be to improve the poor's access to economic opportunities and services.

Links with urban integration

The poor's access to economic opportunities and services may be obtained not only through transport policies, but also through urban policies, in particular regarding housing and urban development: areas that integrate poor neighbourhoods with areas of activity and access to services (education, health) considerably limit the need for transport. However, experience shows that the impact of transport policies on land use issues and location decisions (both economic activities and formal and informal housing) remain secondary to other factors, in particular to land policies. Therefore, the study will consider primarily the direct impact of transport services under a given urban form, where transport policies should allow limiting to acceptable levels the time and money costs of accessing economic opportunities.

Development objective

Therefore, the report will focus on projects aiming at improving the poor's access to economic opportunities and services through improving their mobility.

The poor's mobility is understood here in a broad sense: it involves affordability of transport as well as density of supply (geographical coverage, frequency) and other quality aspects (safety, information, comfort, etc.).

Improving the mobility of the urban poor can therefore be attained through several means: reducing prices, increasing or re-dispatching supply to offer more means of transport to the poor, improving the quality of the services to the poor (physical accessibility, information, timeliness, comfort)…

Co-benefits

Many co-benefits can be expected from OBA-based projects in urban transport, due to the multidimensional impacts of the sector on the lives of urban citizens. More specifically, the following can be highlighted:

- A pro-poor side effect of OBA-based projects for urban collective transport will be to increase the poor's safety, as the share of walking is reduced in favour of less dangerous modes (or as safety of walking is increased).

- While the primary objective is to serve the mobility of the poor, projects can also improve overall mobility conditions in the city and reduce transport externalities.

- Many pro-poor projects in urban transport can also have a beneficial impact on women from middle-income groups. In many cases they share with the poor the impossibility to drive a car (in their case, for cultural reasons, which may for example prevent them from obtaining a driving licence), and as they also have specific transport needs that can be accommodated by public transport.

- OBA projects are a good occasion to leverage and strengthen the authorities' capacity to measure and enhance the pro-poor impact of other, already existing, public transport policies.

C.4.2. Possible outputs towards this objective

In order to reach the proposed development objective, we have identified the barriers that hinder the mobility of the poor in the selected cities, as presented in chapter D of this report.

This analysis has allowed us to identify six main standard categories of OBA-based project objectives:

- Improving and/or increasing regulated collective transport services;

- Improving unregulated transport services (gradually regulating them);

- Improving physical infrastructure for motorized and non-motorized transport;

- Improving intermodality;

- Supporting affordability of urban transport for low-income users;

- Providing specific transport services for targeted low-income groups.

In chapters E and F, we present the practical design and implementation modalities of projects designed to produce these outputs.

C.4.3. Additional leverage effects of OBA grants in urban transport

OBA is a funding mode that allows designing and delivering a public subsidy scheme in a more efficient way, in particular with the goal of alleviating poverty. In this sense, GPOBA grants (or other similarly structured aid) can be used to convert the entirety or parts of a "traditional" subsidy system into a more efficient scheme based on core OBA principles.

GPOBA funds can therefore have a significant leverage effect on urban transport projects, in three different ways. The first two are common:

- Through co-financing, they can bring additional funding for particular urban transport projects and shift or complement their focus, target and objectives;

- Through financing of pilot projects, they can foster replication and thus generate greater and more efficient funding efforts in urban transport.

The peculiarity of the urban transport sector, often already subsidized, provides for a third way:

- Conversion of a “traditional” subsidy scheme into a scheme based on OBA principles, could offer better structuring for a funding scheme that is already identified and decided, and make it more effective and/or more efficient.

In this third case, GPOBA funds would be used neither as co-financing nor as pilot financing (in both cases where they finance a smaller but homothetic part of a larger scheme), but as a trigger, as change management funding, or as initial investment/ramp-up funding for reform.

Additionally, OBA projects can also result in creating an enabling environment for better performance, service delivery and accountability, by setting service standards for operators, strengthening transport authorities and transport policies, reinforcing capacity of involved public service officials, etc.

D. ADRESSING MOBILITY BARRIERS

D.1. OVERALL APPROACH

D.1.1. Introduction

The lessons learnt presented in this report stem from the identification and concept development of OBA project concepts for three cities: Addis Ababa in Ethiopia, Dakar in Senegal, Thimphu in Bhutan. The framework proposed hereafter for adapting OBA principles to the specificities of urban transport is thus rooted in concrete experience.

We also incorporated some of the conclusions of the very recent World bank-financed study on accessibility and affordability of transport in Bogota[17], which identified specific challenges when it comes to urban transport for the poor.

Crossing the theoretical background developed in chapter C, and practical observations from the field cases above, the first lesson to come out is that, to design successful pro-poor urban transport projects, the foremost key is to is identify what actually prevents the poor from accessing economic opportunities and services. In a given urban context where the locations of housing and economic activities are set, this means identifying and addressing the most critical barriers to the poor's mobility.

D.1.2. Barrier approach

OBA projects are meant to specifically target the poor. However, the amount of funds that will reach the poor is not the best measure of a project's or a policy's pro-poor impact. **A primary concern has to be the actual relevance of the policy or project in answering the poor's identified needs.**

Hence, **optimizing a policy's pro-poor impact is not only about maximizing the precision of the targeting, but more importantly about maximizing the policy's overall effectiveness**. Narrow targeting is only a tool among others. Projects that require a broader targeting but are more effective in solving the poor's problems can be better than projects that are based on narrow targeting but produce less relevant outcomes or require large expenses to accomplish targeting.

In other words, there can be a trade-off between two essential requirements for designing an OBA project: 1) accurately targeting OBA project beneficiaries and, 2) designing an effective intervention that best serve the needs of the poor.

[17] Accessibility and affordability impact of Bogota's SITP - Accessibility Analysis Based on the OTPA accessibility tool; World Bank and Universidad de los Andes; Final Report (June 2016), and
Accessibility, affordability and poverty: Assessing public transport subsidies in Bogota; Universidad de los Andes; draft (June 2016)

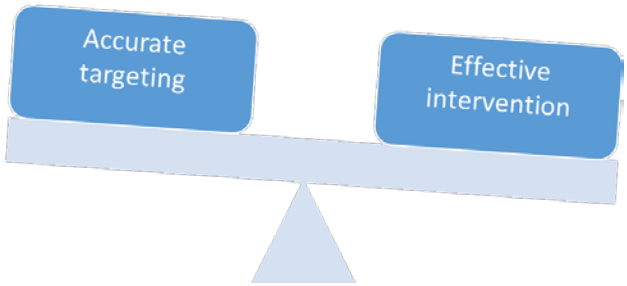


Figure 10 – Necessary trade-offs between accurate targeting and effective intervention in the design of an OBA project in the urban transport sector

In other sectors, the trade-off may be less acute because the nature of the required intervention is obvious: providing connection to a supply network (electricity or water). In the case of urban transport, the data and baseline analysis in the pilot cities show that this trade-off is much more pregnant, as shown further in this section D and in F.1.

However, based on the detailed analysis done on the three pilot cities, we recommend starting not from targeting considerations, but going back to the more fundamental objective of helping the poor, which, we conclude, requires departing somewhat from the "traditional" OBA approach that has prevailed in other sectors. Starting from this fundamental objective, the consecutive steps to be taken are as follows:

- The first step is to identify what barrier(s) prevent(s) the poor from accessing mobility in the most critical way(s),
- The second step is to design a project that can address one or several of these barriers, including a sound targeting strategy that is adequate for the project,
- The third step is to ensure that such targeting strategy, and all other elements of project design, are in line with GPOBA's requirements.

As a consequence, section D.2 focuses on assessing barriers to mobility in the three studied cities, before studying challenges to and opportunities for OBA projects in chapter E, and then addressing project design in chapter F.

D.1.3. Understanding the local context

The analysis of barriers must be based on a thorough understanding of local contexts.

The sector and institutional contexts in the three pilot cities display some similarities, common to many cities in the IDA income group in Sub-Saharan Africa and in South Asia. To help identify some challenges and opportunities that OBA-based urban transport projects will often need to tackle to be successful, we highlight some of these similarities below.

A need to strengthen Transport Authorities and Transport Policies

In Thimphu, there is no Urban Transport Authority. The Ministry of Communications is responsible for supervising the activities of the buses, but although the Kingdom of Bhutan has a long-term strategic plan for transport, multiple agencies have a role in it, and no entity has the

clear powers and mission to design and implement operational policies to reach strategic objectives for urban transport.

In Addis Ababa, The Addis Ababa Road and Transport Bureau has been created a few years ago as a bureau of the municipality, merging the municipality's Roads Authority and Transport Bureau. Nonetheless, it is lacking capability in managing network design and it does not have the mandate and financial resources to be a full-fledged transport authority. Moreover, coordination and cooperation is low between entities that are related to urban transport at municipal and federal level (in particular the national railway).[18] A transport policy for Addis Ababa has been formalized in 2011, but as major evolutions have been taking place (creation of the LRT, definition of an integrated City Master Plan), a more structured approach should now be implemented.

In Dakar, the CETUD was created as a Transport Authority in 1997. It has proven to be a strong counterpart for regulated and non-regulated transport operators in the city, in particular through the implementation of the AFTU renewal and formalization program for minibuses, and by managing contracts with DDD and PTB. However, its recurrent funding is more limited than originally intended, and the CETUD finds itself having to rely on project financing by donors.

This suggests that, in all three cities, designing a successful OBA project for urban transport will need to be complemented to some extent by support to streamlining and building up the role and capacity of the authorities in charge of urban transport. This is particularly important for sustainability.

High modal shares for walking, in particular among the poor, and low modal shares for private cars

As in many cities that could be targets for OBA in urban transport, for their mobility the poor rely first and foremost on walking, while private cars represent a rather low share of transportation for the overall population, being used primarily by a rather small, richest segment of the population.

Data on walking is typically unreliable: quantifying the modal share of walking is made difficult by the lack of an obvious or standardized definition of what constitutes a trip (i.e. what is the distance one needs to cover on foot, or the purpose pursued, in order for the walk to be counted as a trip).

With the above caveat, the available data shows that, in Addis Ababa, 19% of urban dwellers use walking as their primary transportation mode.[19] This proportion rises to 33% for the poorest 21% of the population, which roughly corresponds to the share of the urban poor, while only 4% of the richest 1% use walking as their primary mode. In Thimphu, walking is the main mode for 35% of the population, and the share of the population that primarily uses walking is much more evenly distributed, going down progressively from 40% of the poorest to 27% of the richest.[20] For Dakar, this information on the main transportation mode is not available, but there is data on modal shares, which shows that walking has an overall modal share of 68%. As a comparison,

[18] Challenge repeatedly identified as a sector weakness in World Bank appraisals
[19] 2014 Addis Ababa household mobility survey – statistical tables
[20] 2015 Thimphu household mobility survey – direct use of the database

the modal share of walking (albeit with varying definitions) is 41%in Paris, 30% in Cairo, 67% in Rabat, 31% in Bogotà, and 33% in São Paulo.[21]

Meanwhile, the use of private cars is the main means of transport of only 4% of the population in Addis and 31% in Thimphu. Once again, for Dakar, data is available in terms of modal share: only 4% of trips are by private car.[22]

This shows that, in all three cities, mobility is constrained for majority of inhabitants by lack of motorization or lack of the possibility to use a motorized mode. There is very ample room for improvement of the motorized mobility of the poor, but also a more general need for improved urban mobility.

The importance of data to understand the access and mobility constraints faced by the poor

Availability of data was one of the criteria for selecting the three pilot cities. It is remarkable that in all three cases, a household mobility survey had been fairly recently conducted, which was not necessarily expected. However, these surveys were not optimal in the sense that income had not been a key feature in the questionnaires – or in other cases zoning was not fine enough. One area where particularly little data was available was the geographic distribution of incomes or poverty within the city. This would be very important to validate geographic targeting approaches.

The conclusions presented below show that targeting cannot be appropriately designed without good data, in particular some details on travel patterns and modal use according to income. It was particularly noteworthy in all three pilots (and particularly so in Addis Ababa) that the "conventional wisdom" collected from transport authorities about what the travel patterns and the needs of the poor were, was skewed towards a higher modal segmentation by income groups than what actual data showed.

Until recently, budget sustainability constraints appeared to prevent major increases in the supply of public transport and improvements of its affordability

Collective transport policies either objectively pursue, or de factor result in a balance between three factors: affordability to the user, supply density (frequency, extension and density of service), and budgetary sustainability for the authorities. Due to the very significant negative externalities of private transport (congestion, pollution, noise, accidents) and to the positive externalities of transport (agglomeration effects), the optimal economic situation for a city usually involves subsidies to collective transport modes. Such subsidies exist in most big cities in the world, whether in developed or developing countries. Assuming constant production efficiency, the above three-factor balance thus simply results from a long-term public accounting equation.

Social aspects of transport are also important. The above balance illustrates how they can come into play counter-intuitively: in many cases for example, local authorities refuse to let nominal prices increase in order to maintain or increase affordability of transport; doing this, they may

[21] 2015 Dakar household mobility survey - final report: « *Enquête ménages sur la mobilité, le transport et l'accès aux services urbains dans l'agglomération de Dakar - Rapport définitif* »
[22] Same as previous.

not realize that, if not compensated by additional subsidies, such a decision will jeopardize the situation of the poor, because the availability of motorized transport will deteriorate due to growing financial distress of the transport operator(s).

The determinants of a transport policy can therefore be presented as trade-offs between three conflicting objectives:

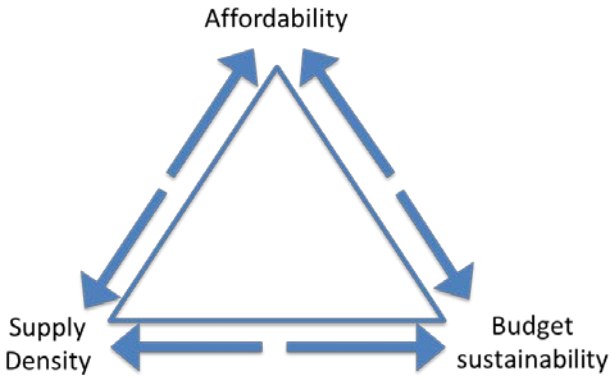


Figure 11 – Transport policy trade-offs (assuming constant production efficiency)

In a previous study, we characterized the choices made de facto between these three aspects among a benchmark of twelve cities. In order to do so, we identified, and classified relatively to the "best performer" in each category:[23]

- the ratios between prices of collective transport and local per capita income;
- metrics of supply density (number of vehicles, length of rail track);
- the ratios between the authorities' financial support to collective transport and overall government expenses.

Each of these ratios is of course imperfect. However, the aim is qualitative, and to characterise trends, rather than absolute values.

The following chart summarizes the results:

[23] For a complete description of the methodology, please refer to the study performed by Nodalis Conseil and SETEC for the Agence Française de Développement (AFD): "Study on socio-economic rationale for subsidising urban transport", 2014: http://www.afd.fr/jahia/webdav/site/afd/shared/PORTAILS/SECTEURS/TRANSPORT/PDF/AFD_etude_justification_socioeconomique_subventions_transport_urbain_Rapport_Final_2014_EN.pdf

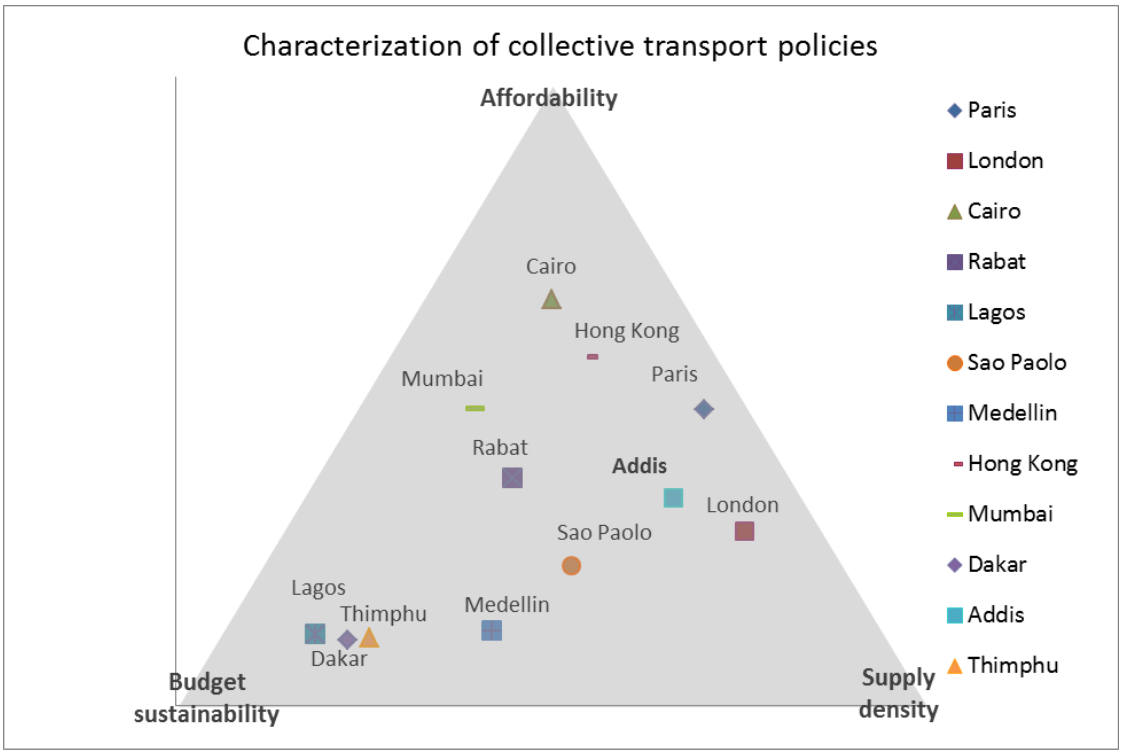


Figure 12 – Characterization of transport policies in different cities

It is to be noted that the graph summarizes the relative effort in the three dimensions for each city, not their absolute performance relatively to other cities.

Thimphu, Dakar and Addis Ababa are all in the last tier of cities as ranked by the levels of income of their inhabitants. As a quite logical consequence of their limited financial possibilities, the cities have all been constrained in their efforts on affordability and supply density:

- Thimphu and Dakar (like Lagos which is the fourth city of this group), insist on budgetary sustainability, rather than developing very extensive or very affordable services;
- Addis Ababa has de facto put less emphasis on budget sustainability, but neither does it show extensive affordability or supply density.

The chart below provides more details on the characterization of the transport policies in the Tier 3 cities of the benchmark by income:

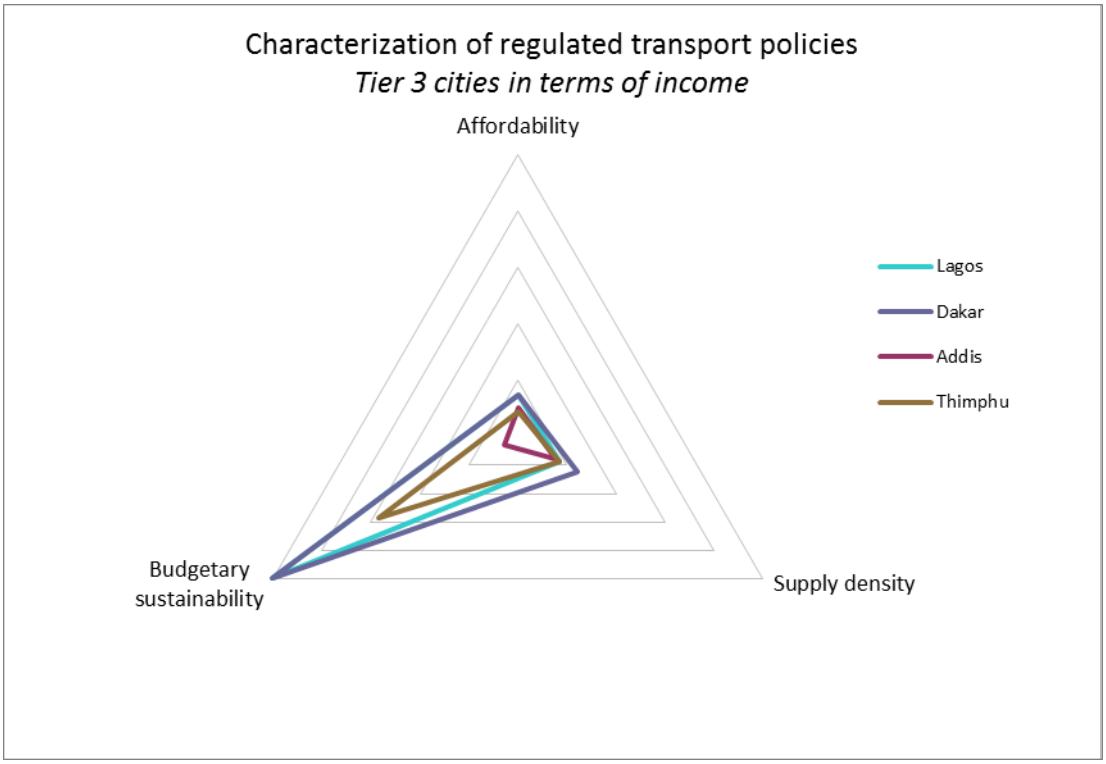


Figure 13 – Characterization of transport policies in Tier 3 cities

Ambitious plans to develop public urban transport

Notwithstanding the above, all three cities have been and are now planning large investments in urban public transport. In Thimphu, the city bus service will be expanded. In Dakar, a BRT and a modern suburban express train (mostly on the existing rail service right-of-way) are planned. In Addis, the LRT has started operations in 2015, and six BRT corridors are planned.

The political momentum for urban transport is in part why these cities have been selected. In the context of growing government intervention in the sector, OBA represents an opportunity to shift the policy dialogue towards an increased focus on the mobility needs of the poor.

Other driving characteristics in other GPOBA/World Bank cities of intervention

The features highlighted above are common to many GPOBA/World Bank cities of intervention. However, other cities of intervention may have other key characteristics with major impacts on how OBA projects should be designed.

In some emerging and developing cities, in particular where the transport system is dominated by unregulated operators operating on a commercial basis in an imperfect market, the most pressing challenges to the mobility of the poor may not be best represented in the above framework, but rather relate to the overall inefficiency of an excessive supply of transport services, or to a mismatch between supply and the distributions of jobs and populations.

D.2. THE AFFORDABILITY OF MOTORIZED TRANSPORT

The household budget barrier

The first constraint to the mobility of the urban poor is, unsurprisingly, income. The share of household income used for transportation increases with the average income in the country, but remains high in all three pilot countries: in the lowest income quintile, this share is 6% in Addis Ababa (the poorest city of the three), 17% in Dakar and 20% in Thimphu (the latter including spending on both urban and intercity). This results in the poor making fewer motorized trips than the non-poor, and walking a lot more:[24]

- In Addis Ababa, 19% of urban dwellers use walking as their primary transportation mode.[25] This proportion rises to 33% for the poorest 21% of the population, which roughly corresponds to the share of the urban poor.

- In Thimphu, walking is the main mode for 35% of the population, and the share of the population that primarily uses walking goes from 40% in the poorest quintile to 27% in the richest.[26]

- In Dakar, only 16% of slum dwellers used public transportation as their main mode in 2010, walking being by far their preferred mode.

To propose solutions that would improve the poor's mobility within their current spending capacity, we must first examine how they currently use their transportation budget.

Assessing the affordability challenge

There are two ways of considering affordability:

- Assessing, for the cheapest transport mode, the mobility offered under a given budget or the budget needed for a given number of trips; and

- Examining what expenses actually make up the poor's transport budget, to design affordability-increase strategies based on that actual mix.

Assuming that household income is an acceptable proxy for household expense in Dakar, the shares of transportation in overall household expenses (for the whole urban population) are fairly comparable between the three cities: from 8% in Addis Ababa to 15% in Thimphu. The shares of transport expenses for the poor and for other income categories differ however quite significantly:

- In Addis Ababa, the share of transportation expenses per capita increases with income, from 6% of expenses for the poorest quintile (and the same proportion for the poorest

[24] Data on walking is highly dependent on how a "trip" is defined and measured when it is perfomed by walking. The data regarding modal shares of walking is therefore usually highly heterogeneous and unreliable.
[25] 2014 Addis Ababa household mobility survey – statistical tables
[26] 2015 Thimphu household mobility survey – direct use of the database

28.1%, which corresponds to the population below the poverty line), to 11% for the richest quintile.[27]

Table 1 – General and transport expenses per income quintile - Addis

	Quintile of Household Expense per capita						Below poverty line
	1	2	3	4	5	Total	
Average annual Expenditures (Bir)	3 423	5 510	7 399	10 113	18 903	9 253	3886
Average annual transportation expenditures (Bir)	200	306	413	667	2 025	741	227
Share of transportation in total expenditures	6%	6%	6%	7%	11%	8%	6%

– In Dakar, the share of transportation expenses decreases as related to income (from 17% of expenses for the poorest to 10% for the richest). Lack of data has not allowed characterizing the share of transport expenses for the population below the poverty line specifically, but the lowest quintile should be a fair enough approximation, as the poor represent 26% of Dakar's population.[28]

Table 2 – General and transport expenses per income quintile - Dakar

	Quintile of Household Income per capita					
	1	2	3	4	5	Total
Average monthly Income (FCFA)	18 958	40 358	55 458	69 269	165 562	70 173
Average monthly transportation expenditures (FCFA)	3 254	5 771	7 215	9 095	15 788	7 984
Ratio between transportation expenditures and income	17%	14%	13%	13%	10%	11%

– In Thimphu, shares of transport expenses increase with overall expense levels between the first and the third quintile (from 20% to 26%), and decrease when overall expense levels increase between the third and the fifth quintiles (from 26% to 11%). For the population below the poverty line (13.8% of Thimphu inhabitants), transportation expenses represent 21% of overall expenses.[29]

Table 3 – General and transport expenses per income quintile - Thimphu

Quintile of Household Income per capita	

[27] 2014 Addis Ababa household mobility survey – statistical tables

[28] 2015 Dakar household mobility survey - final report: « *Enquête ménages sur la mobilité, le transport et l'accès aux services urbains dans l'agglomération de Dakar - Rapport définitif* »

[29] 2015 Thimphu household mobility survey – direct use of the database

	1	2	3	4	5	Total	Below poverty line[30]
Mean Annual Expenditure per capita (Nu)	16 012	30 486	45 150	71 532	219 004	76 506	12 713
Mean Annual transportation expenditure per capita (Nu)	3 223	6 972	11 823	10 645	23 308	11 201	2 623
Share of transportation in total expenditures	20%	23%	26%	15%	11%	15%	21%

These contrasted patterns may be explained to some extent by the differences in transportation behaviours and income inequalities between the cities:

- In Addis, even the highest quintiles are not very rich but are very keen on using more expensive transport modes, hence the share of transportation expenses increases with income,

- In Dakar the increase in transportation expenses from poorer to richer quintiles is about the same as in Addis Ababa relative to the amounts spent, but this is outweighed by a much greater inequality in income between quintiles, resulting in a decrease of the relative weight of transport expenditure over income,

- In Thimphu the increased use of more expensive means from the second quintile generates an Addis-Ababa-like situation between the first and third quintile, and the greater inequalities between quintiles then generate a Dakar-like situation between the third and fifth quintiles.

In each of these cities, the cheapest motorized mode is municipal buses. The affordability of a ten-kilometre-trip using this cheapest mode in each of the cities can be benchmarked as follows:

[30] Significance is low

Table 4 – Benchmark of affordability indices

	Price of 60 trips as % of the average monthly expenses[31] of 1st quintile	Price of 60 trips as % of the average monthly expenses of population	Number of trips that can be paid for by 15% of average monthly total expenses of 1st quintile	Number of trips that could be paid for by the observed average transportation expenses of 1st quintile
Addis Ababa	53%	19%	17	7
Dakar	55%	15%	16	19
Thimphu	90%	19%	10	13
Chennai	19%	8%	49	n/a
Brasilia	59%	6%	15	n/a
Mexico City	19%	3%	48	n/a
Manila	17%	5%	52	n/a

These figures highlight that municipal buses, even if they are the cheapest modes, remain quite expensive for the poor in the pilot cities.

