AGENCE FRANÇAISE DE DÉVELOPPEMENT

PARATRANSIT: A KEY ELEMENT IN A DUAL SYSTEM

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CODATU

This document was compiled by CODATU association at the request and under the supervision of the *Agence Française de Développement* (AFD). It was written by Pablo Salazar Ferro in close collaboration with Lise Breuil (AFD) and Julien Allaire (CODATU). The first version of the document, issued in November 2014, has been updated after review from Xavier Godard and Olivier Ratheaux.

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CODATU gathers the different stakeholders of transport and urban mobility: local authorities and government departments, universities and research institutes, private companies and individual consultants. The association was founded in 1980, following the World Conference on Urban Transport in Dakar. It aims to stimulate the exchange of knowledge and know-how to promote the implementation of sustainable urban mobility policies in developing countries. It organizes international conferences, offers trainings to the leaders of the South and regularly publishes books on this topic. Moreover, CODATU support cooperation between local governments in the field of transport and urban mobility.

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This document is the result of a cooperation within the programme "sustainable urban transport" of the Centre for Mediterranean Integration (CMI), a multi-actors platform for constructive dialogues and knowledge sharing to support transformational reforms and greater regional integration. CMI founding members are Egypt, France, Jordan, Lebanon, Morocco and Tunisia and two international financial institutions active in the region, the European Investment Bank and the World Bank.

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_Introduction

The duality of urban public transport systems in cities of the global south

In most cities of the global south, two types of public transport exist: institutional transport and paratransit. They operate according to very different models and co-exist in a complex relationship that varies from one context to another.

Institutional transport[1] includes public transport services often referred to as planned or scheduled transport services. This means public (or private) companies of a formal structure that provide services according to the regulations defined by the relevant urban transport authority. In response to the requirements of public authorities, these companies develop an offer that, in theory, meets the needs of users by providing a public service. Formal transport operators develop their networks in line with the service quality standards imposed by their governing authority and are often forced into setting low fares, putting even greater strain on the operational budget.

Paratransit, often referred to as 'informal' or even 'illegal' transport, operates on the fringe of the institutional transport system, sometimes even taking over as the main component in the system. In several documents that analyse transport in the Global South, it is most often described as a poorly organised and inefficient sector in terms of operations (route duplication, excessive length of routes, surplus supply of vehicles on certain routes, etc.), and it is considered partly responsible for road accidents, traffic congestion and air pollution. Critics of paratransit point to the unfair competition that heavily penalises institutional transport. Often deemed detrimental to the overall transport system by experts endorsing models similar to those coming from developed cities, the presence of paratransit is nonetheless justified.

Paratransit fulfils a type of demand that generally can only be met by the paratransit sector. In many cities, it is in fact the only type of transport available. Paratransit adapts in a pragmatic way to the local context in Global South cities where the institutional framework is inadequate or inefficient and where topography and geography become genuine obstacles to the development of large bus services. Besides, contrary to institutional transport, paratransit services have the ability to adapt to spending constraints of urban populations.

1. Concept introduced by Godard (2001)

In order to study the potential opportunities for coordinating paratransit and formal transport, it is necessary to gain an understanding of the underlying business model of both types of service.

Institutional transport is established by the responsibility of public authorities that invest in a public service; authorities impose coverage conditions that, generally, are difficult to cover with fare-box revenus. The amount of subsidies (or other type of financial compensation) is not generally guaranteed for long periods because authorities tend to think that the public transport business should be profitable. But financial support becomes essential for reasons that are both internal (transport companies often have the same shortcomings as subsidised and poorly governed public corporations: revenue capture, low technical performance due to lack of incentive, etc.) and external (unfavourable urban development, difficult traffic conditions, etc.).

As for paratransit services, they are the result of private initiatives that develop spontaneously. Stakeholders' main objective is to maximise profitability: drivers will seek high occupancy rates and associated fare-box