Options to address the affordability challenge in developing and emerging countries

If policy makers want to address the above-described price barrier (fare affordability), then they face a difficulty: the public budget constraints in low-income countries typically make an across-the-board reduction of fares unrealistic. To be meaningful, such fare reductions would add up to a tremendous cost because operators need to be compensated so that they keep operating and do not reduce supply. Such fare reduction and associated compensation would also be associated with a great inclusion error, as all users would benefit, most probably in a regressive way.

There might be many other policy reasons in favour of general fare subsidies. However, if the specific target is to improve fare affordability for the poor, in the context of limited availability of public funds that characterises most poor countries' public finances, then a better option would be to allocate funds to increase the budget that the poor can spend on transport: in other words, to implement precisely-targeted, demand-side subsidies.

In cities where there is no existing register of the poor or general income register (such as income tax statement data on rich countries), this option is not practical as it would be too expensive to set up such a register just for the sake of an OBA project (this is discussed in section F.1 below). However, when there is an existing register that can be used to identify beneficiaries, specific transport subsidies can be allotted to the poor through a variety of mechanisms.

[31] Benchmark Affordability Index set by the landmark paper: *Affordability of Public Transport in Developing Countries;* Robin Carruthers, Malise Dick and Anuja Saurkar; World Bank Transport Papers; 2005

This option was part of the shortlisted project concepts for Dakar and Addis Ababa. It was however not retained in either city as the main concept to be developed: in Dakar, there was no political readiness to accept the budgetary weight of additional permanent subsidies (and no ready distribution mechanism); in Addis Ababa, the register is at an early project stage and will not be usable before some years, once beneficiaries will have been nominally identified.

In middle-income countries such as Colombia, such identification mechanisms may exist. In Bogotá, a 2016 World Bank study[32] shows that the development of the public transport service at the periphery and the introduction of user subsidies targeted to the poor have had, jointly, a very high impact on the poor's capacity to access economic opportunities.

The study also assesses the role played by each of these two factors towards the mobility improvements:

- Subsidies provided to the poor have been critical to increase their mobility, more so than for other income categories:

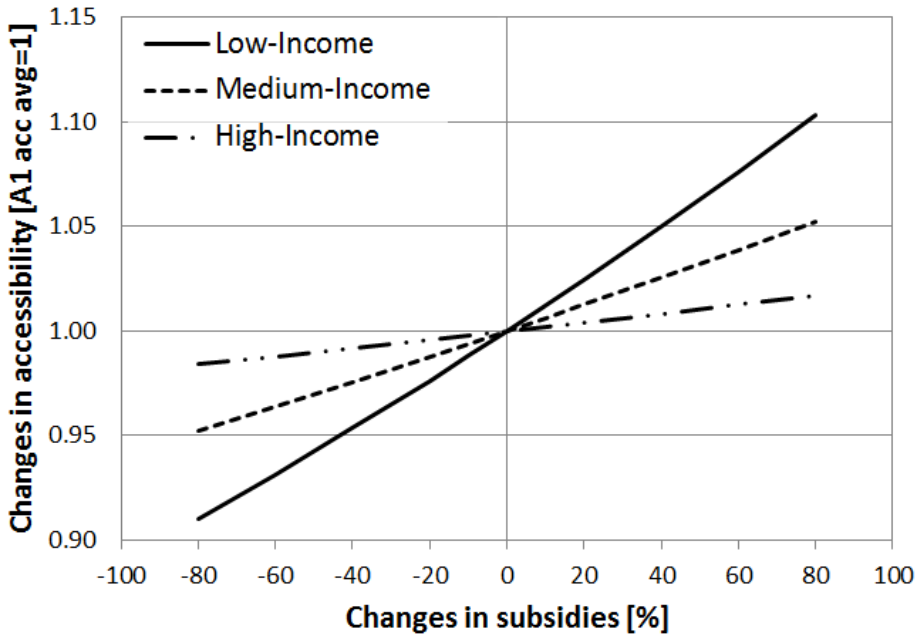


Figure 14 – Work-accessibility changes with variation in subsidies in Bogota, 2015

- Public transport service was reinforced in peripheral areas. Because many of the poor live in those areas, thus increasing supply of public transport for the poor more than for other users. As can be seen in the compared maps below, this has been critical to explaining variations in accessibility even without the subsidy component:

[32] Accessibility, affordability and poverty: Assessing public transport subsidies in Bogota; Universidad de los Andes; draft (June 2016)

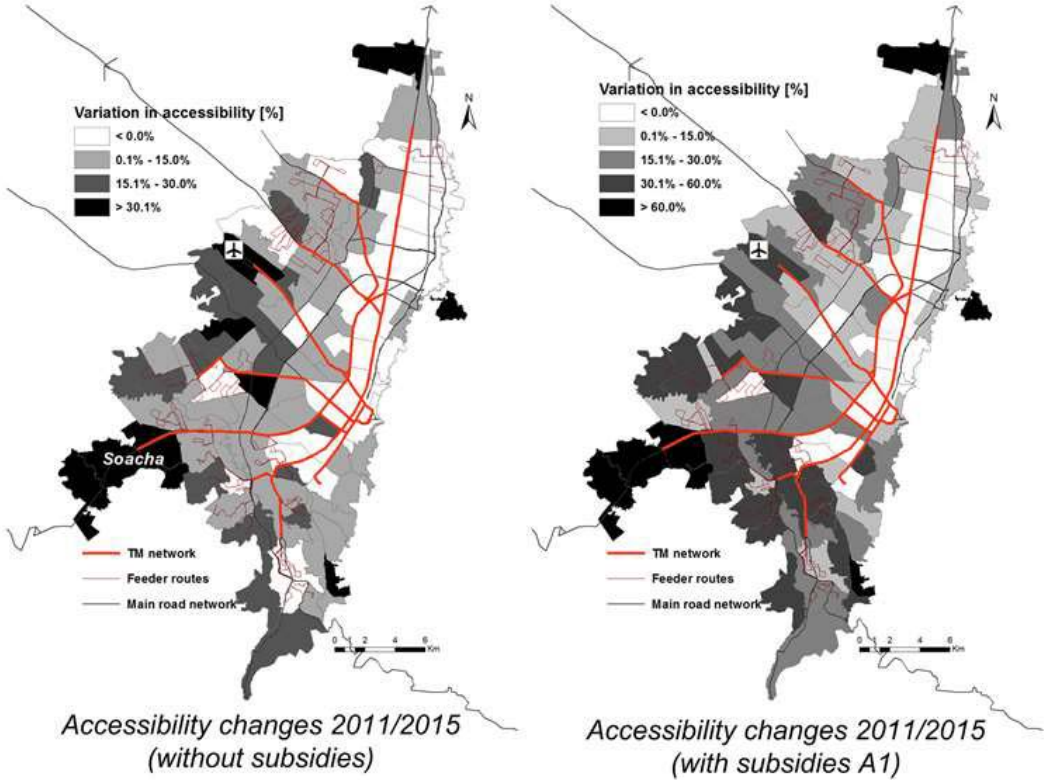


Figure 15 – Accessibility changes per area with and without subsidies in Bogotà, 2015

The latter element leads us to the importance of assess indirect, "non-price" barriers to the affordability of motorized transport. In particular, in all three pilot cities of this study, affordability challenges do not only stem from the price of the cheapest mode, but even more so from the fact that the poor are compelled to also use more expensive motorized modes.

Modal switch as a solution to increase mobility given a certain budget

Indeed, in all of the three pilot cities we observe that the poor "paradoxically" use transport modes that are significantly more expensive than the cheapest mode.

For example in Addis Ababa, we can use the proportion of the three modes that heads of poor households identify as their main means of transportation, as a (loose) proxy for modal shares among the poor. We observe that the current mix of main collective transportation modes for the lower income group (61% minibus taxi, 34% city bus, 5 % Higer) allows for just 5 trips on average, instead of 7 if the poor used only the bus.

In Thimphu, also using the proportion of the three modes that heads of poor households identify as their main means of transportation, as a (loose) proxy for modal shares among the poor, we observe that the current mix of main transportation modes (private vehicles included, as they remain a significant mode) for the lower income group (31% driving a private vehicle, 11% as a passenger of a private vehicle, 49% taxi, 9% Citybus) allows for just 4 trips, instead of 13 if the poor used only the bus.

The graph below shows that many bus users in Thimphu, even in the lowest income quintile, also need to sometimes use taxis.

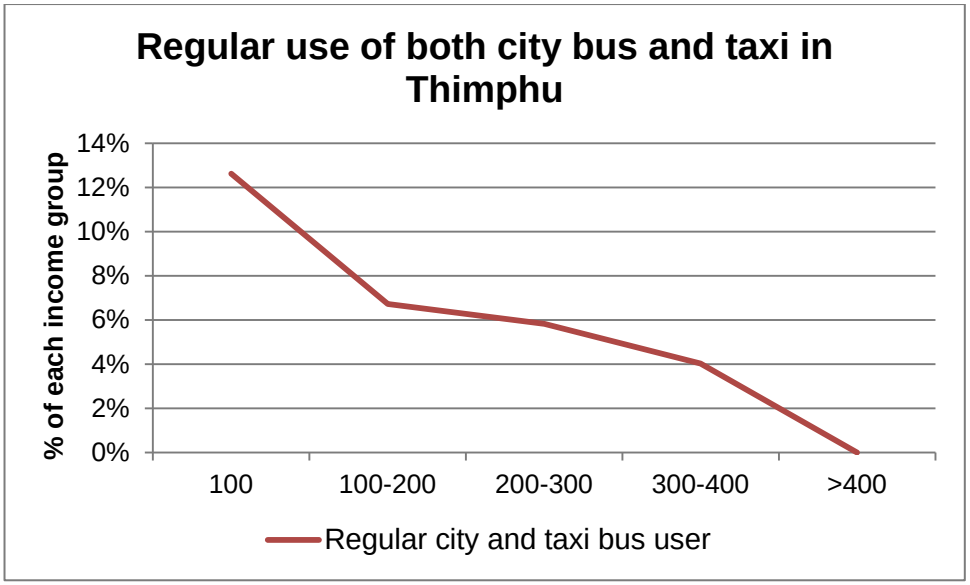


Figure 16 – Regular use of both city bus and taxi in Thimphu per income group

(Horizontal axis: income groups – vertical axis: % using both modes in each group)

Hence, affordability of the cheapest mode appears to not be the only challenge to the poor's mobility. Often, if the poor could use the cheapest mode more systematically, bigger mobility gains within a given budget would be obtained rather than through reducing fares. It is therefore essential to identify quantitatively what main factors prevent the poor from using the cheapest available motorized mode, whether such factor is the price (fare affordability) or the characteristics of supply: quantity, quality, information, accessibility…

We now turn to quantifying this issue.

D.3. THE INSUFFICIENT AVAILABILITY OF CHEAP MODES

Insufficient density of supply of cheap modes

The lack of cheap modes seems to be the main reason why the poor are constrained to use more expensive ones, which in turns constrains the number of trips they can make with the available budget.

This problem of availability (also called low density of supply in the present report), can take several forms:

- Low frequencies,
- Resulting overcrowding,
- Limited coverage in space and/or time (networks do not reach all neighborhoods, coverage varies during the day, etc.),

– Limited density of coverage (stops are distant from each other and from origins and destinations).

These impacts in turn participate in creating other effects: comfort issues, access challenges for paying trips and boarding vehicles, reduced speed due to time needed for boarding and unboarding, excess time for overall trips, etc.

Addis Ababa

The household survey shows that the absence of transport means is cited by most dwellers as their main reason for walking, even in the sub-cities where the share of poor people is the highest (33% to 54% depending on the subcities, 40% overall). Lack of money comes only second (26% to 43%, 35% overall), comfort comes third (7% to 31%, 20% overall), and people citing other reasons are below 5% in all but two subcities (4% overall).

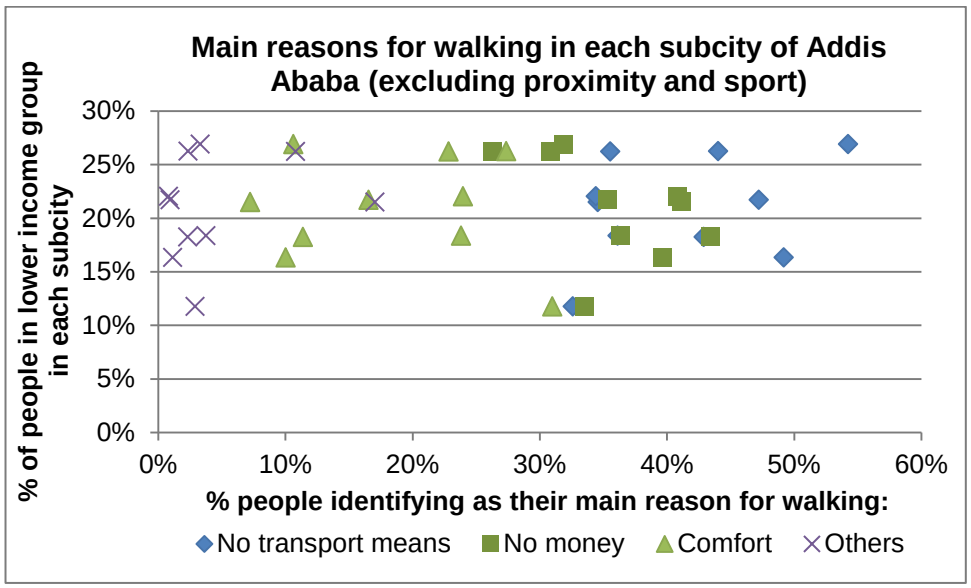


Figure 17 – Main reasons for walking in Addis per subcity

For the poor specifically, and considering only the two main reasons for walking cited by each person, the answer that appears most is the lack of money.

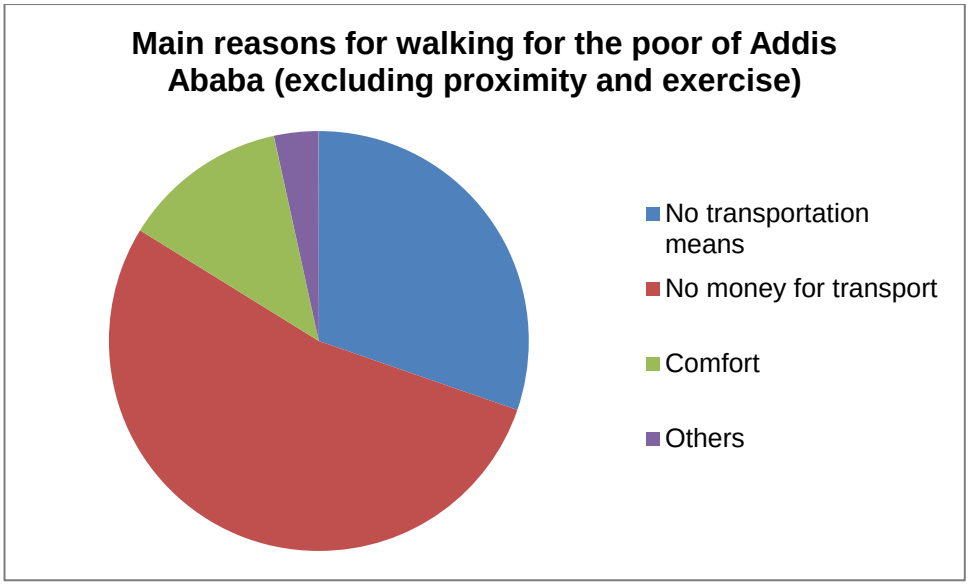


Figure 18 – Main reasons for walking in Addis for the poor

However, this is considering all transport modes. Even though the bus is mentioned as a transport mode by 50.3% of the poor (against 38.7% for the general population), it is the main transportation mode of only 22% of the poor. This can be compared to the fact that 43% of the poor identify the minibus-taxis as their main transport mode. This situation implies that most of the poor were not specifically referring to the bus when highlighting the budgetary problem, but rather to the transport supply they use in general, in particular the minibus-taxi.

On the contrary, when the poor that do not take the bus are asked specifically about the reasons why they choose not to take it, the price appears to be a very minor reason, behind punctuality (frequency) and overcrowding:

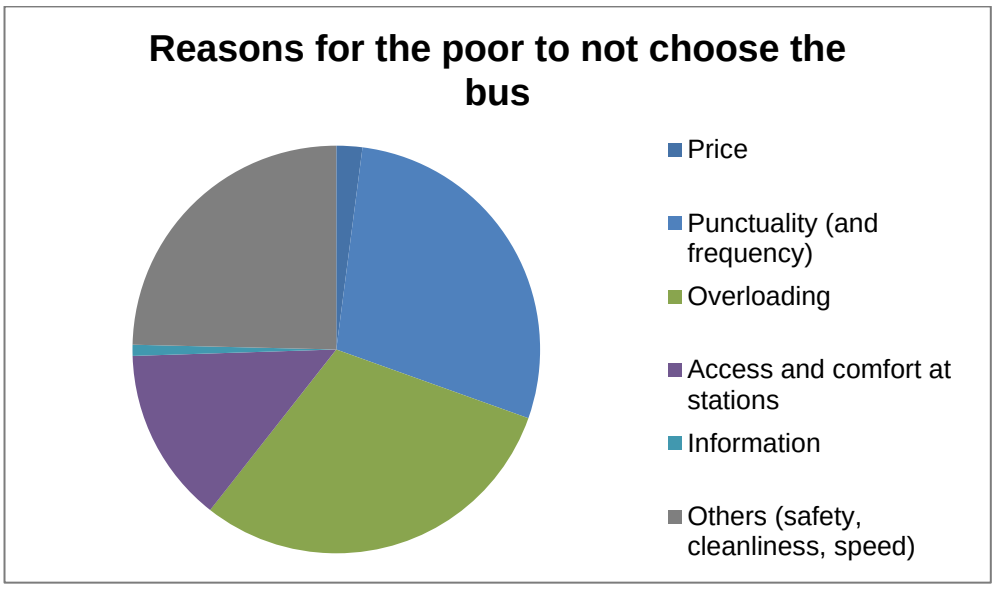


Figure 19 – Reasons for the poor to not choose the bus in Addis

Frequency and overcrowding are both direct results of the insufficient number of buses: Anbessa is keen to ensure a wide geographical coverage of over 100 lines, but with only about 500 buses operating on an average day, it implies very low frequencies on each line.

As a consequence of this focus on geographical coverage, walking distances to access the bus are usually not excessive. They are very similar for poor and non-poor users of the buses:

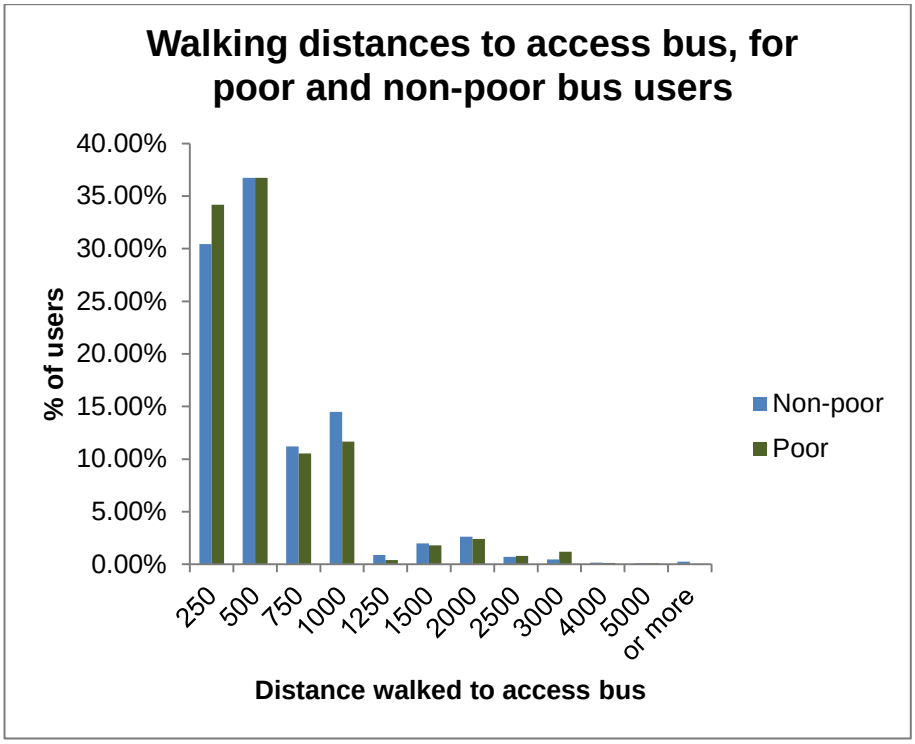


Figure 20 – Distance walked to access bus

However, this widespread coverage hides some discrepancies, as some places do not only have frequency but also coverage issues:

- poor neighborhoods at the periphery, that experience fast growth, in particular through condominium programs, and are underserved (north-east, west, and south),
- some more central neighborhoods that nonetheless face a lighter coverage.

The map below highlights this situation.

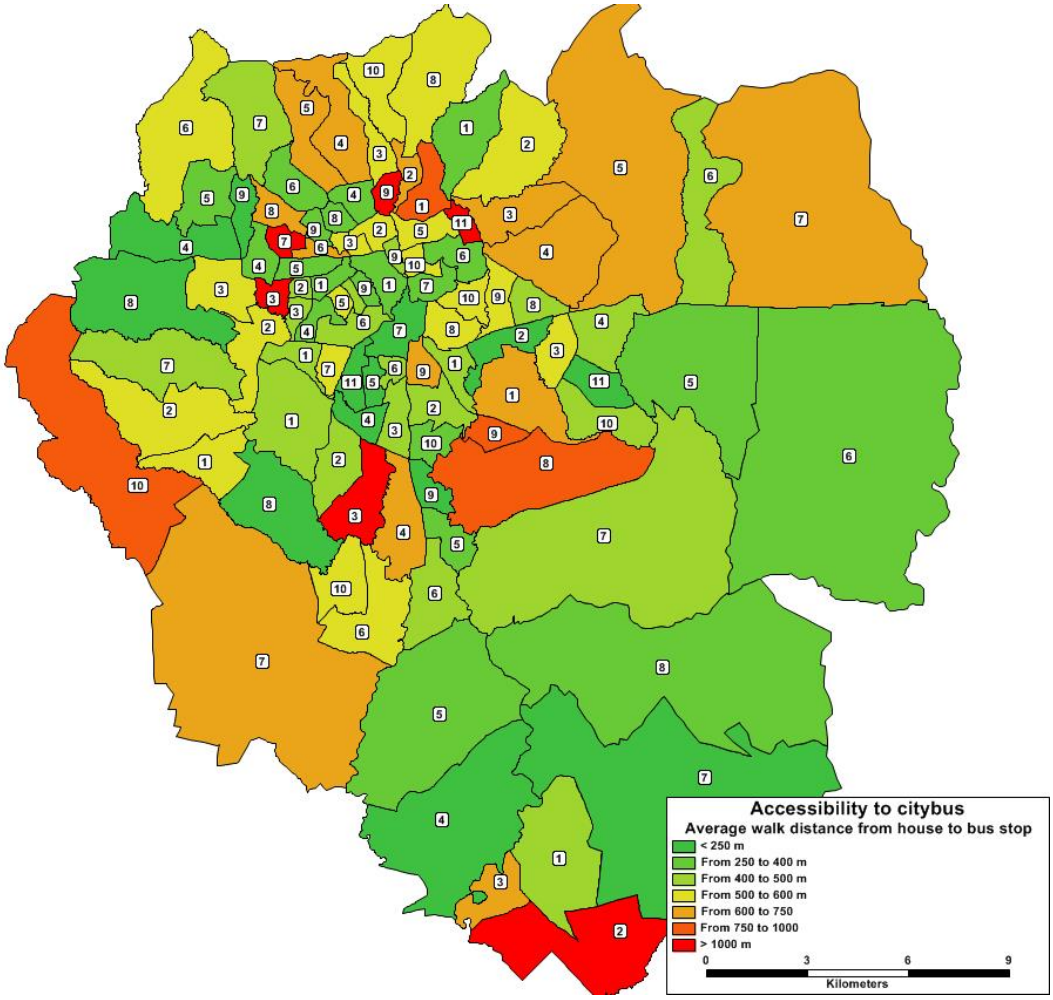


Figure 21 – Map of distances walked to access bus

Dakar

Overall, affordability-related issues are the most often found among the reasons that are cited for cancelling a trip by Dakar dwellers. However, supply density-related issues represent over 40% of cited issues.

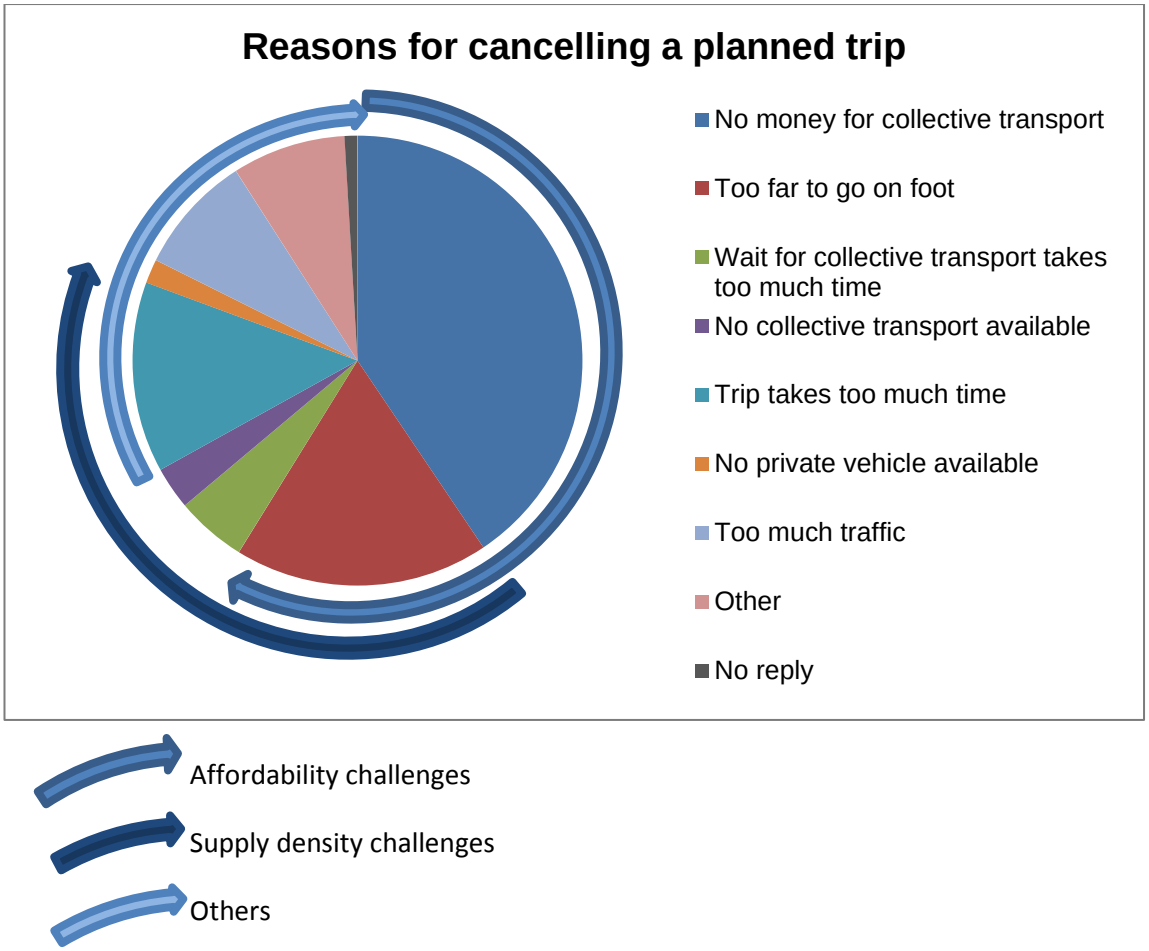


Figure 22 – Reasons for cancelling a planned trip in Dakar

Furthermore, the household survey shows that for many modes, the perceived challenges are linked with density of supply rather than affordability. For the main regulated collective transport modes, the following statistics can be highlighted:

Table 5 – Opinion on different public transport modes in Dakar

% agreement	Cheap	Short waiting time	Station near home	Enough space inside
DDD	87%	37%	54%	51%
AFTU	61%	50%	52%	23%
PTB	82%	67%	21%	45%
Ndiaga Ndiayes	83%	72%	38%	77%
Cars rapides	87%	76%	56%	61%
Clandos	76%	77%	67%	82%

Overall, the main perceived challenge for collective transport is overcrowding, which is directly linked to supply density.

It should be noted that some poor isolated suburbs present walking times to access collective transport that are very significant. At the "département" level, Pikine (with 8.2 minutes on average) and Rufisque (7.3 minutes) display walking times significantly above Dakar itself (6.0 minutes). Not all information was obtained, but the three areas with highest walking times are poor neighborhoods of Pikine (Mbao with 12 minutes and Guinaw Rail with 10 minutes), and of Rufisque (Jaxay, 10 minutes).

43% of inhabitants in the Dakar region say that they are too isolated, but this proportion rises to 62% in the "département" of Pikine on average. The isolated suburbs of Medina Gounass in Gwediawaye, and Thiaroye-sur-mer in Piquine, have the highest percentages, with 92% and 83% respectively.

Overall, the CETUD has identified 10 peripheral neighborhoods (Guinaw Rails, Thiaroye Azur, Diamaguine, Yeumbel, Keur Massar, Keur Aladji Pathé, Kamba, Niaku Rap, Pikine Nord, Rufisque Nord) where access to main transportation means (AFTU, PTB, DDD, Cars rapides) is very difficult and might require to walk for several kilometers.

Thimphu

In Thimphu, data was available to identify that price was far from being the driving reason for not taking the bus, the main reasons being frequency and distance of stations, both indicators of a low density of supply:

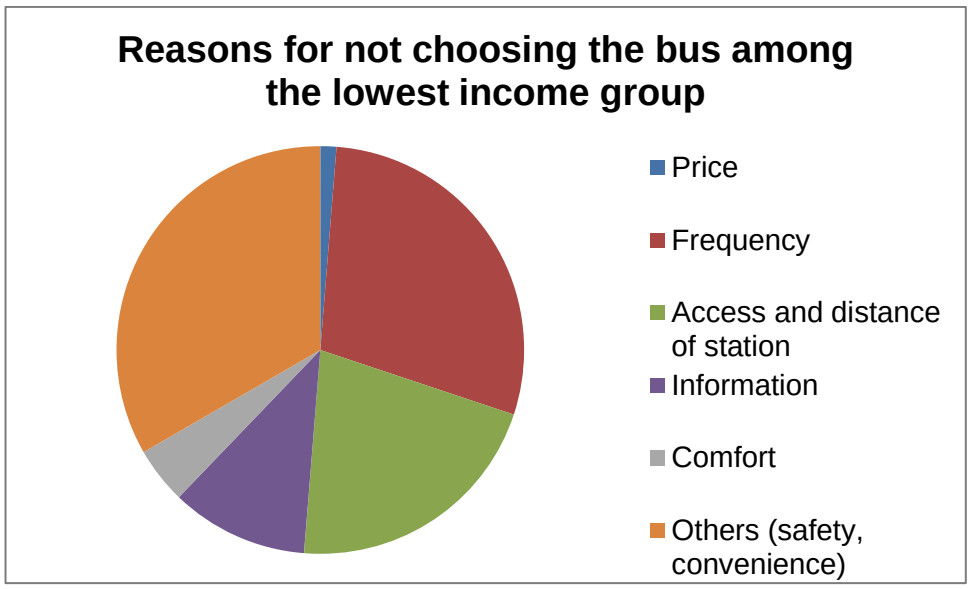


Figure 23 – Reasons for not choosing the bus in Thimphu (lowest income group)

To the opposite, the reasons for choosing taxis highlight that it is mostly because this mode is convenient or quick, which can be seen as a way of saying that the alternative mode, buses, is too complicated and time-consuming due to the insufficient level of supply. It is also to be noted that the second most chosen reason is the absence of any other choice:

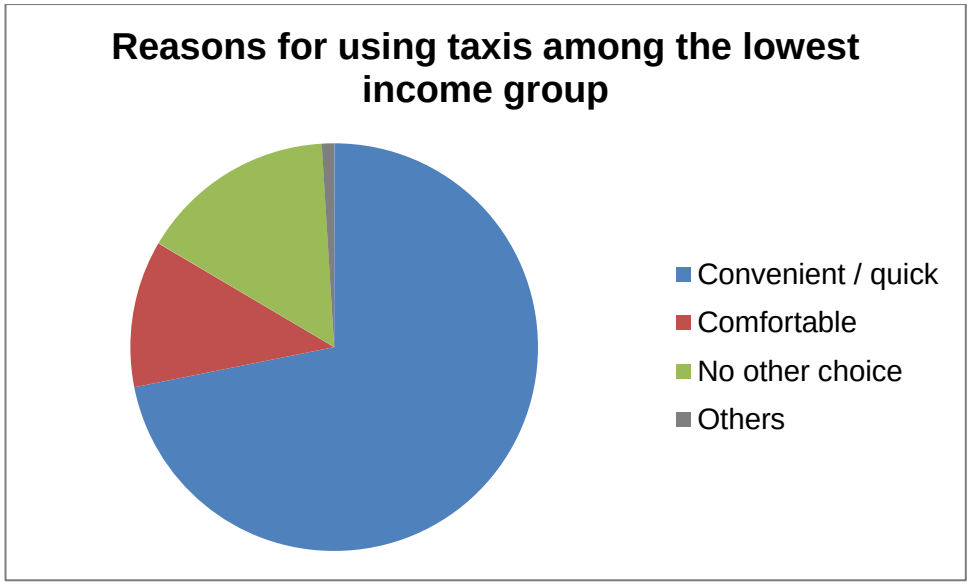


Figure 24 – Reasons for using taxis in Thimphu (lowest income group)

As a consequence, even among the lowest income group, numerous dwellers choose to use taxis:

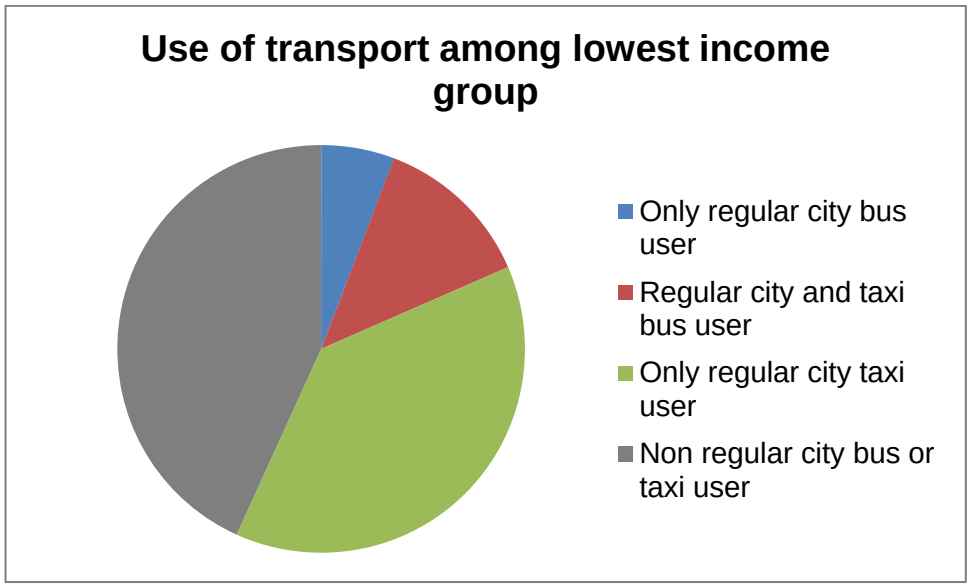


Figure 25 – Use of collective transport in Thimphu (lowest income group)

Increasing supply of buses will allow some poor to shift from taxis to buses, hence reducing their mobility expenses (or increasing their mobility with the same budget), and will also allow some poor that do not regularly use buses due to insufficient availability to start using them.

In a small city like Thimphu, geographical coverage is not an issue, as both poor and non-poor users have an easy access to bus stops:

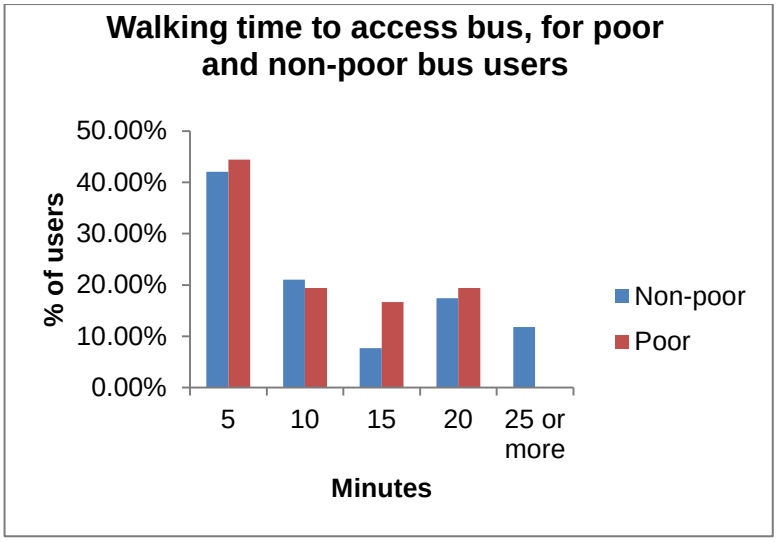


Figure 26 – Walking time to access bus stops in Thimphu

Waiting times are not excessive for the very poor (even though the 100-200 Nu/year households, which are above the poverty line, are 45% to wait more than 10 minutes for their bus), which really brings us back to the fact that overcrowding is the key issue.

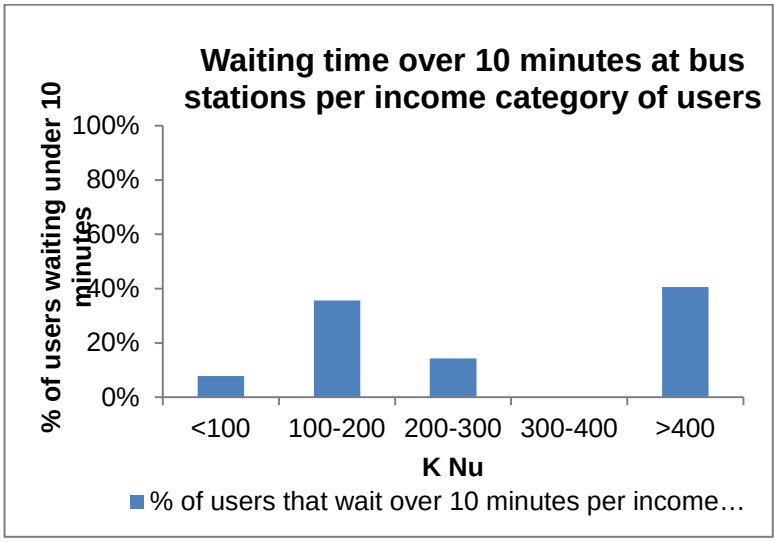


Figure 27 – Waiting time at bus stops in Thimphu

<u>The availability of cheap modes requires the financial sustainability of their operators</u>

Increasing density of supply for the poor can be done through several interlinked ways:

- Increasing the capacity of operating fleets, through:
  - additional vehicles,
  - replacement by higher-capacity vehicles, or

- better maintenance of existing ones;

- Increasing speed and/or other components of operating efficiency,
- Redeploying service towards poor areas and/or specific needs of the poor,
- Ensuring that operators cover their costs in the long run so that they keep operating.

While the first three items can be either jointly implemented or considered as alternatives, in all cases the last item has to be met in order for the system to function in the long run.

Potential projects to increase supply density

Depending on which mode(s) is/are the « cheap mode(s) », and on the sector's institutional and technical characteristics, policies to be carried out in order to achieve the three above-mentioned intermediary objectives can vary greatly. Examples identified by the study are presented below.

Addis Ababa

The cheap mode clearly is Anbessa buses, which is well managed but has lacking financial resources for the maintenance of its ageing buses. Therefore, increasing supply of the cheap mode can mean, among others:

- supporting Anbessa's maintenance,
- supporting the purchase of new additional vehicles,
- in parallel, a contractualization process between the City government and Anbessa, with an adjustment of subsidy mechanisms, would be recommended in order for Anbessa to cover its costs in the future.

The retained project concept for Addis Ababa looks in all these directions, through its different components:

Component A: Vehicles maintenance. This component includes investment in the maintenance of Anbessa buses, in particular the purchase of new equipment for the workshops of the city bus depots and, possibly, training for the maintenance staff as well as recovery of spare parts stocks (in particular imported spare parts). The aim is to increase the overall availability of vehicles and thus to expand the amount of physical capacity on the bus network to the benefit of users.

Component B: Bus services in poor neighborhoods. This will include investment in bus fleet in order to support the creation of new lines serving targeted poor areas. The aim is to increase the density of supply of public bus services in poor neighborhoods. The definition of these new bus lines will have to be conjointly carried out by Anbessa and the AARTB based on data available.

If no additional source of financing for fleet expansion is secured, the amounts made available by the OBA grant itself will not be enough to trigger an interesting fleet purchase, hence this component should be discarded. However, the project's overall target of increasing service to poor neighborhoods (and the related indicators) can nonetheless be maintained: they will

ensure that the increase in fleet availability resulting from component one will be directed in priority to serving poor neighborhoods.

Component C: Public Service Agreement. This component will finance a Technical Assistance for the preparation of a PSA between Anbessa and the AACG, in particular by setting minimal criteria for service delivery and offering a detailed framework for subsidy mechanisms. By supporting this contractualization process, the aim is notably to ensure that adequate amounts of subsidies are provided in the long run in exchange of a continued service to the urban poor, and other performance commitments to be defined.

Dakar

Based on the consideration that AFTU midibuses are part of the collective transport modes used by the poor (even though not the cheapest), a project shortlisted in the study for increasing supply was to expand the already existing AFTU revolving fund, in order to increase the AFTU fleet. AFTU operators fully cover their costs.

Another shortlisted project concept identified to increase the availability of transport to the poor was the creation of specific transport services for deprived categories of population that have specific needs, such as the women working at the fish market. This would be a government-supported partial redeployment of existing transport modes (since these needs are currently served, more or less, by the unregulated “cars rapides”).

Thimphu

The Thimphu project concept, even though not in its OBA part, includes the purchase of buses for the City bus service.

D.4. PHYSICAL ACCESS, COMFORT AND INFORMATION

Challenges of physical access, comfort and information

Physical access and comfort of transport for the poor both depend for a great part on the density of supply of the cheapest motorized modes. Information also does, to some extent, as it is less needed when supply is abundant.

However, they can also be improved per se:

- Infrastructure for non-motorized transport is a key component of the poor’s mobility, as the poor use a very high modal share of non-motorized modes, in particular walking;
- Physical access to stations or other boarding points can be a major problem, in particular in poor neighborhoods were streets and other public infrastructure are in poor conditions; Furthermore, in the case of mass transit, footbridges may be needed to conveniently access stations;
- Boarding of vehicles can be challenging independently of the loading rate of the vehicles, if the infrastructure is not adapted;

- Comfort inside the vehicles not only depends on their load rates, but also on the quality of the vehicle itself and the driving style of the driver;

- Improving information is almost equivalent to reducing transport time, as it is not only a comfort element, but also a tool for users to better plan their travels.

The statistics highlighted in the previous section have showed that physical access, comfort and information are significant challenges for poor users in the studied cities, even though these issues come after affordability and supply density:

- In Addis Ababa:

  - Comfort is identified as the main reason for walking by 10% of poor respondents (excluding "exercise" and "nearest" answers);

  - Physical access and inappropriateness for disabled users represent 7% of reasons cited by poor respondents for not taking the bus, cleanliness 6%, and information 3%.

- In Dakar, the information available does not allow quantifying well these aspects. Security is regularly mentioned in a quantitative way in the report, but is only addressed by the question on whether respondents feel they are **not** at risk of being involved in an accident in each transport mode. Out of the significant modes, for all respondents, taxis are perceived as safest (54% agree), while Cars rapides are perceived as the most dangerous (22% agree). Others are in between: 51% for DDD, 41% agree for clandos, 39% for AFYTU, and 35% for Ndiaga Ndiaye and the PTB.

- In Thimphu, out of the poorest income group:

  - 12% chose to use more expensive taxis because of comfort (of which a part of this may be attributed to the intrinsic characteristics of buses and stops, while other factors are the overcrowding of these buses and discomfort of walking in the absence of buses…),

  - Reasons quoted for not taking the bus appear in the following proportions:

  - 2%: because the user is elderly or disabled, which implies that buses are not appropriate for this type of user (either because of their intrinsic characteristics or because of overcrowding),

  - 4%: because of comfort,

  - 11%: because of lack of information,

  - 14%: because of low convenience.

Potential projects that can improve physical access and comfort

Addis Ababa

A project to increase the quality of cheap transport accessible to the poor, even though not the cheapest, could have been to start a fleet renewal project with informal "blue donkeys" (minibus) operators through a revolving fund comparable to the AFTU one, whereby the fund finances the purchase of new buses, leased to the operators against commitments to fares, routes, and quality. This was part of the shortlisted project concepts.

Another shortlisted, though not chosen, project for Addis was to improve physical access to urban transport for the poor, with three potential subcomponents:

- Improving physical walking paths from poorer neighborhoods to LRT/BRT (paving, sidewalks, overpasses, drainage, etc.) including within slum areas;
- Improving Bus Stops;
- Creating cycling corridors with a pay-per-use bicycle rental system (0,5 ETB/rental).

Dakar

The project concept that has been selected is one that improves quality (and, to a lesser extent, supply) of transport in poor neighborhoods, through support to the development of a new formal transport service in isolated suburbs, connecting them to the city-wide transport system.

Component A: Suburban transport Revolving fund. This will include investment for the initial funding of a revolving fund for the purchase of new suburban transport vehicles. The purchased vehicles will then be leased to operators gathered in Economic Interest Groups against the respect of commitments in terms of routes, fares and service quality. In case of non-respect of these commitments, the vehicles will be taken back from operators. Using a revolving fund rather than extending the privately-financed current pilot project, will allow to better control the operators as vehicles can be reclaimed, hence preventing operators from switching to routes with less difficult operating conditions where they do not serve the intended target and compete against other transport modes, including AFTU.

Figure 1 : The pilot "Taxis de Banlieue" (in white) connect isolated neighborhoods to corridors where they can take other modes (here a "Car rapide" in yellow)

Component B: Regulated transport database. This component includes financial support to the CETUD for the definition of technical specifications for the information flow to be provided from each vehicle of the regulated transport network of the city to the CETUD, and creation of a small web-based interface for the CETUD to manage the data.

Figure 1 :Light e-ticketing systems (supported by a smart phone and a portable printer) are already in use in the "Taxi de banlieue" pilot project

Thimphu

The Thimphu project concept, in its OBA part, will support: (i) bus stop infrastructure including shelters, turnouts, lighting, and basic passenger amenities; and (ii) pedestrian infrastructure connections to upgraded bus stops.

D.5. DIFFICULTIES FACED FOR MULTI-MODAL TRIPS

Challenges associated with multi-modal travels

Challenges related to multi-modality are a combination of the challenges identified above, amplified by the need to connect between two or several modes for a single travel. In particular, the following issues may arise:

- Higher total prices of travel, when the prices of trips include significant fixed parts (i.e. prices are not merely proportional to distance),

- Difficulties at connection points:
  - Low frequency and/or overcrowding of next vehicle,
  - Inappropriate infrastructure for connecting,
  - Insufficient information not allowing to optimize travel design…

In the selected countries, prices are essentially proportional to distance for all modes, which means that prices do not significantly increase due to connections. For example, travelling 2 kilometers on a feeder minibus then 5 kilometers on a mass transit mode will not be significantly more expensive than travelling 7 kilometers in a single trip at the weighted average price per kilometer of both modes. Of course, the installation of a trunk-and-feeder structure may, or may not, imply that additional distance has to be covered for any particular origin-destination.

In spite of the low impact of connecting on total prices, connections are nonetheless perceived as a constraint. In Thimphu, only city of our sample where the data allows to quantify this aspect, the need of transfer embodies 17% of the reasons quoted by the poor for not taking the bus.

Multi-modal transport: nonetheless a crucial need for the poor

Multi-modal travels are a necessity both for the poor themselves and from a wider public policy perspective as soon as the transport system is structured in a trunk and feeder logic (mass transport – BRT, LRT, etc. – on key axes, and elsewhere local services that allow connecting to these key axes). This trunk and feeder organization is the right one in most, if not all, cities where OBA projects could take place, with of course some specificities depending on the urban form of each city.

In Dakar, even though the transport network is still not hierarchized (this will change shortly), 15% of travels are already multi-modal on weekdays.

Potential projects to facilitate intermodality

Addis Ababa

In the context of the shift towards a trunk-and-feeder system in the city (recent creation of two LRT lines, upcoming creation of one BRT line to be followed by six others), a shortlisted project aimed at supporting intermodality (both from a network structuring and from a tariff perspective) was the organization of feeder lines to poorer, underserved areas without increasing the total fare, through Anbessa or contractualized midibuses.

Dakar

Also in a context of a shift towards a trunk-and-feeder system in the city (the creation of one BRT line and the transformation of the PTB into an Express Regional Train being both under preparation), a support to intermodality was also among the shortlisted projects.

Three possible modalities were envisaged, matching the different needs of the Dakar transport system in order for it to smoothly evolve:

- Financial support to guarantee operators' revenues until earnings' stabilization or to ensure an incentive fare supplement for operators during a limited period of time,
- Financial support for the definition of shared norms for ticketing systems and, potentially, for creating financial incentives to adopt the system,
- Financial support for investment in the planning of multimodal exchange points and in passenger information systems.

E. CHALLENGES & OPPORTUNITIES OF POSSIBLE INTERVENTIONS

As suggested by the above analyses, successfully identifying, preparing and implementing an OBA project in urban transport may have structuring effects on the sector overall, that go beyond the immediate user-side impact of the project.

Conversely, designing and implementing an OBA project in urban transport also requires verifying, or putting in place, some key conditions of success.

E.1. ALIGNING POLICY OBJECTIVES

E.1.1. Ensuring coherence with sector policy

As for any project, in particular in urban transport, OBA projects should be part of a broader, sector-wide, long-term approach – in our case, a strategy to improve accessibility and mobility conditions in the city.

Furthermore, as an OBA project may represent a paradigm shift on how to ensure that policies are results-oriented and pro-poor, it is important that local authorities fully understand and embrace the implications of the project. This strengthens the need for the OBA project to be fully aligned with the authorities' main sector policies and vision.

Understanding the authorities' policies

As highlighted in section D.1.3 above, understanding the government's current urban transport policy requires, in the case of urban public transport, characterizing it in terms of the balance between affordability, budget sustainability, and supply density, and assessing whether or how the government intends to shift that balance.

It is also important that the OBA project goes towards implementing the authorities' vision in terms of transport network structure and operations.

Poverty as a focus of sector policy… or not

In many cases, poverty is not the primary preoccupation of urban transport authorities. More frequently, their immediate objectives are rather to maximize positive externalities, in particular agglomeration effects, and to minimize externalities, in particular congestion and pollution (see section C.1.2). As a consequence:

- OBA projects are a good opportunity to bring up the issue of the poor's constrained mobility, and to highlight what can be effectively done for the poor;

- Conversely, OBA projects need to be in line with the broader policy objectives, and should not hinder the overall improvement of the sector for the sole benefit of the poor, which would likely steer the dialogue towards an impasse.

E.1.2. Grounding designs in data

Identifying and quantifying the needs of the poor

As previously explained, in order to target the poor through an efficient and effective OBA project, one needs:

- To identify the barriers to the poor's mobility,
- To quantify the extent to which the project will help the poor by lifting these barriers.

In order to do so, one may need to use:

- A Household Mobility Survey that takes into account income and/or poverty aspects, which is an absolute must in order to identify the poor's needs; whenever possible, specific questions linked to the potential OBA projects should be included at the Survey design stage, in order to ensure a maximum relevance of the study for project preparation;
- A poverty map of the city, as most projects will have geographical implications, and some even use geography as their main targeting strategy;
- A Living Standards Survey or a general census if available;
- Detailed information on the available and planned transport services;
- If available, a City Transport Master Plan or an Integrated City Master Plan;
- Traffic surveys and traffic models, if available, though they might not be necessary at project concept stage.

E.1.3. Strengthening existing institutions

Taking into account the current institutional structure

The urban transport institutional structure is key to the good implementation of OBA projects. Multiple actors will be involved in the implementation phase. Each must have the proper incentives, mandate, and sufficient technical and financial capacity to carry out its part.

In the pilot cities, existing institutional capacity was a major factor in the identification and selection of potential projects. In Dakar, for example, CETUD's proven capacity to implement the AFTU scheme (contractualization by conditioning operators' access to an attractive vehicle leasing program to including new, specific route and fare obligations in their licenses) lead to proposing a similar mechanism for all pilots that included building up a public transport fleet.

On the contrary in Addis Ababa, the initially shortlisted potential project for fleet renewal and contractualization of minibus operators was not finally selected, based on the nature of the relationship between the transport authorities and the operators. In another example in Addis Ababa, the shortlisted potential project for direct support to the beneficiaries of the Urban Safety Net Program was not finally selected for full concept development, because the Urban Safety Net Program selection and identification infrastructure and institutions were still a long way from being ready to support an OBA project.

Using OBA to support or help shape institutions

OBA projects can also be an opportunity to promote important institutional changes. In particular, OBA's results-oriented focus can pave the way for more broadly basing the Government's financial support to the sector on performance rather than on deficit.

Focusing on the poor may also help bring other, more social impact-focused Government institutions into the transport policy-setting process, or foster an increased reliance on data for policy decisions.

A major challenge to leveraging institutional changes through OBA funding, however, is that GPOBA-funding offers one-time grants of a comparatively small amount in a sector usually heavily subsidized (for the reasons explained in section C). OBA projects therefore are best used as replicable pilot projects and/or as projects directly supporting transformation, in order to foster wide-scale changes in the long run. Other results-based instruments with wider-scale funding, such as the World Bank's Program for Results (PforR)[33], can then be used.

Supporting transformation can be done in several ways, depending on sector needs and the authorities' vision:

- Capacity-building. The OBA project may require strengthening the capacity of authorities in charge of public transport, which will have benefits beyond the OBA project.

- Increasing the accountability of Government-owned operators. Because of their focus on actual performance and accountability, OBA projects may require contractualizing the level of service in exchange of the added OBA subsidy. As discussed in section C, subsidies to operators are frequent, but the way in which they are provided can create biased incentives that reduce the operators' efficiency. In the case of Government-owned operators, OBA projects can have a decisive impact in supporting the contractualization of the operator's services, including:

  - defining objectives of public service and performance,
  - linking subsidy levels to measurable achievements,
  - making the subsidy amounts predictable, to the extent allowed by the authorities' budgetary processes.

  This contractualization through a Public Service Agreement (PSA) is generally considered to be an important tool for overall better performance and would have effects well beyond the OBA Project only. The conclusion of a PSA forms part of the project in

[33] Program-for-Results Financing. See http://www.worldbank.org/en/programs/program-for-results-financing

Bhutan. More details on this PSA, which the consultant has participated in designing, can be found in section 0.

- Partnering with the private sector. Through formalization or increased regulation of private operators' activities, where these operators have been operating in a lightly-regulated licensing-based environment:

  - For major operators, OBA projects can support contractualization processes involving enhanced public service obligations (on routes, fares, quality, etc.), similar to the ones highlighted above for public entities, and/or the set-up of full-fledged PPPs, ensuring that public service obligations are respected and aligned with pro-poor considerations;

  - For small-scale operators, OBA projects can support their formalization (through different schemes, including fleet renewals), so that operators can be regulated by the authorities.

- Implementation of new technologies. Monitoring of public service obligations, delivery of subsidies (in particular, when subsidies are directly associated with service delivery, in cases such as fare-sharing schemes, targeted or not to specific categories of users, specific routes, etc.), or improvement of service quality, may rely on new technologies such as integrated light ticketing systems (see section **Error! Reference source not found.**) or others. OBA can help fund these technologies, and assist with carrying out a transformation that is often more complex than expected (in particular, coordination between existing operators and technology providers is usually tricky).

- Supporting the reorganization of operations. When networks are reorganized, demand becomes uncertain on new routes, hence operators are unwilling to take that demand risk. This can have blocking effects. OBA projects could provide transitory support to operators, to guarantee a certain revenue level until network reorganization is complete and operations have proved to be financially viable.

E.1.4. Mainstreaming gender issues

General considerations

Improvement of transport conditions for the poor can easily have a very strong positive impact on women:

- For women in poor households:

  - In poor households with a very small transport budget, men often consume most of the available budget while women have to walk and therefore limit their activities to neighbouring areas. Hence, more affordable transport might open women's access to motorized transport, hence giving them access to economic opportunities and sometimes reducing all kinds of safety hazards associated with walking.

  - Improving quality and quantity of transport, in particular when it allows reducing crowding in vehicles and waiting times at night, will be particularly important for

women in many cultures who are afraid of using public transport for personal security and personal space reasons.

– But also for women of non-poor households:

  - Women of non-poor households often rely much more on cheap collective transport than their male counterparts (for example, over 90% of licensed drivers in Bhutan are male). Hence, women overall may benefit from pro-poor urban transport projects.

Furthermore, access to transport and hence to economic opportunities is a key factor for women empowerment, which in turn is a key factor for reducing poverty. This represents an important ripple effect of pro-poor transport policies.

The Thimphu case

The vast majority of licensed drivers in Bhutan (over 90%) are male. This, and the high price of non-bus transport, are part of the reason why women represent a majority of bus trips (55%), while they only represent 44% of trips overall.

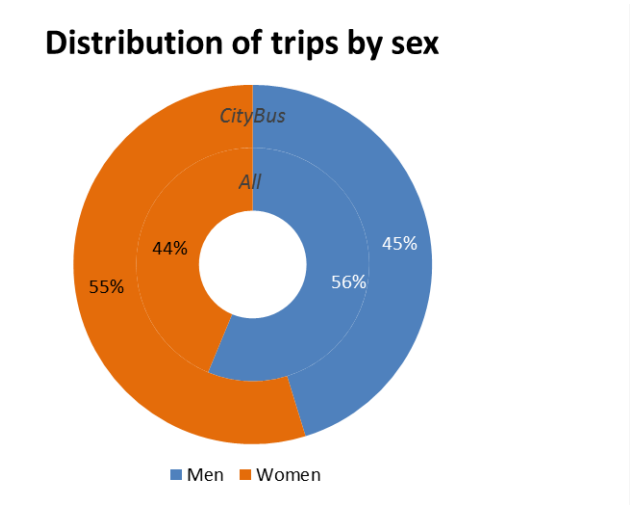


Figure 28 – Shares of trips by sex: City Bus and overall

However, barriers to accessing bus services are also a reason why women are currently underrepresented in the overall trips that are made within Thimphu, based on the Association's household survey on travel behaviours.

For example, 62% of male heads of household reported making two or more trips per day. In contrast, only 17% of female heads of household reported making two or more trips per day. Reduced mobility is particularly true for women in lower income households whose ability to afford private transport or taxis is limited.

For that reason, increasing the density of supply of bus services can offer an attractive, affordable alternative to meeting the latent trip demand of Thimphu's female population.

E.2. ANTICIPATING SCALE-UP AND REPLICATION

OBA projects as demonstrators

Given both the limited funds available under the form of GPOBA grants, and the limited time-span of projects, GPOBA-funded projects should be designed to demonstrate the viability and effectiveness of new sector approaches to improving service to the poor, whether through institutional, organizational or technical innovations (see section F.2.2 Innovation).

Scale-up or replication can then happen in several ways, depending on the initial scope and context:

- Extension of the project to cover the whole city (in case the OBA project was a true pilot, extending only to certain lines or certain districts of a city),
- Replication of the project to other modes of the same city,
- Replication in other cities and/or countries where relevant conditions are comparable.

The additional GPOBA grant, in most cases, is justified at pilot stage by the need to pay for, or cover the innovation risk taken by the public or private project parties. Once the innovation has proved valuable, GPOBA grant funds would either become unnecessary or could be replaced by another funding mechanism with a larger scale: in other words, future financial viability must be ensured by more permanent mechanisms (see E.3 below), and verifying that this can be achieved should be part of the OBA pilot.

Funding an initial information technology investment

In many cases, GPOBA grants will be sufficient – or more than sufficient – to fund initial investment and associated capacity strengthening for the deployment of e-ticketing and fleet management systems, in particular those we characterize as "light" technology (see section E.4 Leveraging information technology). Because data is so valuable for the management of a public transport system (see section E.1.2), the scaling up potential from such IT investments also resides in future improvements that they will make possible, in addition to the ones immediately targeted by the OBA project. In such cases it may often be worth designing such systems to do more than what is strictly required for the purpose of the OBA pilot.

For instance, if GPOBA funding allows for setting up a ticketing and operations monitoring system, with the aim of verifying operators' compliance with production DLIs and for general results monitoring, this system could also enable the collection of network statistics over time (detailed production and patronage data) that until the system existed may not have been available. Such data will then help operators, or transport authorities, optimize the network for better cost efficiency, or help size new line capacity adequately.

Demonstrating the use of pro-poor targeting mechanisms that can be replicated to other sectors

Identifying the poor is not a simple process. In the case of most developing countries, the poor are almost entirely in the informal economy and their income is so low that they do not pay

direct taxes; thus they cannot be identified through existing databases. Social safety net projects have demonstrated the extensive work required to establish a list of poor households, wherever the threshold for "poor" is set: this involves, typically, establishing a methodology, creating an organization with adequate governance, establishing contact points in communities and/or administrative districts, surveying families, creating a database, then delivering means of identification such as personal cards… (An example is provided for Ethiopia in section F.1.2.) All in all, a lengthy and expensive process that is not commensurate with the timeline and amount of a GPOBA-funded operation.

However, as explained in section F.1, an OBA project could innovate by using pre-existing identification systems for targeting transport-related subsidies. In particular, as large social safety net programs have been or are being established in many countries, they could serve as a base to target transport subsidies towards the most vulnerable. Experimenting this "piggy-backing" of an existing targeting program, for specific public services that are managed by other institutions than the one managing the base program, would in many countries set an interesting precedent that could be replicated for other sectors.

E.3. ENSURING FINANCIAL SUSTAINABILITY

E.3.1. Taking the nature of the operator into account

Incentivizing service delivery in PPP schemes

By design, OBA projects are particularly adapted to delivering service through an arrangement with the private sector (in other words, a PPP): they provide a private operator with a financial incentive to target new, more abundant or improved services to the poor.

Large private operators may often be more likely than public entities to be able to:

- Accept and manage risks associated with performance-based payments (if the overall scheme is in line with their financial interest),
- Cover liquidity gaps associated with ex-post financings,
- Understand the OBA concept and integrate it in their planning.

Given the vast variety of possible PPP schemes in urban transport, it would not be practical to define here a detailed typology of ways in which OBA schemes can contribute to optimizing the incentive structure of PPP contracts. This should be tailored to the local situation, the contract type, and what would be assessed as feasible with the existing or potential operators. Nonetheless, we can provide some broad indications and possibilites:

- The private operator can receive a direct additional remuneration for extending more or better services to the poor, which in turn can come in several ways:
  - It can be based on usage (i.e. demand-side subsidies), for instance fare subsidies on specific lines or for specific categories of passengers, or travel vouchers, which has the inconvenient of increasing the operator's revenue risk (which he may or may

not be able to mitigate depending on the terms of his concession or franchise, such as whether he is able to adjust itineraries, capacities and headways);

- It can be based on supply, i.e. making more or better services available to the poor, which leaves the operational risk and in some cases the rolling stock investment risk on the operator, but not the revenue risk;

- It can be a mix of both;

- The private partner can receive an additional remuneration for constructing infrastructure or fixed assets (bus stop shelters,…) that removes barriers for the poor, or for making such assets available;

- The private partner can also receive an additional remuneration for making support services available, that have direct impact on improving service for the poor (fare collection, fleet management, financial clearing between operators, etc.);

- There can be a combination of the above.

In most cases, the OBA mechanism places a financial risk on the operator, as it will be remunerated not on the basis of inputs but of outputs. It is therefore essential for financial sustainability that this financial risk is coherent with the risk apportionment in the operator's existing contract, in other words the operator should not be required to take risk on outcomes he has no or only partial influence on.

Such excessive risk can come either from a disconnect between the type of remuneration and the contractual freedom of action of the operator (typically, asking the operator to take patronage risk on fare subsidies but imposing a certain increase in level of service, because whether the increased level of service will correspond to the additional income generated depends on probably unknown price elasticities); or from requiring more than gradual increases in inputs, for which it may become difficult to adequately estimate the amount of output subsidy required[34].

Improving service by small-scale operators

Small business-based operators have a dominant share of urban transport services in many cities. Their financial capacity is typically very weak, which puts limits on the amount of output risk they can take, and therefore on the type of OBA scheme that is sustainable in such a situation. Some OBA schemes proposed in this report are directly targeted at service delivery through a multiplicity of small operators, such as supporting a better regulation of existing actors, or setting up self-sustaining financing schemes that are meant to improve small-scale operators' service delivery (fleet renewal programs for example).

[34] The latter issue can be solved through periodic adjustment mechanisms, but the public authorities would then have to bear the difference between these periodic adjustments and the amounts in the GPOBA grant. In other words, this idea would be to split the output risk between the authority and the operator, if the authority also plays a role in determining the amount of inputs required towards the targeted results, which is often the case in urban transport.

Rewarding the performance of public entities

In principle, government or local government-owned operators or infrastructure providers (this includes municipalities or agencies providing, for instance, access infrastructure) could be treated, in terms of OBA project design, just like a private service provider under a PPP.

However, the budgeting and funding processes of these entities often make them incapable of bearing cash shortfall risks. Public bus operators, for instance, typically have very little working capital and tend to function on the basis of day-to-day cash available. Procedures to adjust their budgets to unforeseen events can be long and cumbersome. As a result, they may be less capable than a large private operator to take the risk of a disconnect between input costs and output remuneration (whether a time disconnect or an amount disconnect).

While a large private operator has a profit margin that enables it to absorb the output risk, a Government-owned bus operator usually barely makes ends meet and, if outputs end up costing more than planned, it may well find itself in such a financial shortfall that service could be severely affected. Design of the OBA project should be careful to not put the operator in such a situation. The proposed mechanism is in the draft Public Service Agreement designed under this study for the Thimphu City Bus Company (detailed in E.3.3 below) is an example of how to protect the operator (and with the operator, the service) while still making it more accountable.

E.3.2. Triggering efficiency-improving transformations

One way to improve financial sustainability of public transport services is to foster increased efficiency of operations.

OBA projects can fund tools and incentives that foster improvements in sector efficiency, through ICT innovations (see section E.3) but also through institutional and operational reorganizations.

Among others:

- Sector-wide integrated rationalizations of routes at the initiative of the Transport Authority, which may (or not) be associated with operational and fare integration of different transport modes, may lead to more efficient operations from a system point of view;

- Transport operators may improve their efficiency. Better regulation (eventually formalization) of new or existing operators can help ensure that they improve their long-run operational efficiency, in particular by financially incentivizing them to commit adequate funds to maintenance.

E.3.3. Financial balance through contractualization

Challenges regarding the financial balance and incentives of subsidized operators

Authorities have a key and difficult role to play towards subsidized operators:

- As has been seen in section C, supply-side subsidies may prevent operators from expanding operations and from optimizing their efficiency.

- Conversely, excessive pressure on fares imposed by the authorities, and unpredictable subsidies, can jeopardize an operator's operations through gradually growing or sudden funding shortfalls.

As highlighted earlier, contractualization of the operator's services is a well-tested tool towards better financial management on both sides (in particular for government-owned operators). It allows for:

- defining objectives of public service and performance,

- linking subsidy levels to achievements,

- making subsidy amounts predictable, to the extent allowed by the Government's budget processes,

resulting overall in improved efficiency and financial sustainability of the service.

Case study on contractualization: Thimphu City Bus Services

Introduction

The proposed Public Service Agreement for the City Bus Service in Thimphu maintains the existing two elements of public funding: a periodic subsidy and capital grants. However, the consultant recommended changing the way the periodic subsidy is calculated and paid to Operator of the City Bus Service.

The draft PSA and its accompanying explanatory note can be found in Appendix 5.

Objectives of the proposed subsidy structure

The current periodic subsidy is paid quarterly at the end of the quarter following a submission by the operator of a report indicating the incurred costs of delivering the service, the actual fare revenue, and the resulting shortfall.

However, the Government often does not cover the full shortfall, or does so with delay, for a variety of reasons including the lack of budget authorization (when the required amount is more than planned), and improper planning. As a result, the operator is forced to cut service in to reduce cash outflows, thus not making an optimal use of its rolling stock assets. On the other hand, the Government has expressed frustration at the fact that the operator keeps running a deficit and would like to see plans for improvements in the overall efficiency of the service. Maintenance, in particular, suffers from the funding system.

The proposed new structure for the periodic subsidy seeks to answer these concerns through three components: a fixed monthly or quarterly operating subsidy, an annual subsidy adjustment, and an infrastructure maintenance subsidy. The components are structured to attain the following objectives:

- providing budget certainty on both sides: save for exceptional circumstances, both the operator and the Ministry of Finance know in advance the amount of subsidy that will be paid/received over the course of the year;

- making the operator more responsible for the cost of its operations: save for an adjustment for changes in the price of diesel which are outside the control of the operator, the subsidy is based on a gross cost per bus-km that the operator must commit to;

- simplifying the administrative process and its costs by having:

  - a fixed periodic subsidy (monthly or quarterly),

  - adjusting the level of periodic subsidy only once annually to account for changes in operating conditions or service requirements,

  - compensating for actual fare income and production quantities (bus-km) only once annually, through an annual subsidy adjustment at the beginning of the following fiscal year, so that, save for exceptional circumstances, total subsidy amounts in a given year can be kept within the amount approved in the Finance Law;

- identifying separately the funding needs for the base service and those corresponding to service expansion;

- taking into account the possibility of unforeseen or exceptional events;

- providing for adequately servicing and maintaining infrastructure that would be entrusted to the operator.

Requirements

To reach these objectives, it is necessary to:

- implement systematic short- and medium-term business planning for the City Bus Service;

- implement a governance mechanism for the service, involving all stakeholders, so that all parties agree on the contents of shared short- and medium-term business plans, i.e. essentially the levels of service required and the technical and financial means necessary to provide it;

- align the calendar of subsidy revisions and adjustments to the Government's budget cycle;

- implement a compensation for the difference between planned service,revenue and actuals in year N that would be due only in year N+1;

- ensure however through the schedule of subsidy installments that the Operator retains sufficient working capital to operate normally.

Annual cycle:

1) The bus service would be under the oversight of a multi-stakeholder technical committee, including in particular the Ministry of Finance.

2) The Operator would prepare 5-year and annual business plans that would require a consensus of the technical committee.

3) The 5-year business plan would be adjusted annually before the draft Finance Law is prepared, providing information about the amount of subsidy to be proposed in the Finance Law submitted to the Parliament's vote.

4) Following approval of the Finance Law for fiscal year N, the operator would then prepare and submit for approval:

   a. an operations report for year N-1, which would translate into a compensation due the difference between the actual bus-km produced and the actual fare revenues vs. the planned ones,

   b. an annual business plan in which the operator would adjust the service proposed (i.e., in a period of expansion, adjust the quantity of proposed new services) so that the total of (i) the subsidy required for year N's service and (ii) the compensation due in year N for year N-1, remain within the amount approved in the Finance Law.

5) The annual business plan would commit the operator to a certain cost per bus-km, save for changes in the price of diesel fuel.

E.4. LEVERAGING INFORMATION TECHNOLOGY

E.4.1. Introduction on Fare Collection Systems, Fleet Management Systems, and User Information Systems

The rapid growth of information and communication technologies (ICT) in the last decades and the increasing demand for mobility solutions have led to the emergence of intelligent transport solutions (ITS). These solutions aim mainly at monitoring transport networks, adjusting operations in real time, automating the sales process and making it faster, monitoring the corresponding sales and traffic data, and informing passengers.

While fleet management is essentially helpful to optimize operation and maintenance costs, e-ticketing may reduce transaction costs and improve fare collection, but also may be necessary to offer fares tailored to customers' needs (passes, discounts, intermodal fares, etc.). Passenger information is equally important to improve the performance of the transport network because it allows passengers to make more efficient transport choices and reduces the negative impact of waiting times.

ITS options such as e-ticketing, fleet management and passenger information solutions exist in cities across the world, mostly in higher and upper middle-income countries. Cities in emerging and developing countries have also shown interest for improving their transport systems through IT solutions (Lima, Peru is an example among many). However, the implementation of such systems should only follow an analysis of the context and a determination of needs. Many factors, such as the size of the network, the existing infrastructure, the institutional and financial

organization (number and size of operators, type of contractualization if any, remuneration modalities, type of subsidies if any, etc.), will impact the choice of the systems to be implemented.

The following paragraphs describe three different levels of integrated ticketing, fleet management and passenger information systems. The first ones are considered as "paper" systems as they do not rely on IT solutions. The second solutions are "light" systems, meaning that these solutions rely on ICT technologies but do not require the use of specific IT infrastructure. And finally, the last ones are "e-"solutions relying on the installation of specific equipment and telecom infrastructures.

E.4.2. Types of ticketing and fleet management systems

The most frequent base case: "manual", paper-based systems

Ticketing

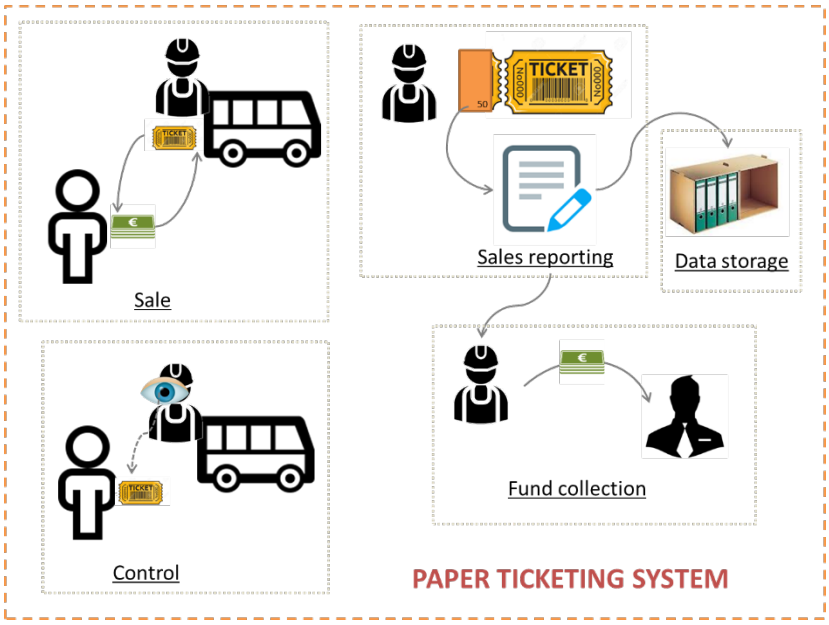


Figure 29 – An example of paper-based ticketing system

Many developing cities and small to medium developed cities use paper-based ticketing.

The conductor of the bus (or, if there is no conductor, the driver) sells paper tickets to the passenger. The conductor has different tickets for each fare or subscription available. The transport ticket can then be checked and be perforated or torn by the conductor himself or a verificator.

A sales report is then elaborated from the tickets stubs, which allows the transport operator to determine the number of tickets sold per conductor per shift.

Fleet management

Numerous transport networks in developing cities also use non-automated solutions to perform their fleet management operations. This means that the transport operator uses paper files to track its vehicles (current status of the vehicle, kilometres per vehicle, brand, year of purchase, maintenance operations …) and to program the runs (identification of the vehicle, the driver and the conductor assigned to a certain itinerary at a certain time). Paper systems tend to be limited to the core and essential functionalities of fleet management.

Heavy E-Systems

Automated Fare Collection system

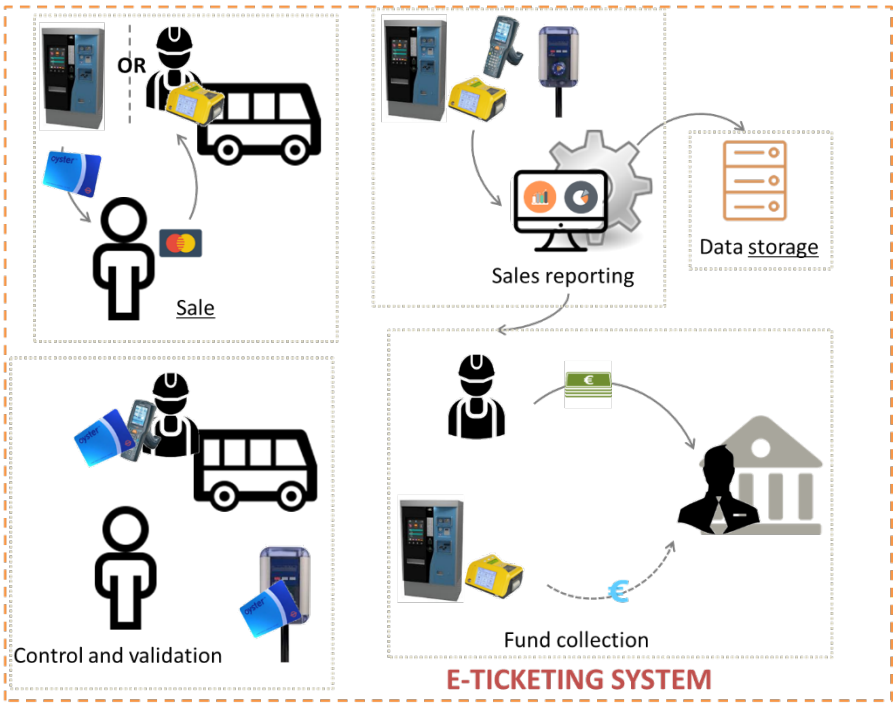


Figure 30 – An example of heavy Automated Fare Collection System

In the past decades, many major developed cities have implemented “heavy” Automated Fare Collection and fleet management systems. These solutions which rely on specific equipment and infrastructures offer numerous functionalities.

An example of e-ticketing system is presented below. The system typically works as follows: the traveller owns a smartcard on which she/he can record her/his “profile” (student, retired, social category …). Then, the traveller can load her/his smartcard at a fare vending machine with the appropriate ticket (special discount for students for example) or a certain amount. Before getting on the bus, the traveller validates the smartcard loaded with a transport ticket or an amount at least as high as the fare at a validating device. On the bus or when getting off the bus, the traveller might need to present its smartcard again, which has been validated before, to a verificator who will ensure, thanks to a specific device, that the travellers’ smartcard has been loaded with the adequate transport ticket and validated or was debited of the proper fare. The various equipments in the system can communicate together and with a central system. The

sales and validation data are thus sent to the central system which uses them to perform sales analysis, transport ridership reports and financial reports among other functionalities.

Description		***Automated Fare Collection (AFC) system based on the use of "heavy" equipment able to communicate together and with a central system*** *Example : AFC systems in European cities (Navigo in Paris for example)*
Main Equipment		- Fare vending machines - Point of sale terminal - Validating device - Checking device - Central system
Network coverage required		- Telecommunication links for the ground equipment (SDSL) - For the on-board equipment: . Radio (specific infrastructure) . Wifi . 3G, 4G, GPRS (usually the network solutions are based on a combination of these technologies)
Sales	Sales method	On-board, and/or on fare vending machines in stations and in points of sales. After the payment, the equipment either loads the transport fare on a contactless support or delivers a new support.
	Transport support	Contactless media: smartcards, contactless tickets, smartphone…
	Means of payment	Cash, bank card (including contactless bank card), check Payment by mobile phone (NFC) is also available for some transport networks
	Manage-ment of the variety of fares	Selection of the requested fare by the client (on the Fare Vending Machine) or by the salesperson or driver. The complex structure of the fare system (numerous fares in function of welfare beneficiary status, operators and distance for example) can also justify the complexity of the AFC system
Verification Method		Verification of the possession of a valid ticket thanks to a checking device.

		Specificity: the users are requested to validate their ticket before using the service. The verification consist in verifying the possession and validation of a transport ticket
Fraud rate		Medium (user fraud)
Data	Collection	Required data sent to the central system (ongoing transmission or time to time synchronization in function of the equipment)
	Analysis	- Calculation of the turnover - Amount of sales per equipment - Quantity of fare sold - Various statistical reports can be performed (peak-load times, …) - Revenue repartition in case of fare integration
	Archiving	Data stored by the central system
Fund collection schemes		With the help of the system (calculation of the amount supposedly collected) the conductor, driver or salesperson calculates and closes his/her cash register. The cash amount collected is then deposited at the depot.
Business model		The equipment and AFC system are usually owned by the transport operator.
Investment costs		High (between $300,000 and $1M and up depending on size of operations)
Operating costs		At least around $100,000

Fleet Management system

Like the Automated Fare Collection systems, automated fleet management systems require the installation of specific equipment and IT infrastructures to be able to operate. These systems allow to monitor and track operations in a transport network and also to collect data which can be used by traveller information systems. An example of fleet management system is presented below.

Description		***Vehicle scheduling control system based on the use of specific equipment able to communicate together and with a central system.*** *Example : vehicle scheduling control system of the RATP (Paris, France)*
Main Equipment		- On-board equipment - Radio aerial - Central system
Network coverage required		- Telecommunication links for the ground equipment (SDSL) - For the on-board equipment : . radio (specific infrastructure) . Wifi . 3G, 4G, GPRS (Usually the network solutions are based on a combination of these technologies)
Functionalities		- Lead / lag management (for this function a Radio connexion is usually required) - Real time management fleet - HR management (change of shift management) - Voice communication - Traveller information completed by the installation of information terminal, or mobile applications for example) - Calculation of the estimated time of arrival to the next stop - Alert system (In function of the needs of the transport network, this list can be completed by other functionalities)
Data	Collection	Required data sent to the central system (ongoing transmission or periodic synchronization depending on the equipment)
	Analysis	*Data used to perform the functionalities described above*
	Archiving	Data stored by the Central System

Business model	The equipment and AFC system are usually owned by the transport operator
Investment costs	Around $350,000 + $6,000 per vehicle
Operating costs	Around $115,000 + $400 per vehicle per year

Light automated systems

Automated Fare Collection

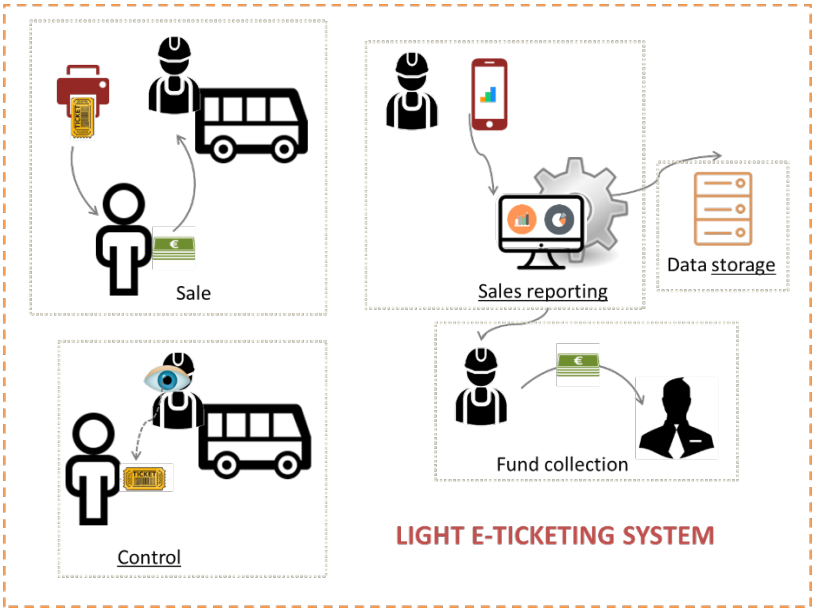


Figure 31 – An example of light Automated Fare Collection System

In recent years, several e-ticketing providers have focused their efforts on developing cheaper Automated Fare Collection (AFC) solutions adapted to smaller transport networks. These efforts have resulted in the development of new e-ticketing solutions often based on smartphones and requiring no specific heavy IT infrastructures. Similar solutions have also been developed by actors operating outside the ticketing field.

These "light" systems have been implemented in middle-sized European cities (example of the Communauté Urbaine de Saint-Omer in the North of France) as well as in developing cities. The example hereafter presented is based on the "iticketing" solution implemented by Amarante, an IT firm, in Dakar, Senegal. This solution consists in using a smartphone and a Bluetooth printer installed in each vehicle to produce and sell paper tickets. The corresponding sales data are collected and sent to a central system for storage, reporting and analysis.

Description		***Automated Fare Collection system (AFC) based on equipment requiring no specific infrastructure.*** *Example : "iticketing" by Amarante implemented in Dakar, Senegal*
Main Equipment		- Smartphone - Bluetooth printer - Central System - Computers and internet connexion (that the transport operator might already own)
Network coverage required		Depending on the real time connectivity required : GPRS, 3G coverage (solutions can be developed and implemented to overcome poor / patchy data coverage)
Sales	Sales method	On-board sales (in some other light AFC systems, sales via internet, smartphone and SMS are also available). According to the need of the traveller, the conductor selects through the smartphone the required fare, selects the corresponding amount and then prints the matching ticket.
	Transport support	Printed ticket
	Means of payment	Cash (in some other light systems AFC payment is also available via credit card or online payment)
	Management of the variety of fares	System to help to choose the appropriate fare : in function of the bus route (geolocation), the Smartphone only offer the fare available for the corresponding line.
Verification Method		Visual verification or use of a control number (in some other AFC systems, checking equipment can also be implemented to automate the verification process)
Fraud rate		Medium (since the implementation of the service in Dakar, the fraud rate among the drivers and conductors has sharply decreased).
Data	Collection	Sales data are periodically sent by the smartphone to the Central System
	Analysis	- Calculation of the turnover - Number of tickets sell per route (line + vehicle), per conductor and per stop

		- Production of statistical reports The transport operator accesses this information thanks to a software/interface accessible through an internet connexion.
	Archiving	- Data stored by the central system - Data saved for at least 4 years
Fund collection schemes		The system calculates the amount to be collected by the transport operator per conductor based on the expenditures and receipts of the day
Business model		Usually service-based. The server and software are owned and maintained by the IT provider and the transport operator rents the equipment and there is a monthly fee to access the service (data, reports, statistics,…) on a web interface. This is particularly economical where there are many small operators.
Investment costs		Low (around $50 per vehicle)
Operating costs		Low (around $25 per month per vehicle)

Fleet Management system

Often, the light ticketing solutions developed in the last few years also include fleet management units.

For example, the "iticketing" solution developed by Amarante offers fleet management functionalities without requiring any installation of heavy, specific IT infrastructures and mainly based on the data collected by the smartphone. Indeed, thanks to the GPS included in the smartphone, the system allows in particular to track the vehicles in real time and to manage the allocation of vehicles and itineraries to conductors and drivers.

Description	***Vehicle scheduling control system based on simple equipment which does not require specific infrastructure*** *Example : "itiketing" by Amarante implemented in Dakar, Senegal (in this example, the AFC system and scheduling vehicle control system are paired)*
Main Equipment	- Smartphone - Bluetooth printer - Central system - Computers and internet connexion (that the transport operator might already own)
Network coverage required	Depending on the real time connectivity required : GPRS, 3G coverage (solutions can be developed and implemented to overcome poor/patchy data coverage)

Functionalities		- Tracking and management of the fleet - Real time tracking of the vehicles - Information about runs, itineraries - HR functionalities (conductor and driver duty time, planning, and clocking in and off)
Data	Collection	The data are sent by the Smartphone to the Central System
	Analysis	*Data used to perform the functionalities described above*
	Archiving	- data stored by the Central System - data saved for at least 4 years
Business model		Service-based. The server and software are owned and maintained by the IT provider and the transport operator rents the equipment and there is a monthly fee to access the service (data, reports, statistics,…) on a web interface.
Investment costs		$50 per vehicle (mutualized with the AFC system)
Operating costs		$22 per month per vehicle (mutualized with the AFC system)

A multiplicity of possible systems

The 6 systems presented above are examples of ticketing and fleet management solutions among the many existing. Thus, the elements presented are not exhaustive; ticketing and fleet management systems need to be adapted to the context they are being implemented to and thus can be a combination of the elements presented and can be completed by additional functionalities. For example:

- An IT software can facilitate the process of data collection and analysis in a paper ticketing system
- A light AFC system could consist in specific equipment printing paper transport tickets and sending the sales data to a central system (example of Bhutan)
- Smartcards and other contactless supports can be used with a light AFC system
- SMS can be used to pay for the transport service (example of SMS ticket in the TPG network, Geneva, Switzerland)
- A public-private partnership business model type could be chosen for the implementation of an AFC system (such as in Riga, Latvia or Lima, Peru where the PTA did not support the investment costs but allowed an e-ticketing concessionaire to collect a percentage of the sales for a certain amount of time).

E.4.3. User information systems

User information allows travellers to gain knowledge of the mobility options at their disposal, hence making the link between user demand and the supply of transport.

Information is as critical as speed to the value of the transport service offered. Indeed, having information allows users to select overall faster routes and/or reduce connection times, and therefore reduces overall time dedicated to transport. It also gives them more comfort as it has been demonstrated that waiting times are more bearable if the traveller knows how long it will last.

When implementing traveller information systems, the following fundamentals must be considered:

- Build a traveller information chain that is efficient and coherent
- Provide information to the traveller at the right time
- Homogenize all the maps
- Manage information in real time
- Tackle intermodality issues
- Reduce the number of visual impacts
- Favour continuous and integrated signage and information media
- Ensure universal access to information
- Enable the identification of a singular itinerary within a global network
- Adapt maps and schemes to particular uses
- Build a graphic transport language that takes the existing environment into account
- Differentiate transport information from other local information

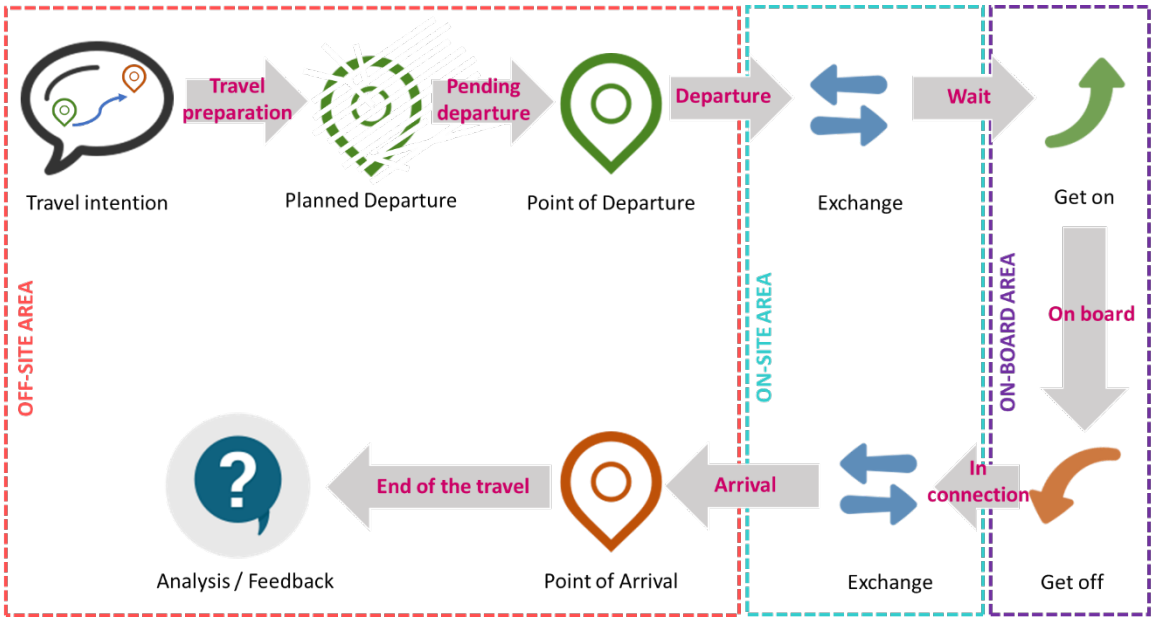
Moreover, traveller information needs to be adapted to the place where it is provided and to its purpose (phase of the travel chain). The travel chain is composed of several phases:

- Preparation of the journey
- Pending departure
- Departure
- Wait
- On Board

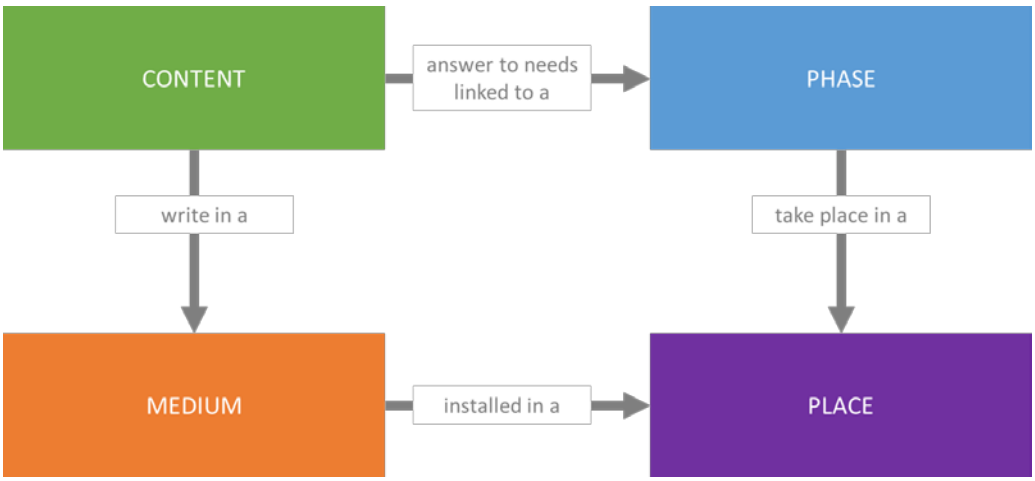
- In connection
- Arrival
- End of the journey

Three spaces characterize the travel chain:

- Off the Transport site
- On the Transport site
- On Board of the Transport mode



The content and medium of user information have to be adapted to the different phases and places of the travel chain.



The user information contents are conveyed through various media (brochures, posters, electronic displays and screens…):

- Shared media (screen displays for example)
- Personal media (mobile phones for example)

Feeding the user information system

Traveller information systems need transport data to be operational. The three main types of information that can be used in a traveller information system are:

- Theoretical information
- Real Time information
- Circumstantial information.

The Automated Fare Collection and Fleet Management systems presented above (whether light or heavy) can contribute to user information systems by feeding some of their data, either to collect initial information (routes, timetables…) or to update it. For example, parametering a Fleet Management systems requires knowing such information as theoretical routes and timetables. This information can then be used to feed user information systems. Moreover, Fleet Management systems can also collect real time information (lead / delay, next passage at a stop…) that can directly be used to inform travellers.

Examples of user information media

Depending on the phase of the travel chain, the place, the available technologies and context of implementation, and the available budget, user information can be performed through various solutions. A few examples are listed below:

- **Paper timetable**: based on theoretical information and not requiring IT infrastructure, paper timetables display the schedule of a line
- **"Next departures" screen display**: installed in a bus terminal and based on real time information, to display the next X bus departures (time of departure) and the corresponding platforms
- **Smartphone app**: mobile applications can be seen as a mobility guide as they can be used in every phase of the travel chain. The itinerary search function can first be used by the traveller to prepare his journey, then he can follow his trip in real time on his phone and be warned of any disruption (in that case he is proposed an alternative itinerary). Finally, if the traveller had any trouble during his trip he can contact customer service through his smartphone.
- **SMS information**: through SMS technology, users can have access to the timetable of a stop. This type of solution consists in the passenger texting a station/stop code (written

on the stop) to a certain number, and then having an answer indicating the time of the next vehicle stopping there. The information sent to the users can be either theoretical or in real time depending on the solution implemented. This type of user information system has been implemented in several transport networks around the world (Paris or Washington DC for example).

The latter traveller information solution seems highly relevant for many cities in developing countries as it does not require specific IT infrastructures (thus has a lower investment cost) and seems to match the growing use of SMS technology that is affordable to even poorer users *(according to Spring 2014 Global Attitudes survey, 80% of African cell phone owners use their cell phones to send text messages).*

E.4.4. Advantage and challenges of technology upgrades in the framework of OBA projects

From paper to light systems

Major advantages

Light systems, like presented above, demonstrate highly relevant characteristics in the light of OBA core principles. A light Automated Fare Collection system allows for the collection of sales data, including the place and time of the sale, and light fleet management systems allows for real-time tracking of the vehicles. Thus this information could contribute to verifying the actual and effective use of supply-side and demand-side subsidies:

- Proof of the use of transport services in targeted geographical areas
- Proof of the sale of a certain type of pro-poor fare
- Proof that the operator runs routes in certain pro-poor targeted areas.

Such systems prove to be very acceptable to operators, which reduces the risks of tensions between the operator and the Authority and/or the service provider for the IT systems:

- They are financially sustainable for the transport operator because they are cheap and typically enable a sharp decrease in fraud rates. For example, in Dakar the vehicles equipped with the iticketing (Amarante) solution increased their turnover by 30%, a gain several times higher than the system's total cost.
- The operators can choose and negotiate with any service provider, as long as the functional specifications of provided data meet the standards set by the Authority, which means that the constraint on the operator is light.

Light AFC and fleet management systems prove to be efficient, **innovative** and **sustainable** tools to realize **output verifications and monitoring** of the efficiency of the subsidy, such as required by the OBA core principles. They could also ease the implementation of effective demand-side subsidies. For example, the systems could technically allow for the feasibility of discounts specific to certain targeted areas (if legally feasible) or could eventually facilitate the identification of individual customers and apply discounted fares for such customers.

Moreover, these e-systems present additional potential co-benefits. In particular, operational performance of the whole transport network could be improved as automated solutions allow to:

- Save time: the sales process is simplified and should be quicker, and the sales data collection is facilitated (no need to manually enter the data in a database)
- Improve the reliability: the automatization of the processes allows to decrease the risk of human errors, and allow for safer transmission and storage of the data

Light automated systems can also simplify the implementation of intermodal fares (specifically thanks to revenue apportionment calculation).

Challenges

Light solutions can also present some drawbacks, which have to be anticipated for successful implementation:

- Eventual difficulties of implementation and operation due to poor / patchy telecom coverage
- Training needed to learn how to use the equipment and functionalities of the systems
- More limited range of functionalities than “heavy” systems
- Need to have one or several competent service providers locally.

From paper or light systems to heavy e-systems

Heavy e-ticketing systems and fleet management systems have advantages that are however often outweighed by their costs and challenges in the context of OBA projects.

Limited additional advantages

Compared to light systems, e-systems present the advantage of being able to handle more complex transport systems and may be better adapted to more sophisticated networks. For example, the management of the advance / delay per vehicle can be tracked thanks to advanced fleet management solutions and then be sent to traveller information services.

The differentiation between the action of selling the ticket and the action of validating it for a trip also allows for implementing additional functionalities. For example, thanks to the validation data, ridership reports can be elaborated indicating the effective use of the transport service, and identifying peak hours. These data are principally useful in schemes where the purchase of a transport ticket does not lead to its immediate use (example of the 10-tickets booklet), but also present the advantage of allowing for the collection of information on the effective use of season passes. The existence of a validation process is also a prerequisite to the implementation of services that are remunerated ex-post, which may facilitate the management of intermodal fares.

Major challenges

These systems can provide data that could be relevant in OBA projects but several elements demonstrate the irrelevance of these types of systems for OBA project:

- Challenge of the initial implementation: projects to deploy such e-ticketing and fleet management systems are usually very long (around 16 months between the start of the definition of the system and its implementation)
- Unaffordable investment and operating costs: these costs are often too high as compared with both benefits and available funding
- New IT infrastructures required
- Often drastic behavioural changes required by the implementation of these systems (for both the travellers and the transport operators)

E.4.5. Roadmap for the implementation of an IT system

As explained above, the relevance of implementing an IT ticketing and/or fleet management system, whether light or not, depends greatly on the specific context of the unmet traveller needs and the operation conditions of the network. In particular, the following elements must be taken into account:

- Needs to be met: definition of objectives both in terms of operation and user experience
- Transport network characteristics: size of the network, number of vehicles, customer path (validation process, distinction between the sale of the ticket and its effective use to travel)…
- Operator structure and organization: operation and fare collection processes, number of employees (drivers, conductors, inspectors)…
- IT context: existing or planned ICT infrastructures, current transport or ICT projects, local habits for using ICT (smartphone penetration rate for example)
- Sustainability: automated fare collection and fleet management systems have annual operating costs. Options to ensure financial coverage of these costs must be identified (increased revenue from reduced fraud rates, annual supply-side subvention...)

Although implementation of an automated fare collection system or fleet management system may require some changes in the operator's organization or the passengers' habits, it still needs to remain relevant to the local context: for example, the implementation of a light e-ticketing system including the use of smartphones to load the transport ticket (the traveler can buy, load and validate his ticket on his smartphone) would be irrelevant in the pilot cities because the penetration rate of mobile internet services remains too low; on the other hand, the implementation of a mobile money payment method could be efficient because these services are widely used in at least one of the pilot cities. As another example, ticket vending machines are often a bad choice in poor countries because they are more expensive to maintain than

having sales staff (either in station or on-board), and because travellers are not used to them which results in maintenance and fare evasion issues.

Of course, the sustainability of the implemented systems is particularly critical: a given system is only relevant if the transport operator(s) have the required human and financial means to operate and maintain tehm properly.

The interoperability of the system is also an essential issue for the public authorities, to ensure:

- The possibility to share information defined in a coherent way,
- The possible of fare integration (intermodal fares), now or in the future,
- System resilience in case an operator or an IT service provider needs to be replaced.

This requires the authority to mandate some standards or requirements in the early phases of the project. These requirements should be not be over-reaching (which could drastically increase system costs) but should include the minimal common functional or technical characteristics that must be met for any transport system in a common territory.

F. RECOMMENDATIONS FOR STRUCTURING AN OBA PROJECT

The recommendations in this chapter are organised in three sub-sections:

- Recommendations on how to address the first OBA core principle: the pro-poor focus,
- Recommendations on how to address the other five OBA core principles,
- A design roadmap for identifying and structuring OBA concepts for urban transport.

The recommendations are illustrated with examples from the three pilots.

F.1. MAXIMISING PRO-POOR IMPACTS – THE FIRST CORE PRINCIPLE

F.1.1. Targeting, a project implementation modality

Effective impact as the priority

As highlighted earlier in the report:

- the key driver of project design should not be targeting, but maximising impact towards meeting the needs of the poor;
- targeting methods cannot be selected independently of project types, and the preferred type of project depends on the barriers the project aims at overcoming;
- therefore, targeting should first be designed to answer project objectives, and then checked for consistency with GPOBA's requirements.

Each category of project can be associated, depending on the exact project modalities, with one or a few targeting methods.

Table 6 – Standard categories of OBA projects in the urban transport sector emerging from data analysis in the three selected cities

Standard categories of projects	Objectives	Possible targeting modes
Improving and/or increasing regulated collective transport services	Improving the quality and/or the quantity of formal transport services serving the poor	Modal / geographic
Improving unregulated transport services	Improving the quality and the quantity of other public transport services serving the poor through line/service agreements	Modal / geographic

(gradually regulating them)		
Improving physical infrastructure for motorized and non-motorized transport	Improving physical conditions of access (such as safety and convenience among other things) to motorized and non-motorized modes of urban transport for the poor including the elderly, children and the disabled	Geographic / modal
Improving intermodality	Improving the quality and the quantity of public transport services serving the poor through the organization of feeder lines that are economically viable for operators and affordable for poor transport users	Geographic / modal
Supporting affordability of urban transport for low-income users	Facilitating financial access to urban transport for the poor.	Individual
Providing specific transport services for targeted low-income groups	Addressing the specific transport needs of identified poor groups.	Geographic / modal

For urban transport projects, the targeting strategy therefore becomes a key element of project design that needs to be optimized within the framework of other project requirements.

Efficiency of targeting

Reducing inclusion and exclusion[35] errors is important and should generally be pursued in an OBA project once a concept is identified. However at concept identification stage this principle has limitations.

Eliminating inclusion and exclusion errors is meaningful **only as long as the cost of the targeting mechanisms does not outweigh the perceived cost of misallocating the resources.**

For example, trying to set specific lower fares for poor people based on an individual identification of their socio-economic group (like in Bogotá) is not realistic in Thimphu, where no individual socio-economic identification mechanism is in place: putting such a system in place would have a cost greater than the project amount itself. On the opposite, it might become relevant in Addis Ababa if it is backed on the future Safety Net program that is currently under preparation, if and when such program puts in place the required individual identification tools.

A good indicator of targeting efficiency can be the % of total budget – cost of targeting included – actually allocated to the poor, rather than inclusion and exclusion error figures alone.

[35] For pilots in a specific area that are meant to be replicated, it is obvious that exclusion errors should only be assessed over the area of the pilot and not the entire city.

F.1.2. Targeting strategies

Direct and indirect targeting strategies

Targeting strategies rely on two levels:

- First level, definition of ultimate target: who are the population targeted by the policy;
- Second level, targeting criteria: how to ensure that the targeted population is actually the one benefitting from the policy.

As mentioned above, both levels can be the source of inclusion and exclusion errors: failures of the targeting mechanisms are challenges at the second level, while side effects and design issues of the policy/project are failures at the first level.

Targeting strategies can be classified in two broad kinds:

- Direct targeting: individual
- Indirect targeting: proxy, geographic, service characteristic (modal)

Direct targeting: individual

Principles

Direct targeting is based on each (individual or household) user's characteristics. In that case, the targeting criteria are simply the characteristics of the targeted user.

For sectors where targeting is easy to implement (water, electricity or sanitation connections), targeting mechanisms can be directly based on the household's income and/or on the characteristics of their home (geographic and others), which guarantees highly effective targeting. The characteristics of the projects (for example, physical connection to networks) allow such targeting mechanisms to be quite efficient as well.

For other sectors, such as urban transport, targeting the user directly based on its income is likely to be efficient only if a system is already in place that allows to easily identify the poor. In the cases of Addis Ababa and Dakar, the setting up of urban social safety net programs, which require the creation of universal beneficiary databases, provide interesting opportunities.

Example of Addis Ababa

The Ethiopian government and the World Bank are preparing an Urban Productive Safety Net Project that will be implemented in Addis Ababa among other cities. The first phase supported by the proposed project will run from 2016 to 2020 and will focus on putting in place basic safety net building blocks, including productive and predictable transfers to targeted poor households through public works (PW), livelihood interventions, and capacity building.[36]

This Urban PSNP can be expected to draw on the targeting and registry methods developed for the rural Productive Safety Net Project that has been implemented since 2005 in Ethiopia.

[36] Urban Productive Safety Net Project Information Document – Appraisal Stage, World Bank, October 2015

According to the World Bank's Project Identification Document: "*In the long run, the proposed Urban Productive Safety Net Project (UPSNP) and the rural PSNP will allow the GoE to gradually expand the safety net to national coverage.* […] *UPSNP and the rural PSNP will be guided by a common policy framework and will also share a number of operational modalities and systems to ensure a coherent national safety net program. The design of the urban safety net will make linkages with PSNP to benefit from the PSNP's systems investments. These will include such areas as the national unified registry and the management information system (MIS).*"

The targeting process has, since the PSNP's beginning, been based on several layers:[37]

- Identification of woredas (third level in the hierarchy of Ethiopian administrative geographic subdivisions) that are chronically food insecure (not applicable to Addis, which is at the same time a state, a zone and a woreda);
- Within these woredas, assignment of beneficiary numbers to each Kebele (smallest administrative subdivision, present in Addis) by local program administrators based on the perceived needs;
- Local community-based selection of household beneficiaries based on a series of criteria (set at regional level at the inception of the program);
- For graduation (i.e. exit from the program once the household has obtained enough wealth), valuation of the households' assets and comparison between this value and a benchmark.

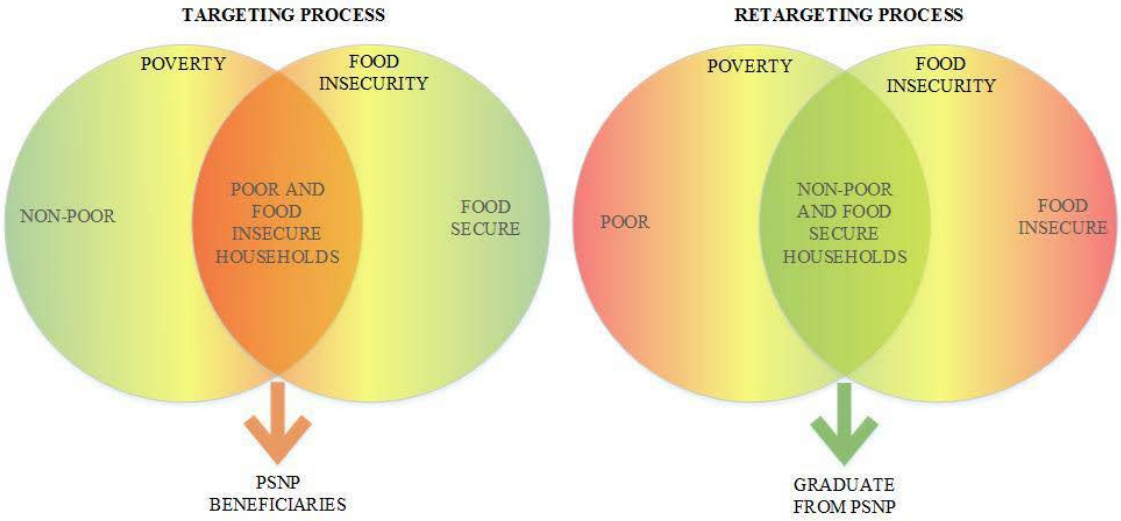


Figure 32 – Targeting process for Ethiopia's PSNP[38]

Beneficiaries are then registered on a software called PASS, specific to this project, and at woreda level only.

[37] PSNP4 Project Appraisal Document, World Bank, September 4, 2014

[38] PSNP4 Project Appraisal Document, World Bank, September 4, 2014

Improvements that are being brought to the targeting mechanisms of the PSNP according to the PAD of the fourth PSNP financing approved by the World Bank in September 2014 are the following:

- Improved targeting of kebeles based on a new food security index;
- Verification of the community-based selection using a household poverty index that aggregates:
  - an asset-based formula already using assets as proxies to identify poverty levels (which can be adjusted depending on the context: urban/pastoral/agricultural),
  - the new food security index at kebele level;
- Creation of appeal committees to decide on cases where the community-based selection and the household poverty index do not give the same results, both for the initial inclusion or exclusion from the program, and for the graduation decision.

Registering will also be improved, through:

- The creation of an integrated National Household Registry (NHR) database that can be used by any administration in charge of safety net, social protection or relief program, with the aim of establishing a technical, objective, equitable and uniform mechanism for classification of households in different poverty levels.
- The creation of a Management Information System (MIS) that can handle administration, targeting and registration, case management, payroll, and monitoring and indicators.

The implementation of these practices for the urban PSNP will allow having a database of poor urban households associated with poverty indicators. This could then be easily used to determine, through a scoring process, which households can be eligible to urban transportation support.

The last organizational and technical challenge would be to go from this database-based targeting to the actual distribution of the subsidy (through cheap or free bus coupons or pre-loaded magnetic cards, or through identity cards or chipcards allowing for a discount when purchasing tickets onboard buses, for which the operator is then compensated). In all cases, this will require a capacity to verify a means of identification of eligible household members in order to prevent fraud.

Example of Dakar

Since 2014, the World Bank has been supporting a « Social Safety Net Project » in Senegal, which provides block grants (« Bourse familiale ») and employment opportunities (employment on small-scale local civil works with high labor intensity) to the poorest households.

The project financed the set-up of a Unified National Register (“Registre National Unique”) for vulnerable households, the design of a targeting process to identify such households, and the development of an information system that could manage the corresponding database. Beneficiaries are issued a personal identification card with safety features to reduce the possibilities of fraud.

The Government has made this targeting database available to any program that would seek to address the needs of the most vulnerable. The first series of beneficiaries have been identified. This program could be used to target the distribution of demand-based subsidy support to public transport usage. The challenges are the same as in Addis Ababa, and in particular strong controls would need to be in place so that operators have no incentive to cheat the system.

Indirect targeting: proxy, geographic, service characteristics

Principles

Indirect targeting is based on a quantitative and qualitative assessment of whether the overall policy or project is targeted to a significant enough poor population, and whether the targeting mechanisms satisfactorily directs policy or project benefits to this targeted population.

Indirect targeting can usually be accomplished through three selection criteria (taken alone or combined):

- Proxy: subsidies applied depending on user types (for example: students, elderly, etc.);
- Geographic: project applied to a certain area;
- Service characteristics:
  - For urban transport, a certain mode (modal targeting),
  - For energy, a voltage level or annual energy delivered;
  - Etc.

Indirect targeting requires having enough information on the project's expected impact. It is worth noting that, if well designed, projects can be aimed at very specific groups even though their targeting criteria are merely modal and/or geographic. For example, subsidizing bus services on specific routes at specific times can be a way of addressing the specific needs of low-income women going to the market in Dakar.

The initially proposed possible project concepts in the three pilot cities were based primarily on modal targeting (improving the quality and/or the quantity of formal transport services in Addis and Thimphu, for example) and others based primarily on geographic targeting (improving transport infrastructure in specific areas in each of the three cities, for example).

The lack of data for defining accurate proxies, and the perceived low interest in proxy-targeted projects, have not allowed us to develop concepts based on proxy targeting.

A successful project, both for direct and indirect targeting, must strike a good combination of targeting accuracy and effectiveness of intervention, as highlighted below.

Geographic targeting – example of Addis Ababa

The geographic approach works by identifying where poverty and key accessibility challenges coincide. In the case of Addis, it is interesting to incorporate in this approach the fact that numerous government-lead condominium projects generate fast-growing, high-density, non-

rich areas which need to be served, and where part of the poor are also likely to live, due to new social rental schemes.

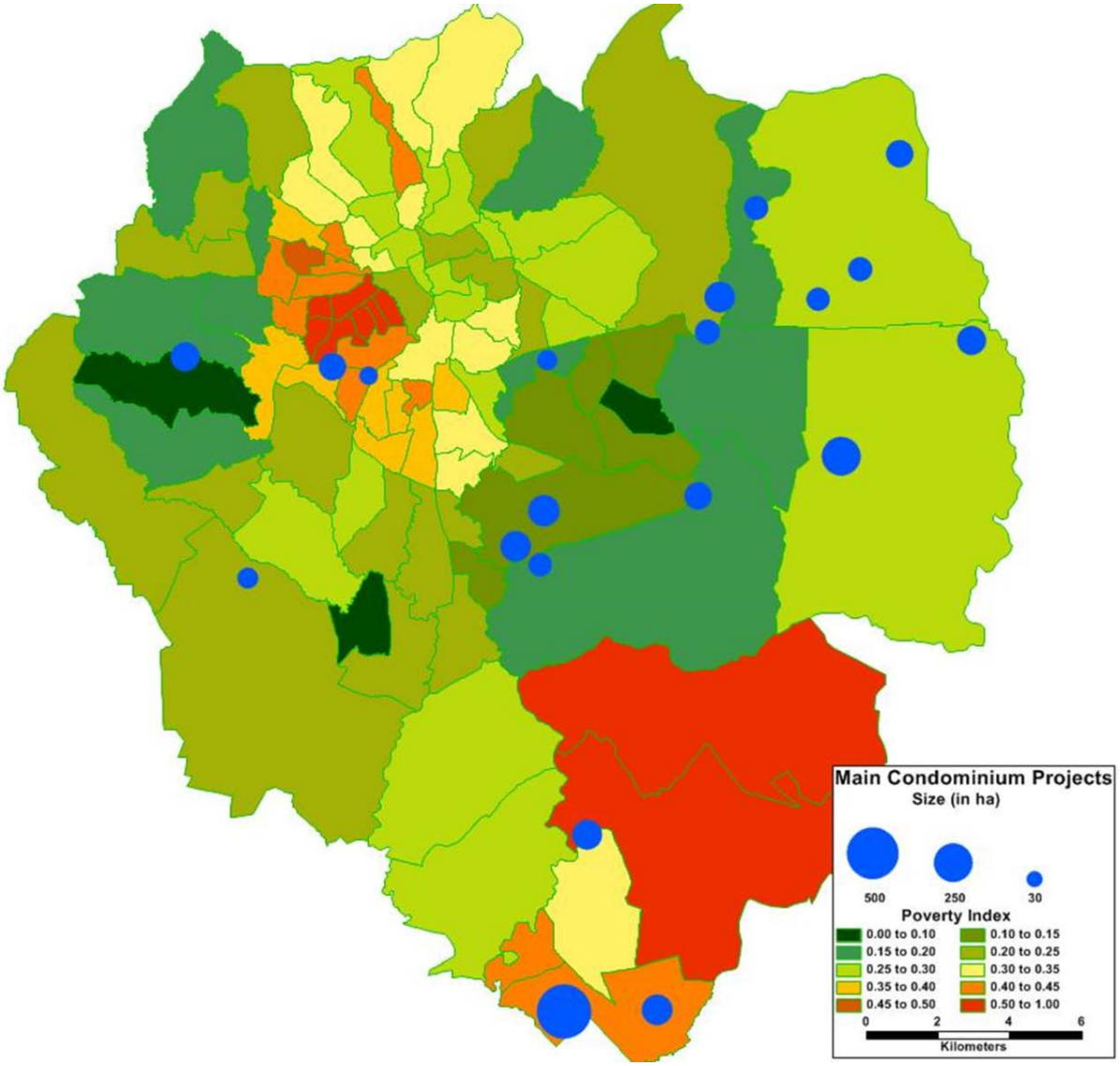


Figure 33 – Addis Ababa poverty and Condominium projects map[39]

[39] Source: Addis Ababa Housing Program Department data used by the authors; and Ethiopia Poverty Assessment 2014, World Bank

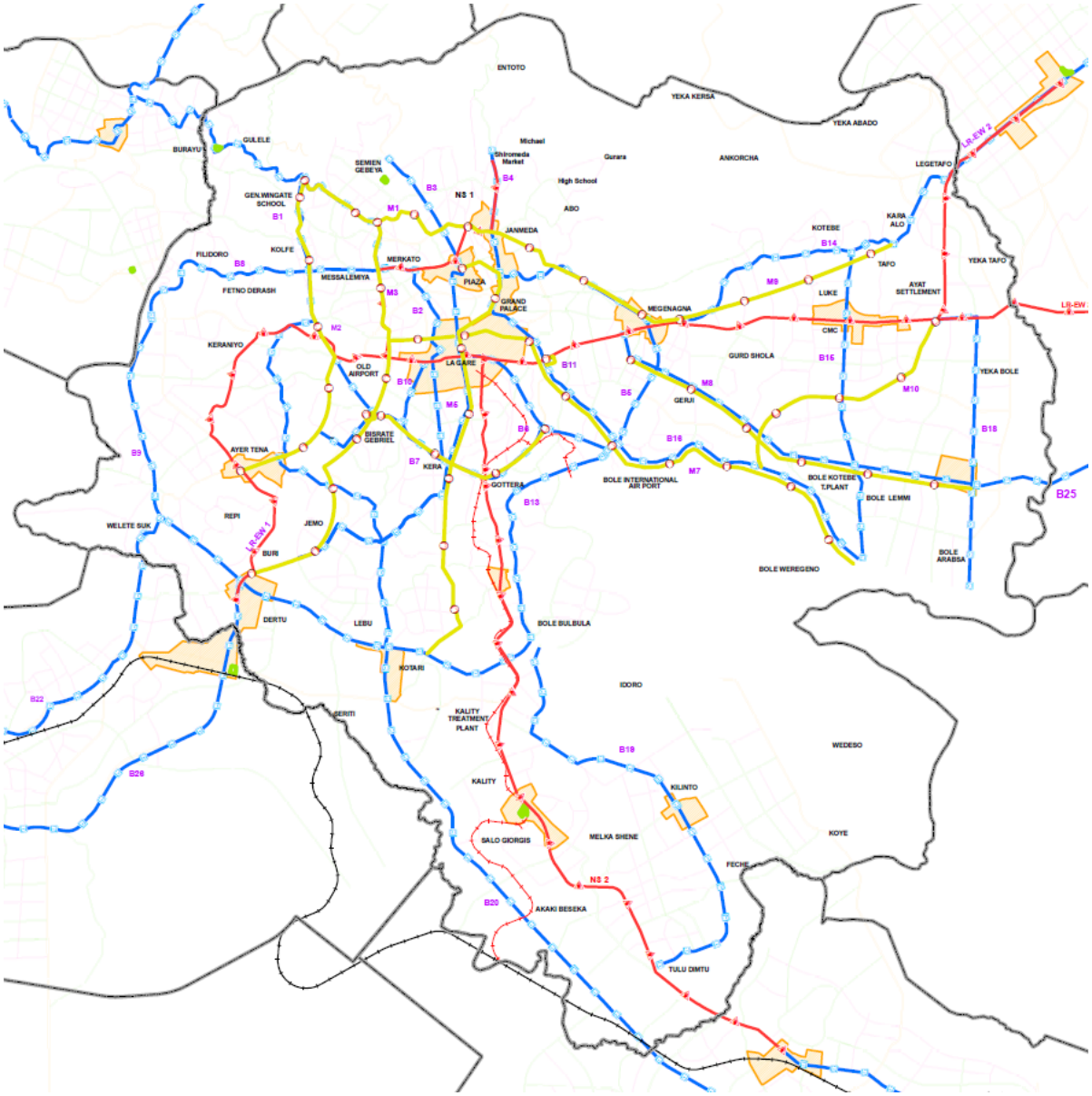


Figure 34 – Addis Ababa regulated transport map[40]

For Addis Ababa, available data allows us to assess, at near-kebele level (some kebeles being grouped together), both:

- poverty levels (from the 2011 Household Income, Consumption and Expenditure Survey), as shown above, and
- collective transport issues (from the Household Mobility Survey) as highlighted in part D.3.

[40] Addis Ababa Integrated City Masterplan preparatory documents

(This would have been a very strong tool to support detailed tailor-made project design if the questionnaire of the household survey had been oriented towards assessing the needs for several kinds of potential projects.)

Already, the data allows for the identification of specific needs in some poor neighbourhoods that are situated farther than usual from bus routes. By crossing kebele groups with high poverty and with high walking distance to the nearest bus (see Figure 20 – Distance walked to access bus), we have identified a few "challenged" kebele groups[41].

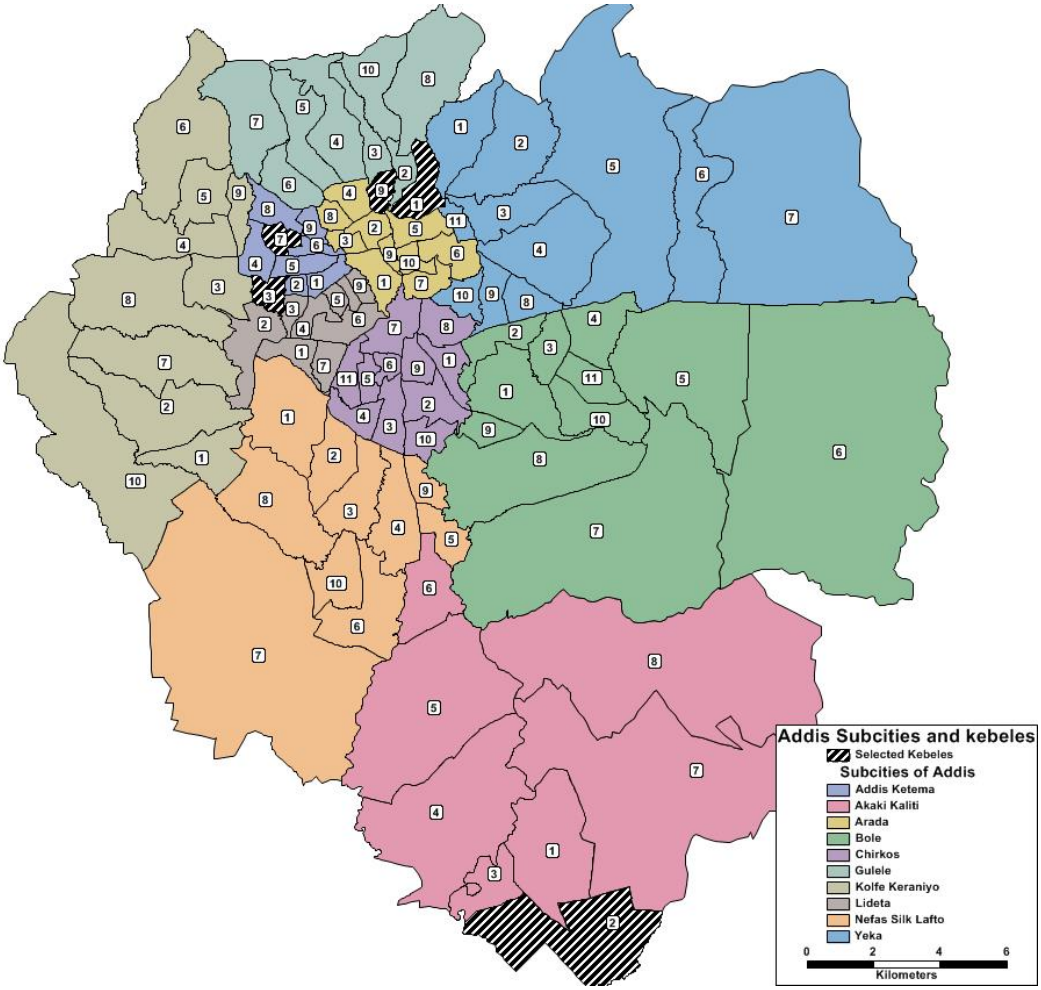


Figure 35 – Map of selected kebele groups

Interestingly enough, they are both:

- Towards the periphery of the city (north and south), and
- In the core of the "poor center" of Addis Ababa.

This may suggest different challenges: booming demography and lagging service in a remote area at the southern periphery, limited service due to lower population density at the northern

[41] Kebele group 2 of Akaki Kality corresponds to Kebele 02/04 of Akaki Kality in the administrative division of Addis Ababa, group 3 of Addis Ketema is Kebele 06/07, group 7 of Addis Ketema is Kebele 16/17, group 1 of Gulele is Kebele 01/02, group 9 of Gulele is Kebele 6

periphery, lack of commercial viability of transport operations and/or lack of good quality road infrastructure in the central poor area…

However, altogether they show a strong lack of transport options, which really advocates for a – at least partially – geographic approach to transport challenges:

- Even though buses are less accessible, they are more widely used as primary means of transport by the poor (25% versus 22%), and so is walking (41% against 32%), while the dominant motorized mode, minibus-taxis, is far less predominant (31% against 41%).

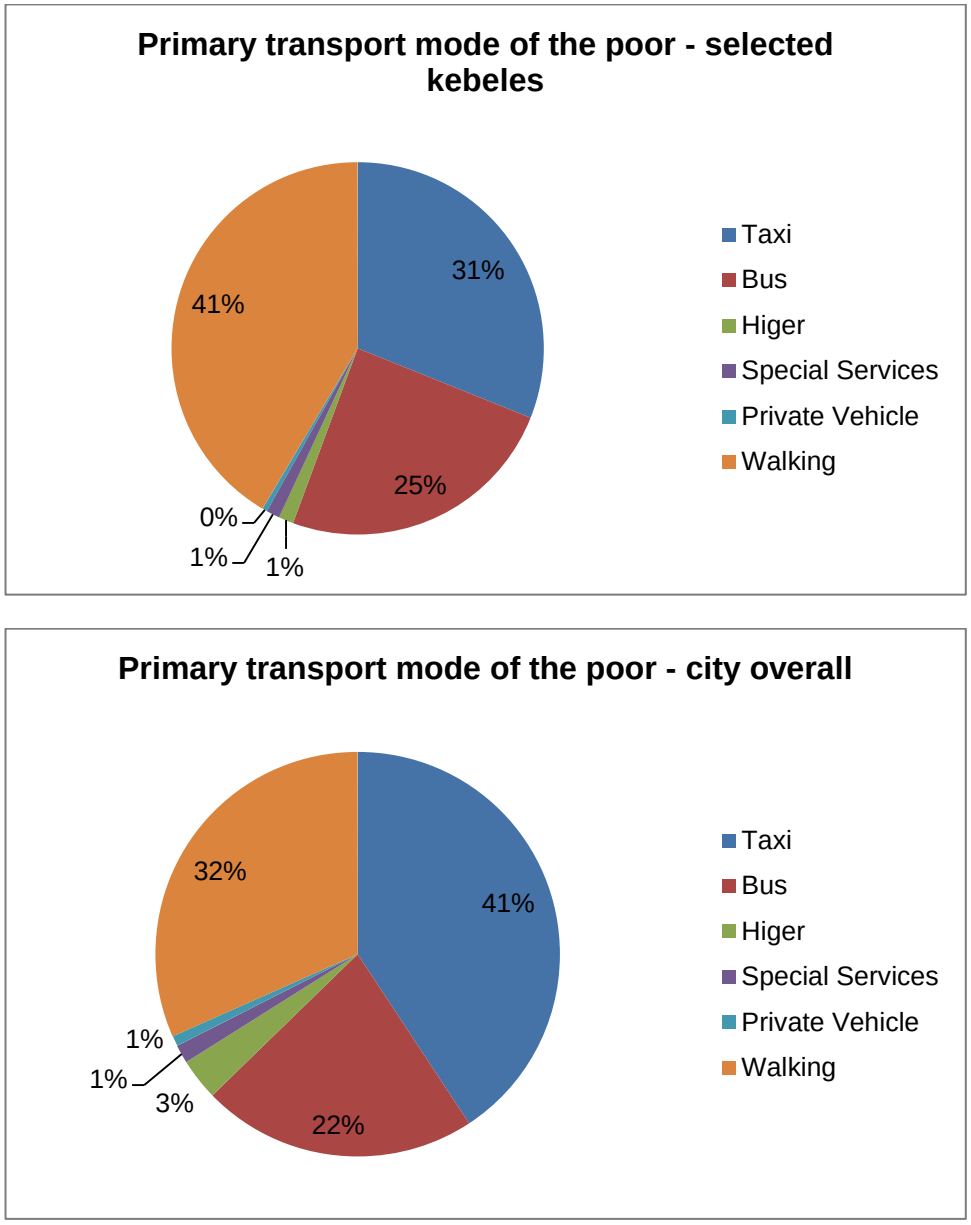


Figure 36 – Primary modes of the poor – overall and in specific kebeles

- This happens even though the buses' main issues are exacerbated: frequency-related issues (punctuality and overloading), already the dominant reasons for the poor (and the overall population) not to take the bus, totalling together 60% of main reasons mentioned (see "Figure 19 – Reasons for the poor to not choose the bus in Addis" in

section D.3), are now of even greater importance, while cleanliness seems much less important, and while price was mentioned by no one. The shift in identified issues can be seen in the general population of the area as well, in the same proportions as for the poor.

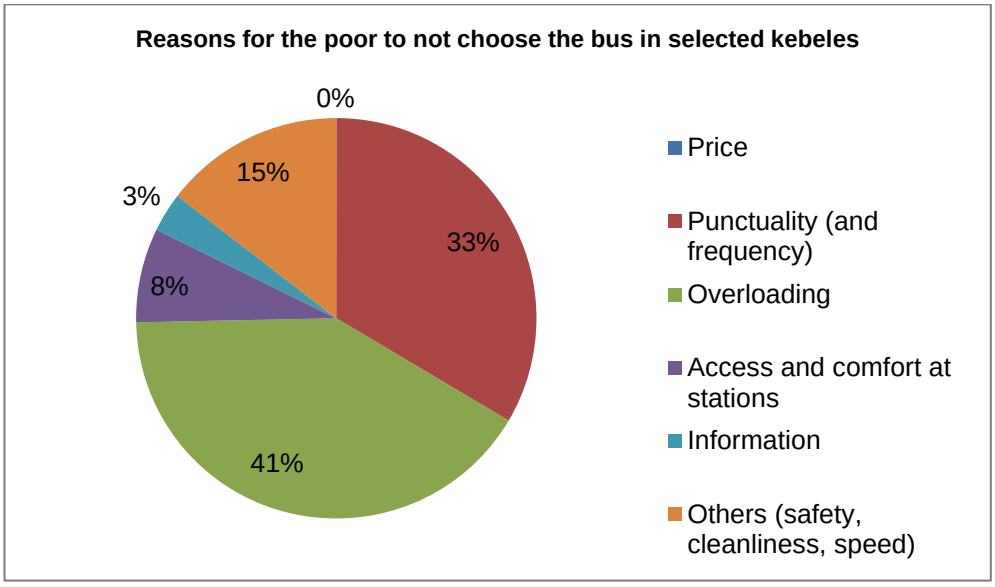


Figure 37 – Reasons for the poor not to take the bus

- The absence of transport means as the primary reason to walk has doubled its share of answers from the poor (reaching 26%), above the affordability issue (25%), all other reasons remaining equal or receding.

It therefore seems that these areas definitely need additional support for transport.

A bigger sample would have allowed kebele-by-kebele analysis, but the sample size in the existing survey does not allow for such analysis to be statistically significant.

Geographic targeting – example of Dakar

Like in Addis Ababa, no detailed data has been obtained that allowed precise enough geographic targeting, but it is possible to compare the distribution of poverty with the distribution of public transport, mostly for illustration purposes.

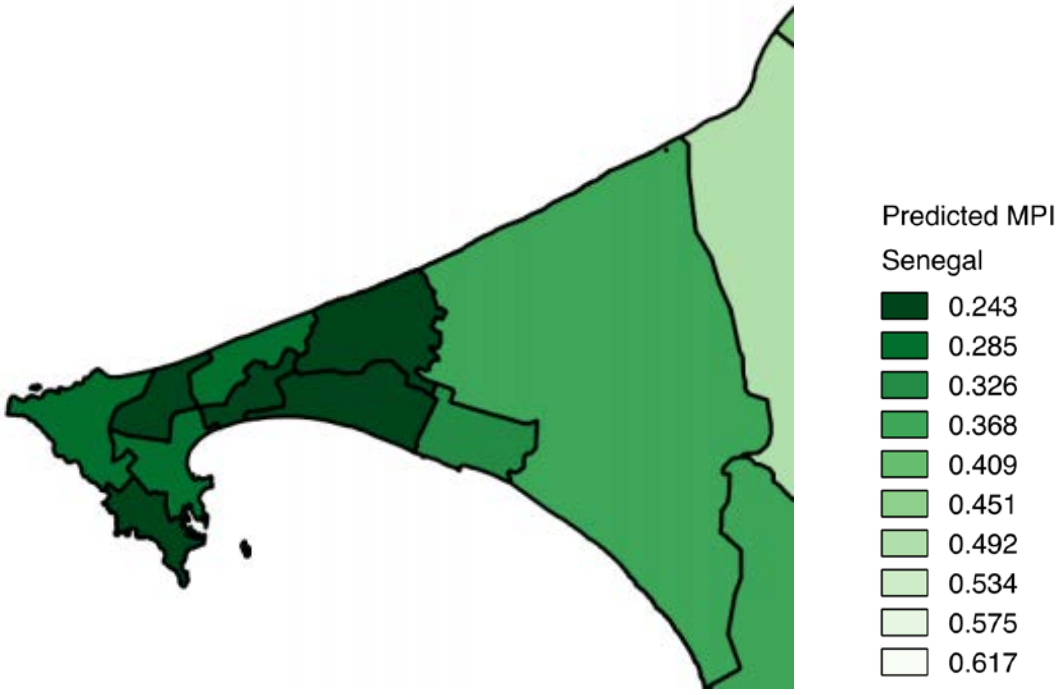


Figure 38 – Estimated poverty map in Dakar[42]

MPI : Multidimensional Poverty Index

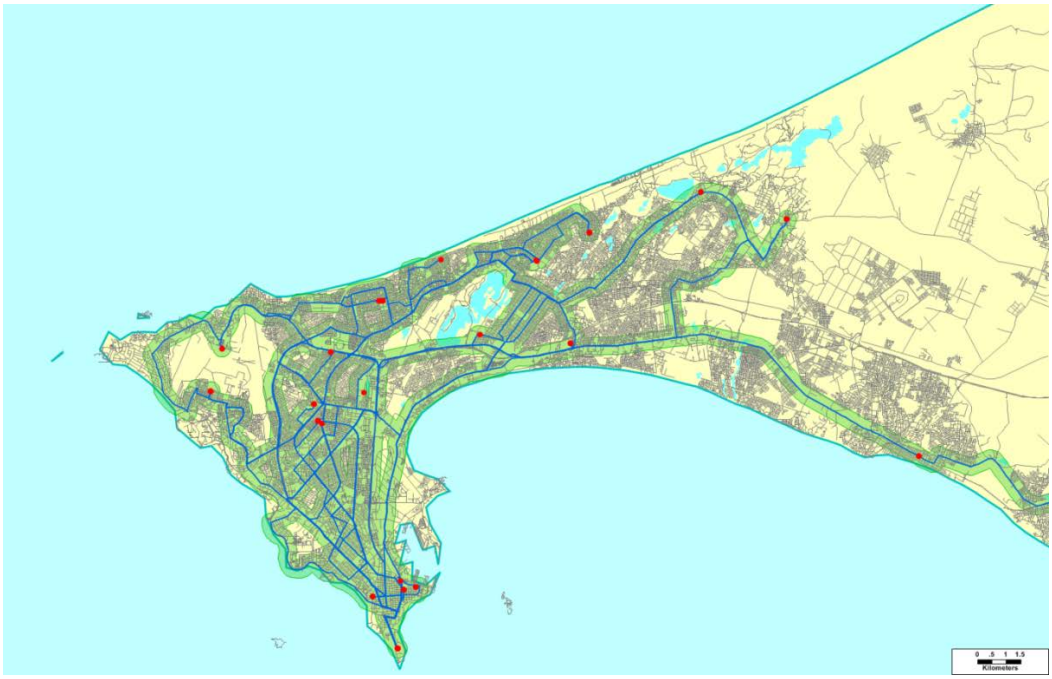


Figure 39 - Coverage of the DDD network[43]

[42] Virtual Networks and Poverty Analysis in Senegal; Neeti Pokhriyal, Wen Dong, Venugopal Govindaraju; 2015; State University of New York at Buffalo

[43] CETUD

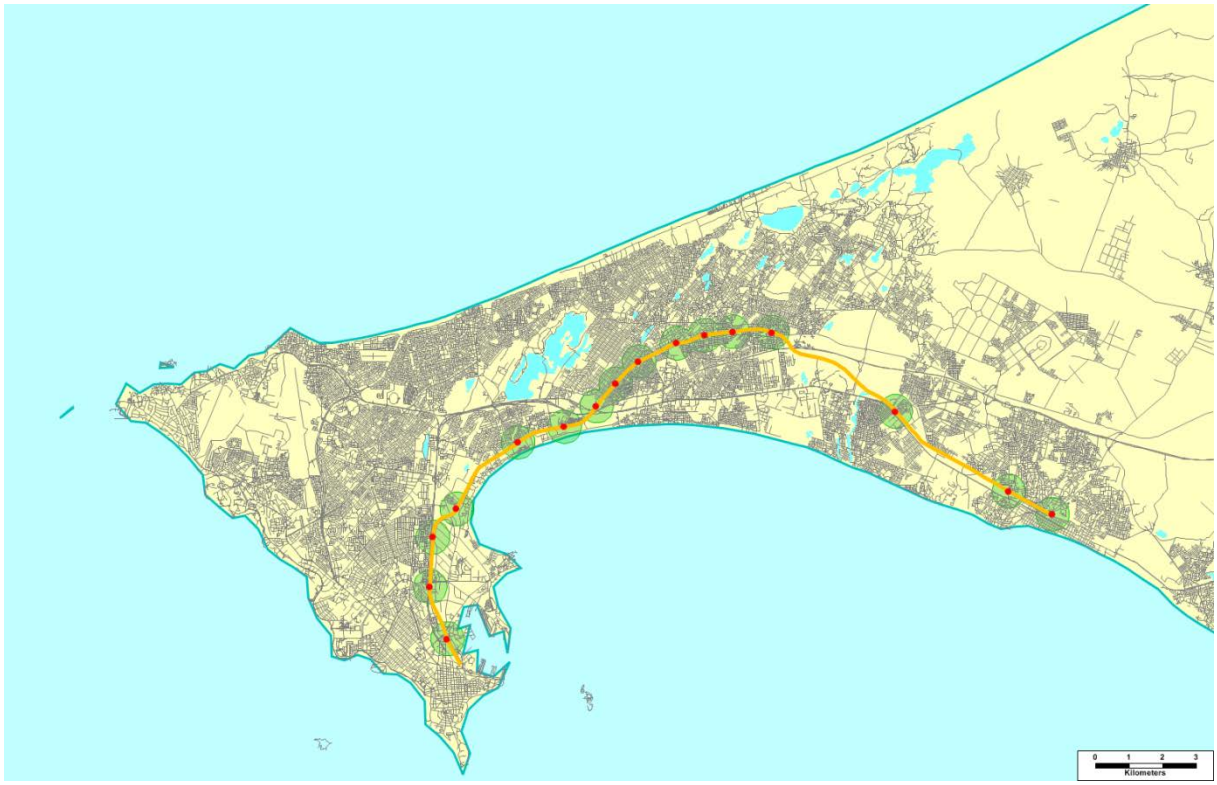
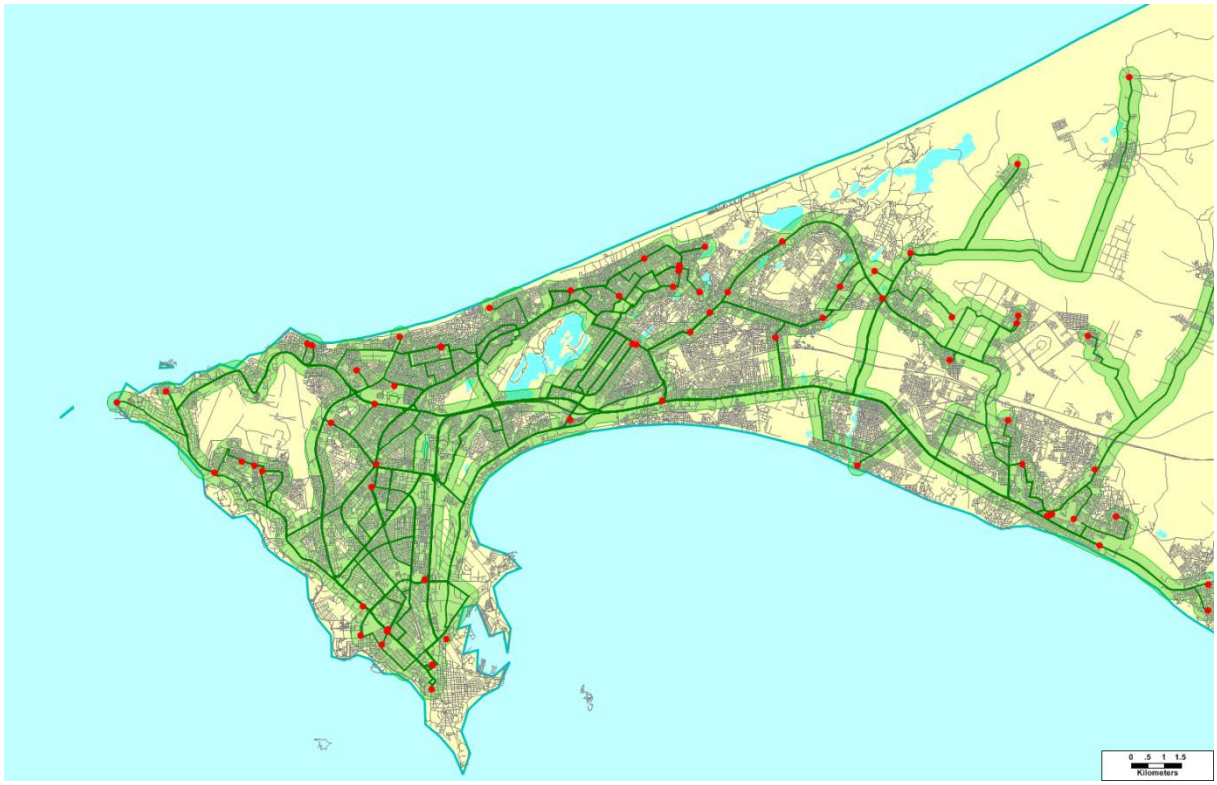


Figure 40 - Coverage of the PTB network[44]



[44] CETUD

Figure 41 - Coverage of the AFTU network[45]

On the above maps, service coverage appears limited in the poor areas between Yeumbeul and Keur Massar, east of the peninsula. In such a zone, more detailed statistics and line maps could help identify a possibility for geographic targeting.

Modal targeting

The principle of modal targeting is to direct GPOBA funds to a specific mode, without any other form of narrower targeting.

Modal targeting must rely on a data-based assessment of barriers that reduce mobility of the poor (household survey). It is particularly justified when:

- The mode is used predominantly by the poor, or
- Insufficient cost or quantity of that mode has been identified as preventing the poor from using it.

Section D.3 illustrates how, in the three pilot cities, data pointed to the latter issue as critical.

Modal targeting is the right option to choose when alternative narrower targeting strategies are not more effective in satisfying the mobility needs of the poor, due to low efficiency of targeting and/or low impact on the poor's needs of the projects made possible by such targeting methodology:

- The cost of the alternative targeting system can be higher than the amount of resources "mis-targeted" by modal targeting; or
- Projects associated with narrower forms of targeting may not be as effective to remove the key barriers impeding the poor's mobility.

While it is not necessarily the case in principle, all the concepts considered in the three cities that use modal targeting are supply-side support.

F.1.3. Summary take-aways on ensuring pro-poor impacts in urban transport projects

As highlighted above:

- Maximizing pro-poor impact means participating to reducing the most critical barriers to the poor's mobility,
- In order to do so, several aspects must be factored into project design instead of relying only the accuracy of a targeting mechanism:
    - An effective project concept that will allow high leverage on the price, quantity or quality of transport service and/or infrastructure offered to the poor, for a limited amount of subsidies;

[45] CETUD

- Precise and relevant targeting;
- The capacity of the project to generate long-term changes, including through its impacts on sector organization and/or through the scheme's attractiveness and replicability under different funding modalities.

F.2. APPLYING THE FIVE OTHER OBA CORE PRINCIPLES

F.2.1. Accountability

Definition and challenges of accountability in OBA projects

Accountability, in the OBA terminology, is the fact that performance risk is shifted to the service provider by transferring grant funds only after the delivery of the pre-specified outputs (contrarily to standard projects where financing is disbursed at the time of investment). More specifically, the risks to be shifted are[46]:

- Construction risks related to infrastructure and other investments made under the project, particularly the risk of cost overruns or benefit shortfalls caused by incomplete delivery of outputs or delivery of improperly-specified outputs;
- Operational risks related to service delivery;
- Demand risk (or uptake risk) related to whether the intended beneficiaries request the service provided at the price provided.

As for many OBA projects, but perhaps more critically in urban transport, this raises several questions, among which:

- The pre-financing capacity of actors;
- The capacity and willingness of actors to bear the above-mentioned risks;
- Payment risk, whereby payments could be delayed after the operator considers that the output has been achieved.

All these issues may result in cash shortages for the operator. As already mentioned in section E.3.1, the nature of the operator (private or government-owned; small or large) may drastically affect its capacity to withstand cash shortfalls. The financial structuring of the subsidy must take this into account to avoid shifting more risk to the operator than required to provide an adequate incentive to perform.

Capacity and willingness of actors to bear investment, operational, and demand risks

As has been highlighted earlier in this report, the urban transport sector is often structured with multiple entities, many of which lack financial capacity, and are at risk in case of any systemic changes. Furthermore, services may be delivered by small-scale operators, which need to be

[46] Output-Based Aid, Lessons Learned and Best Practices; Yogita Mumssen, Lars Johannes, and Geeta Kumar; World Bank; 2010

grouped into associations in order to participate in the project definition or in the policy dialogue. A significant part of the sector's equilibrium may rely on the Transport Authority, which may just be a regulator but also may be procuring services; often, it can fulfil its role only by stretching limited technical and financial resources.

All this creates an environment in which it is difficult for stakeholders to take additional risks, and in which stakeholders do not necessarily have the capacity to participate in "sophisticated" program designs.

Such capacity constraints must be taken into account for project design: a detailed assessment of actors' capacity should inform the selection of projects that can be contemplated.

It may also, in some cases, be more realistic to transfer the risk not to the final operators, but instead to the authorities, provided of course that the operators are still adequately incentivized to provide the services: the AFTU program in Senegal is a good example of how this can work.

Payment risk

This is the risk specific to OBA, whereby challenges in output verification or disbursement mechanisms may put operators at risk of delayed or no payment. It is addressed in section F.2.5 below.

F.2.2. Innovation

Institutional innovation

Urban transport sectors usually have complex institutional structures, which leaves room for many possible directions in which to innovate.

However, due to the stakeholders' capacity to resist change, in particular informal operators that can use strikes or even violence to maintain their positions against perceived threats, institutional innovations take time. They have to be extremely well prepared, to be rooted in the pre-existing context, and to feature incentives (including compensation mechanisms) for all stakeholders that have significant blocking powers.

Institutional innovations include the following possibilities, which can be combined:

- Organizational and financial mechanisms such as the AFTU program provide an opportunity to improve fleets and extend regulation over the sector;
- Changes in the economic conditions under which operators provide their services:
  - from direct transactions between users and operators, with no financial involvement of the transport authority,
  - to contracts where operators are remunerated by the transport authority for providing certain levels of supply (measured in seat-kilometres or similar metrics), under net cost or gross cost arrangements.

- A reform of the Transport Authority, in most cases to amplify its mandate, and its technical and financial capacities; this step may mean merging several public bodies into a single, better-structured entity; such transformation may happen in order for the Transport Authority to be able to handle other institutional innovations.

These institutional innovations are often coupled with technical innovations, regarding transport modes and/or vehicles, and/or IT systems.

Technical innovation – vehicles and modes

Modal and vehicle innovations include major shifts to urban transport such as:

- The creation or extension of mass-transit systems (BRT, LRT, Urban trains);
- The retirement, with or without compensations, of old vehicles, which have to be replaced;
- The introduction of new types of road vehicles (new midibuses, electric or GNL vehicles, etc.). For example, in Dakar, both the AFTU and the Taxis de Banlieue programs have been based on the introduction of new categories of vehicles.

Technical innovation – ICT systems

As described in detail in section E.4, the installation of light ticketing systems can be both:

- a necessary step for output monitoring for many of potential OBA projects, and
- a welcome component of an OBA project that will have long-lasting positive consequences on both the operators' performances and the Authority's monitoring capacity.

In addition, the cost of such systems is generally well within what a GPOBA grant can support, and in most cases they can be implemented through service models that avoids IT capacity issues with the operators or the authority. Finally, examples show that with well-designed systems, the monetary benefits they generate greatly outweigh their total costs (initial and running costs), making them very sustainable financially even for small operators.

Consequences for OBA projects

The urban transport sector has seen many innovations over the last three decades and that trend is continuing. OBA projects in the sector should promote innovation in developing country cities:

- By providing a financial incentive to innovation in the form of grant support to the innovative investment or to the innovative service;
- By financially supporting advice and technical assistance to designing and implementing innovative components.

However, projects that include important innovation aspects, in particular institutional, should be carefully designed to ensure that such innovation is actually feasible and realistic.

F.2.3. Efficiency

Operator efficiency and long-run performance are key to an optimized urban transport system, but they are also, often, negatively affected by systemic issues resulting from the organization of the sector (or lack thereof).

OBA projects are based on the principle that transferring the risks to operators by rewarding the output, and letting them decide how to optimize their operations, will ensure increased efficiency.

OBA projects for urban transport need to carefully balance these two views on efficiency, as transferring risks may not always be enough to ensure that operators actually optimize service provision.

Impacts of regulation

When regulatory pressure is too strong (fares that are too low, mandated routes that are not profitable) without financial compensations, vehicles cannot be maintained and operated properly.

OBA projects that involve a tight regulation of operators should ensure that they have enough "breathing space" to let the operator adjust operations as necessary to remain financially viable.

Suboptimal operating practices

Destructive operating habits

Drivers may compete for clients, driving too fast and unsafely to get at stops first, and/or may take little care of vehicles that are not theirs.

OBA projects should ensure that drivers are incentivized to drive properly and take care of the vehicles. For example, the AFTU program does so by mandating that operators pay the drivers minimal fixed wages.

Unsustainable maintenance and renewal practices

Out of competitive pressure and lack of long-term financial planning, it often happens that operators, whether formal or informal, neglect to cover maintenance and/or fleet replacement from their revenue, or neglect to save the corresponding amounts. This will jeopardize the operator's efficiency in the medium run, when the vehicles start requiring excessive maintenance.

In the scope of OBA-funded schemes, authorities can require operators to allocate savings to these expected expense items. This was envisaged in the shortlisted project concept for furthering the AFTU scheme in Dakar.

External challenges to operator efficiency

Numerous other challenges to operations are a threat to operators' efficiency, often outside of their control: unreliable fuel supply, difficult sourcing of spare parts, challenging roads, unpredictable and/or heavy congestion…

The authorities can work to help the sector address these efficiency challenges, in particular for small operators that may not have the capacity to resolve them alone. Alternatively, they can foster the rise of professional associations that would support operators in such matters. While this represents a long-term effort that cannot be sustained solely on the basis of an OBA project, these challenges should be taken into account when preparing projects.

F.2.4. Sustainability

As has been seen, worldwide experience and benchmarks show that significantly increasing the supply of urban public transport can only be done with additional public financial support. Such support is justified by the positive externalities of increased mobility and the negative externalities of individual transport.

The OBA tool, however, was not initially designed to be used for continued public funding. The adequate emphasis on financial sustainability of the service, which is an OBA core principle, requires that the operator can balance the cost of service with income.

The examples of the World Bank-supported "AFTU" vehicle renewal and contractualization project in Dakar, and of the design, during the identification of a proposed OBA operation, of a Public Service Agreement for the City Bus service in Thimphu, show two methods of meeting this core principle.

In Dakar, government support to AFTU is in the form of support for investment. The World Bank, and other donors, funded the initial purchase of new, larger vehicles that are leased to private operators with the condition that they meet certain operation, route and fare obligations. If they stop meeting these obligations, the vehicle is repossessed. Because lease payments are made with a much shorter maturity (5 years) than the underlying IDA credit, lease payments help partially replenish the revolving fund. As detailed financial modelling has shown in the course of concept preparation, OBA funds could serve to increase the revolving fund's size and thus contribute to expand the contractualization and supply expansion process, while ensuring that the mechanism remains financially viable over the longer term.

In Thimphu, the bus operator is entirely public (as is the operator of the cheapest mode in Addis Ababa, Anbessa). However, it has long suffered from the lack of certainty over, and variability of, its operation budget. The mechanism proposed in Thimphu provides for a periodically adjusted support that is based on 5-year planning periods, thus sheltering the operator from the risks of arbitrary budget cuts and unplanned shortfalls, but also making it much more accountable for the cost of the service it provides.

In both cases, the critical element is that obligations of the parties regarding financing the service are clearly defined. The government decides on policy and on the global balance between level of service, fares and supply, while the operator is made accountable for the agreed service and its cost (gross cost in Thimphu and net cost for AFTU in Dakar).

In many countries, contractualization would be a much needed improvement in the public transport system. The experience in Thimphu, in particular, (where the Consultant contributed detailed contractual financial sustainability provisions for the Public Service Agreement being proposed) shows that OBA funds can serve as an incentive for this to take place.

Further, as highlighted earlier, contractualization is a key element not only of financial sustainability, but also of building more sustainable institutional arrangements to ensure that the improved service remains at the desired level of performance.

F.2.5. Output verification and monitoring

Principles of Monitoring and Evaluation

The main purpose of the M&E system is to verify relevant pre-agreed indicators as evidence of achievement of outputs and results claimed. The M&E system can include setting up a reporting system, self-reporting by service providers, and independent verification of project outputs.

In particular, the M&E system should allow verifying that:

- Pre-agreed outputs are effectively achieved;
- Participating service providers perform in accordance with defined quality standards on an on-going basis; and
- Claims processing is carried out adequately.

Eventually, the M&E system should allow determining disbursement amount of the OBA subsidy to the service provider, by assessing the performance in reaching Disbursement Linked Indicators (DLIs).

To achieve this goal, it is necessary to first ensure that the participating transport service providers are trained and have implemented accredited M&E procedures and systems, that results claimed are consistent with output definition (service indicators are met and claims are processed); and that claimed output reimbursement is consistent with agreed unit reimbursement.

Design of the M&E system is all the more important in an OBA project that it is an integral part of fiduciary management.

Defining the outputs

The concepts identified during the study have allowed distinguishing a few main output categories to be used for urban transport projects:

- **Investment outputs**: these are close to the typical outputs of the first OBA projects, such as a target number of new water or electricity connections meeting certain standards.
- **Production outputs**: these include various metrics of increased supply of a specific mode. They do not refer to the investment itself (e.g., buses) since that would not provide for the verification that the investment is put into service. Instead, they should reflect the

actual reduction of the identified barrier (for instance, available seat-km during the peak hour). The exact choice will depend on the specifics of each operation.

- **Fare incentives**: these are to be used in the case of individual targeting and are all akin to targeting a number of trips made by eligible poor passengers – either through the use of prepaid vouchers, or the payment of a specific fare. A subsidy per passenger or passenger-km is then paid to the operator. **Strictly speaking, individual targeting cannot target outputs but only consumption of the service, i.e. results.**

- **Leasing contracts**: in the case, particular to transport, of a revolving fund supporting a leasing scheme (for example for fleet renewals), the output could be the number of leasing contracts concluded. Indeed, the leasing contract can include all characteristics of services required. As the leasing provider has an interest in repossessing the vehicles if they are not used according to the public service contract, conclusion of the lease carries the promise of the service being rendered. The leasing scheme thereafter bridges the disconnect between the quick disbursement of OBA funds and the long period over which the financed assets are used and generate revenue.

- **Capacity strengthening**: in spite of not being an output by itself, capacity strengthening is often an integral part of OBA projects, should be measured by the "effort" rather than by the end results, and can participate in triggering disbursements.

Defining Disbursement-Linked Indicators (DLIs)

Definition

Disbursement-Linked Indicators are the way in which the achievement towards the targeted output is measured. Such achievement is the condition for disbursement.

Typical indicators in the urban transport sector could include, among others:

- For investment outputs:
  - number of improved bus stops meeting improved standards (accessibility, comfort, weather protection, passenger information system with shared timetable accessible at bus station/on bus shelters/online);
  - length of new foot/bike paths between a poor neighbourhood and the closest bus stop meeting minimum standards;
  - quantity of new infrastructure (pedestrian crossings, foot-bridges, etc.);
  - implementation of a ticketing system (provided services are billed and traceable).
- For production outputs:
  - number of additional vehicle-km produced (on specific lines or overall);
  - total number of buses/total capacity into service at peak hour;
  - a target number of seat-km offered at peak hour;

- number of lines reaching and maintaining the agreed level of frequency of transport services (average waiting time for passengers at a given location/bus shelter on an identified transport line);
- punctuality (buses respect the pre-defined timetable and passengers are informed about modifications, if any).

– Fare incentives:

- General number of passengers;
- General number of passenger-km;
- Number of specific targeted passengers (beneficiaries of social safety net programs);
- Number of passenger-km for specific targeted passengers (beneficiaries of social safety net programs);
- Number of subscribers, when a subscription system is implemented where pre-determined user contribution is received (smart cards, etc.), possibly with information on subscribers (gender, age, address, profession, and if possible: poverty assessment/registration within a social safety net program, etc.);

– Leasing contracts: number of contracts signed

– Others:

- Number of service providers that have received training/are accredited to participate in the program;
- Implementation of a claims processing system (including the implementation of fraud detection and prevention measures).

The pilot concepts show that there is no “one size fits all”. The specific choice of indicator (for instance, available seat-km vs. bus-km) must be tailored depending on the following considerations:

– The specifically targeted barriers (insufficient supply overall, too long headways, inefficient use of production means, etc.),

– The need to leave enough flexibility to the operator so that it can make the most efficient use of the resources granted,

– The type of contractual relationship between the operator and the authority (for example, gross cost or net cost),

– External factors (i.e. factors out of the operator’s control) that may impact the level of output (for these, in order to avoid putting excessive financial risk on the operator, target output values must be set taking the impact of these uncertainties into account).

In many cases, there might be a choice between an investment-based output/DLI and a service-based output/DLI. For example, vehicles are an easy investment to verify; but it is preferable from both a sustainability and an efficiency perspective to look at the service provided with these vehicles than at the vehicles themselves, which unlike a water or electricity connection could remain unused or not efficiently used.

Therefore, if the project is to support increased investment in movable assets (because overcoming the lack of these assets is critical to removing identified barriers), then we recommend that the DLI be linked to the service and not to the investment. In some cases, an enforced commitment to provide the service can be a good proxy: for instance the number of lease contracts signed, in the example of the Dakar "Taxis de banlieue" concept, can be considered a reliable proxy for service provision because there is historical evidence that the transport authority enforces repossession and reallocation of the leased vehicles if the operator does not meet service commitments (route, fares, etc.).

Finally, direct targeting presents a specific issue: as mentioned earlier, the only way to disburse against direct targeting is actually to measure results, i.e. transport system usage by the targeted groups. However, basing disbursements on results rather than outputs can create a significant financial risk the operator. For example, a targeted subsidy will generally cause an increase in ridership, but the exact level of that increase has a degree of uncertainty (fare elasticities are only an estimate). If the targeted increase in ridership is proportionally so high that it requires increased capacity to happen (otherwise crowding will prevent patrons from getting onboard vehicles), then the operator is required to commit resources to increase production while bearing the risk that the targeted ridership increase does not happen at the expected level.

Examples: Addis Ababa

Project concepts	Possible outputs / Disbursement-Linked Indicators
Concept 1: Improvement of Anbessa services	- Signature of a public service obligation contract between Anbessa and the RTB. Respect of the public service obligations specified in the contract to be signed between Anbessa and the municipality of Addis Ababa. Examples: * Total production output (number of commercial bus-kilometers driven; could be verified by controlling odometers + GPS) * Capacity offered at peak hour (maximum number of buses in commercial service on certain identified bus lines; could be verified using GPS technology) * Implementation of a passenger information system with shared timetable accessible at bus station/on bus shelters/online
	Implementation of an electronic ticketing system (provided services are billed and traceable)

Concept 2: Support to beneficiaries of the Urban Productive Safety Net Program	Number of passengers carried paying a fare they have title to, within the pre-agreed range for transport trip cost of beneficiaries of the program (consumption output)
	Effective distribution of free or pre-loaded bus cards to the beneficiaries of the program
Concept 3: Contractualization of minibuses	Number of midibuses leasing contracts signed with operators by the revolving fund
Concept 4: Make transit more accessible to the poor (physical access)	Number of kilometers of functional pedestrian infrastructure of acceptable standard constructed at pre-identified locations
	Number of improved bus stops constructed respecting applicable standards in terms of safety and hygiene
	Number of kilometers of functional cycling corridors constructed, respecting safety norms at pre-identified locations; number of bicycle and bicycle rental stations put into service; number of users.
Concept 5: Make LRT and BRT more accessible to the poor (intermodality)	Number of feeder lines organized in poorer, underserved areas and corresponding passenger transport capacity; bus-km produced; implementation of a passenger information system; number of passengers carried at the agreed fare (consumption output)

Measurement

Depending on the nature of the DLI, direct observation or IT-based monitoring are necessary to validate the levels reached by each DLI.

Reaching the target

Each DLI is checked against an output target. When such target is reached, disbursements can be made. Targets can be of two orders, depending on the nature of the DLI:

- Total number achieved (for example, total quantity of bus stops built, total number of contracts signed, etc.),
- Performance target consistently achieved for a certain period of time in the recent past (for example: the “total number of bus-kilometer” target should be reached each month for a certain number of months,)

The driving principle is that, to the extent possible (depending on what makes sense in technical terms and on the financial capacity of the operator to wait for payment), DLIs have to be linked to a continued performance rather than just the completion of the initial investments.

Output verification by an Independent Verification Agent (IVA)

For OBA projects, an Independent Verification Agent is in charge of checking the operator's performance in reaching target DLIs. This is key, as it is the main condition to disbursement.

There are two distinct possibilities for DLI verification:

- **Direct verification**, when the reality and quality of all outputs produced can be easily verified independently through direct observation. This is typically possible for investment outputs and contracts concluded[47]. The IVA shall verify the functionality of installations (vehicles, passenger information system, ticketing system, GPS and other infrastructure such as sidewalks, pedestrian crossings, bus shelters, etc.) as well as their conformity with applicable law or regulation regarding safety, hygiene, accessibility for children, the elderly and the disabled, etc. Pictures of the facilities should be taken for records.

- **Verification based on a monitoring system**, when verification must be based on a mix of self-verification, verification of the integrity of monitoring systems, and random-sample physical verification, because strict verification by an IVA of all outputs is not possible within reasonable cost limits. This is the case of production outputs (such as commercial bus-km produced) and fare incentives (such as vouchers used) which only the operator can monitor daily. Self-verification requires installing DLI-monitoring systems, such as GPS aboard the buses, and having a process to ensure that these monitoring systems function according to specification and cannot be tinkered with. During random physical inspections, the IVA will need to verify the integrity of the monitoring systems in addition to assessing the quality of the monitoring process.

While direct verification has been the preferred mode for OBA projects until now, it cannot be envisaged in the cases of many of the concepts proposed in the long-list of possible concepts in the three pilot cities. In particular, verification of monitoring systems combined with self-verification is the only available option when the output on which the DLI is based is a unit of service and not an investment.

Both approaches are coherent with the typical OBA verification cycle:

[47] Since the leasing provider has an interest in repossessing the vehicles if they are not used according to the public service contract, conclusion of a leasing contract carries sufficient promise of the service being rendered. The IVA could additionally verify that repossession actually takes place if the operator breaches the contract.

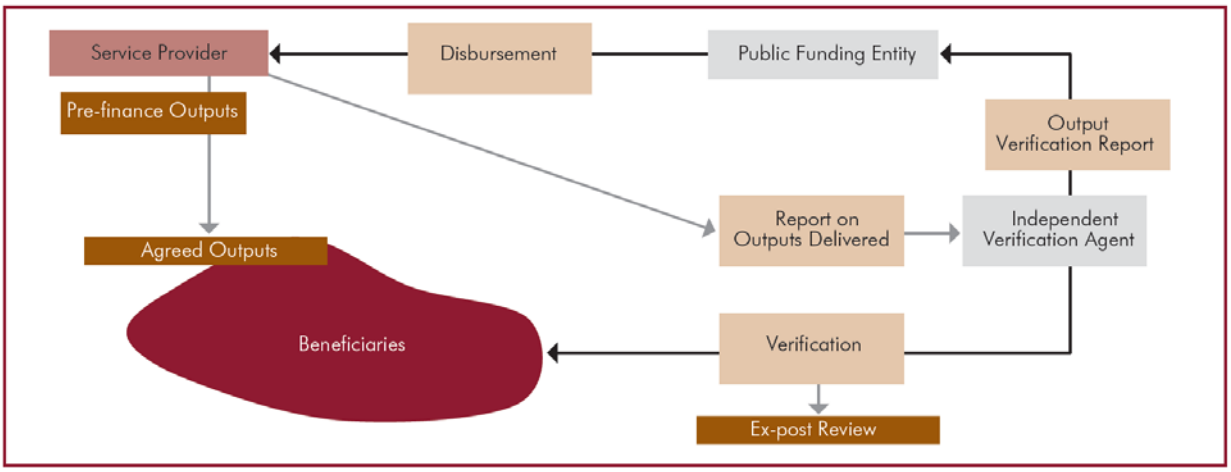


Figure 42 – Typical OBA Verification Cycle[48]

Monitoring additional aspects of projects

As in all OBA projects, the IVA should also verify that the transport trip cost is in pre-agreed range and that the amount of subsidy per output requested is equivalent to the pre-agreed subsidy level.

In addition, M&E could include randomized interviews with households in order to assess whether and why they use (or not) public transport services financed by the scheme and, in case of positive response, their level of satisfaction with service (perception of quality, waiting time). One could also assess through questionnaires the change (or not) that the project has brought to women and girls' lives (Do they use more public transport? Do they go further? Do they travel later in the evening? etc.)

Additional aspects of projects may need to be monitored, as for any development projects, such as Environmental and Social Impacts (and the implementation of corresponding Action Plans).

F.3. STRUCTURING DISBURSEMENT

Financial indicators

The GPOBA preparation process requires assessing the project's financial long-term sustainability and impacts, through the following indicators and pieces of information:

- Unit cost per subsidy: amount of subsidy being requested e.g. gap between cost of access to service and willingness to pay;
- Affordability: user contribution as percentage of total cost; will fares cover operation and maintenance costs?

[48] OBApproches Number 43, May 2012: Independent Verification in Results-Based Financing; Esther Loening and Luis Tineo

- Pre-financing: how much public and private investment is contributed to the project, and how much external funding is leveraged by the OBA grant?

Example of Dakar

As part of the Concept note development, we have modelled the "Taxi de banlieue" EIG's operations and financial performance, and the associated revolving fund. The model is briefly described in Appendix 3: *Brief presentation on the modelling of the « Taxi de banlieue » transport activity and the associated revolving fund*. Key design features are escribed below.

Unit cost per subsidy

The fund will be financed 100% by the GPOBA subsidy.

However, remarkably, due to the fund's revolving nature, this is not "sunk" money. The Fund can keep expanding, or some of the money can be "cashed out" and used for something else after some time. For example, if the fund keeps working, the operating fleet will reach 631 vehicles in year ten, and keep growing.

Affordability

The model's estimates are that, based on the tariffs per km currently set in the pilot project, users pay on average 116% of the cost of production, leaving a comfortable margin for operator's profits and risks.

Even though prices are higher than those of the "taxi clandos", the scheme is a great commercial success for operators, as quality, density of supply and adequacy to the users' needs are incomparably in favour of the new schemes in the pilot neighbourhoods.

Subsidy payment schedule and disbursement

GPOBA subsidy payments could be disbursed in the following way:

- An advance payment of 20% in order to fund the CETUD's liquidity gap at program start,
- Progressive disbursements based on the number of contract leases signed,
- A payment when ICT-related components are fully implemented,
- A payment when training-related components are fully implemented.

Pre-financing

The 20% advance payment from the project, the operators' own 25% financing (required to be put down a bit ahead of vehicle delivery), and a short delay for full payment to the vehicle provider, should be sufficient to avoid funding gaps. A more detailed modelling of cash flows should be done during project appraisal.

Disbursement structuring

Like in other sectors, implementing entities often have limited financial capacities. This implies serious liquidity constraints, which are likely to be even more acute for the both types of operators most frequently present in poorer countries: state-owned operators and small-business operators (large private operators might have less of an issue securing interim financing to fill the gap between investment and obtaining a DLI-based payment). The output-based disbursement schedules therefore need to take this constraint into account.

This can be addressed depending on the type of project and disbursement-linked indicator (DLI – see section F.2.5):

- If the DLIs correspond to portions of completed investment, the following scheme can ensure that the liquidity constraint is limited:
  - an advance payment, and
  - output-conditioned disbursements for refinancing each completed portion.
- If the DLIs correspond to performed services (for example, commercial bus-km produced), then there might be a need to address a disconnect between the duration of the project implementation period and the period over which assets will be put into production. The latter being much longer than the former, this means that amounts disbursed per DLI unit will need to be calculated over the former period, and will not correspond to "accounted" production costs which are calculated over technical life or standardized amortization schedules.
- In the case, particular to transport, of a revolving fund supporting a leasing scheme (for example for fleet renewals), the output could be the number of leasing contracts concluded as explained above, and the same type of scheme as for infrastructure finance can ensure that the liquidity constraint is limited:
  - an advance payment, and
  - output-conditioned disbursements for refinancing each "tranche" of initial leasing contracts.

  In the case of a leasing scheme, the issue of the disconnect between financing the means of production (the buses) and income that pays for them (the fare box) is taken care of by the leasing intermediary. Since the leasing provider has an interest in repossessing the vehicles if they are not used according to the public service contract, conclusion of a leasing contract carries the promise of the service being rendered and the leasing scheme bridges the disconnect between the quick disbursement of OBA funds and the long period over which the financed assets are used and generate revenue.

F.4. SUMMARY OBA CONCEPT PREPARATION ROADMAP

Overall approach

The 2010 publication from GPOBA: *OBA Diagnostic Tool – Part one – Initial Assessment*, identifies a two-stepped approach to an OBA project identification and design:

- Initial screening against six criteria in the areas of Institutional Capacity & Arrangements and Financial Mechanics;
- Further detailed analysis including Regulatory & Legal Environment factors

This publication lays out the following six critical requirements for initial screening:

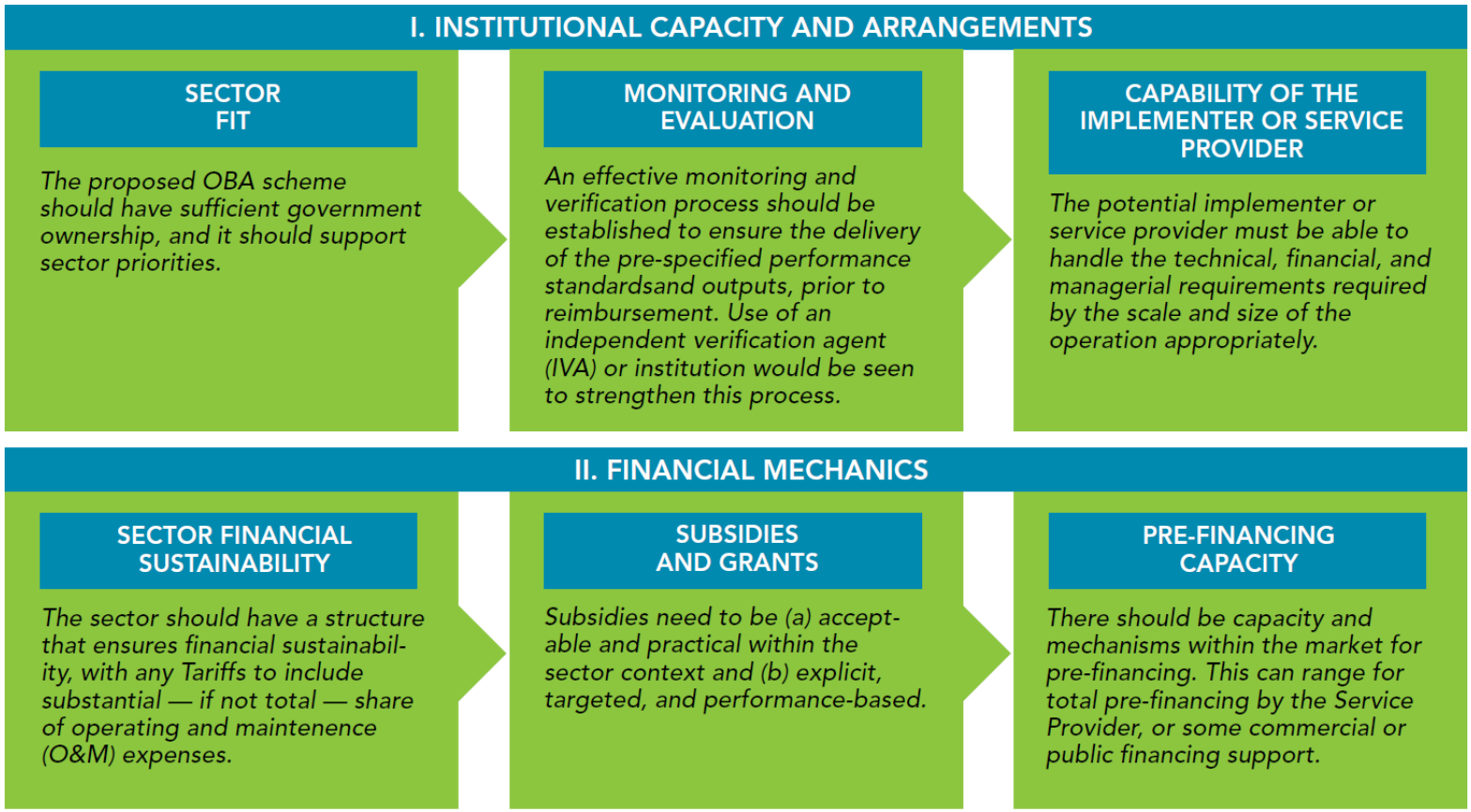


Figure 43 – GPOBA's general diagnostic tool approach

We remain within the main principles of this approach.

However, as urban transport projects may be more context-specific than most OBA projects in other sectors, the project identification process suggested following the present study follows the same logic, but with a deeper focus on each local sector's specificities and on the poor's needs, as identified through careful data analysis:

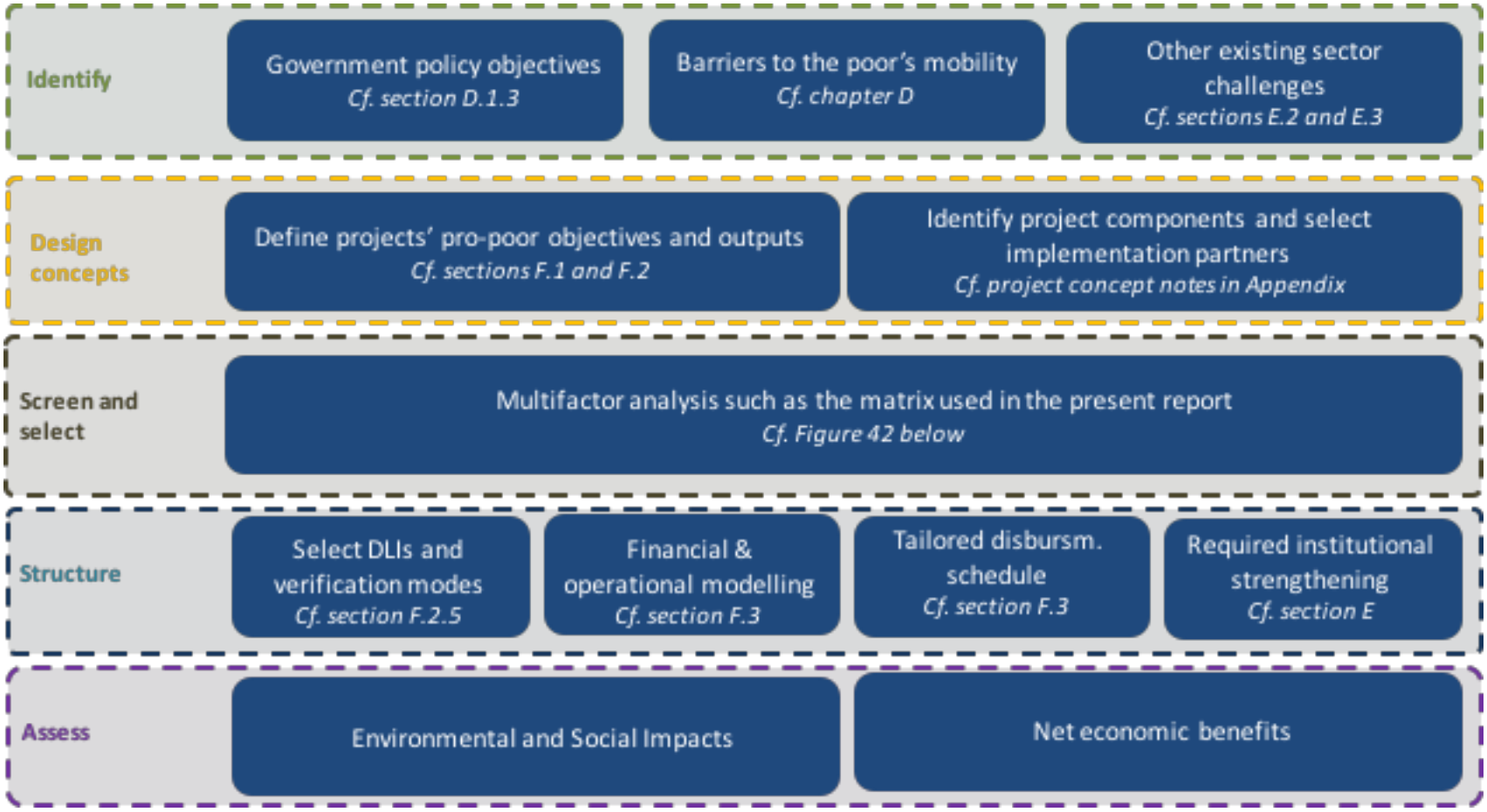
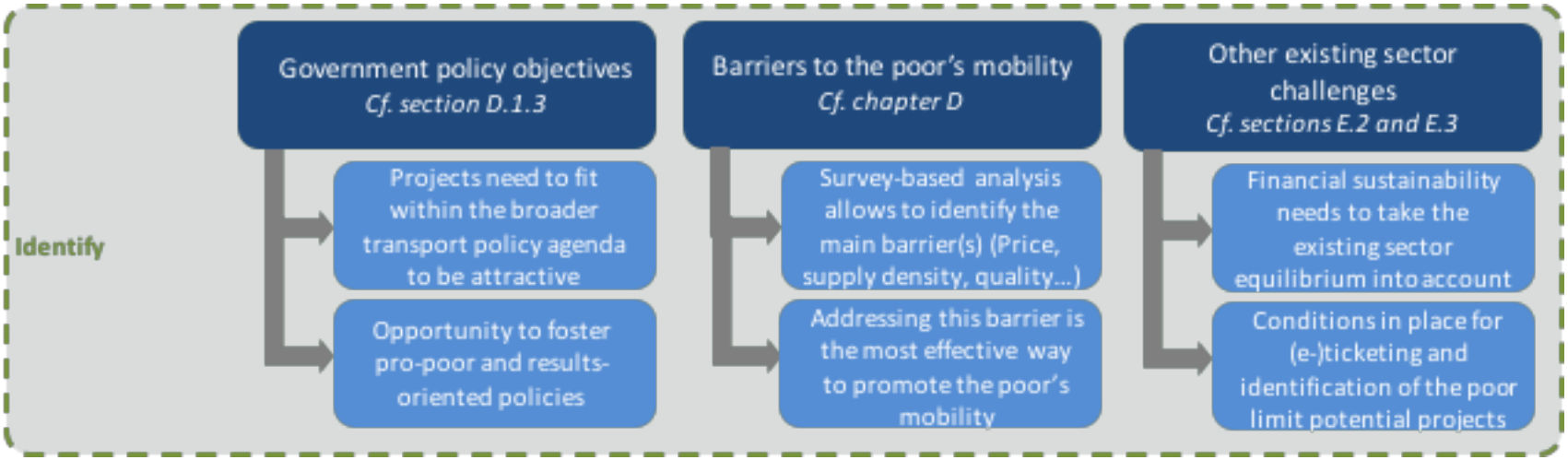


Figure 44 – Adapted diagnostic tool approach

Below is a breakdown of the first four steps highlighted here (the last one, "Assess" being common to all DFI-financed projects and not addressed in the present report).

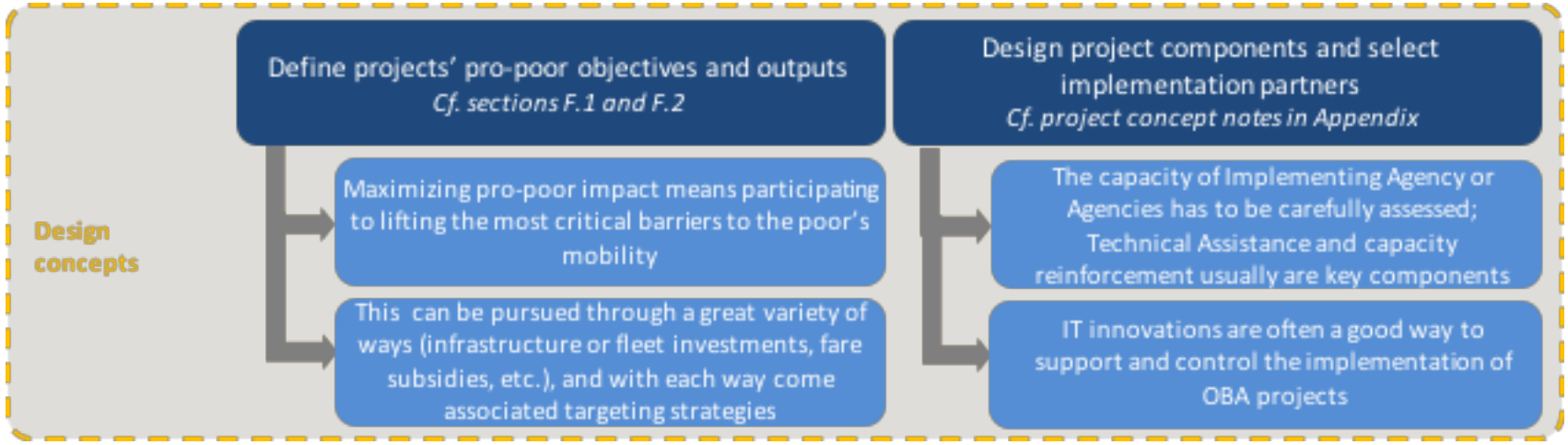
Identify

Key elements to take into account when first analysing the sector and other context elements include:



Design concepts

At project design stage, the following considerations are critical:



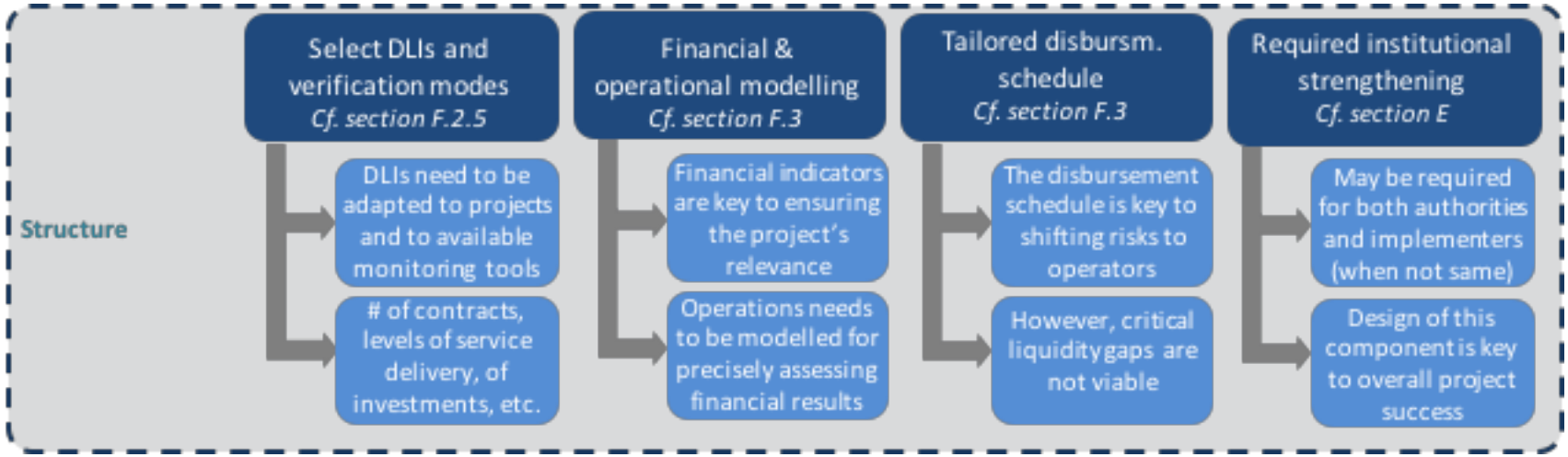
Screen and select

The screening of potential projects mentioned above can be carried out through a multi-criteria assessment as illustrated below:

Critical conditions of the sector		Considered scheme types and scheme components		
		Example 1: Creation of new bus stops	Example 2: Fare incentives when an operator carry poor users	Etc.
Political and institutional feasibility and challenges	Urban transport sector institutional structure	Quantitative factor	Quantitative factor	
	Existing financial balance of the sector	Quantitative factor	Quantitative factor	
	Political objectives and goals for urban transport	Quantitative factor	Quantitative factor	
	Support of authorities to OBA-type financing	++	++	
	Capacity and mandate of supervising authorities	++	++	
Strong impact on mobility barriers to the poor	Transport challenges raised by the urban space	Quantitative factor	Quantitative factor	
	Affordability of existing urban transport	+/-	++	
	Physical accessibility of existing urban transport	-	+	
	Supply density of existing urban transport	-	+	
Technical feasibility and challenges	User-specific identification	n.a.	++	
	Centralized ticketing and monitoring system	n.a.	++	
Sustainability	Financial sustainability of project and of implementer	+	++	
	Long-term impact on sector's sustainability	+	++	
Other relevant implementation modalities	Replicability and extension potential	++	++	
	Capable implementer	++	+	
	Accurate DLIS for expected output	++	+	
	Verifiability of DLIs	+	++	
Conclusions		- Quite relevant scheme - [List of challenges to scheme and measures to take accordingly]	- Very relevant scheme - [List of challenges to scheme and measures to take accordingly]	Etc.

Structure

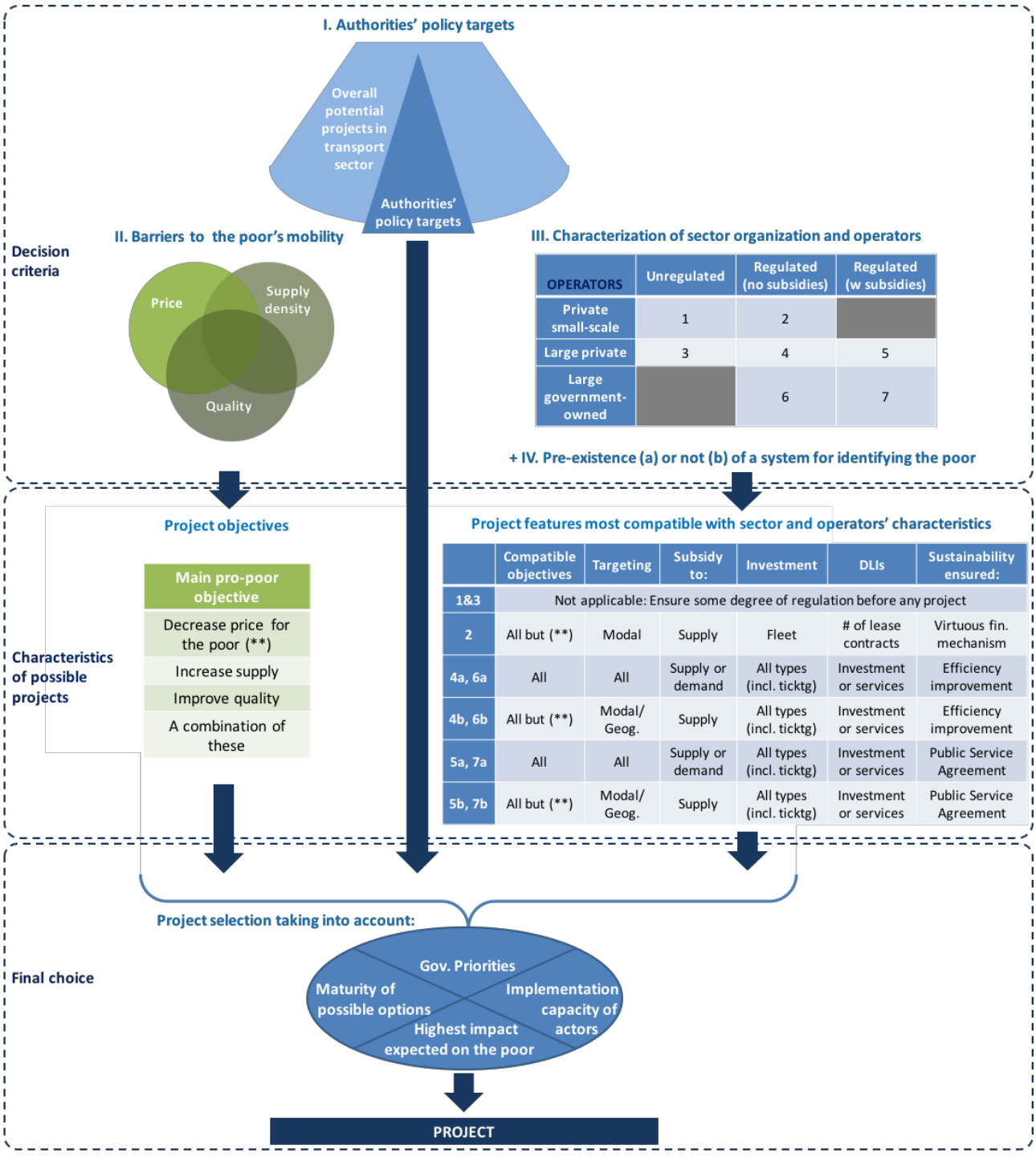
When structuring the project, the specificities of OBA projects must be taken into account and integrated into the considerations of all development projects structuring:



Summary framework: from sector characteristics to potential OBA projects

As highlighted just above, potential projects need to be assessed in a very qualitative and pragmatic way, in order to present both the desired level of attractiveness to authorities and a cost-effective implementation potential.

For that reason, drawing systematic lines between contexts and desirable project types is a limited exercise. The following graph nonetheless summarizes some relevant considerations:



LIST OF APPENDICES

For convenience, appendices are provided in a separate volume.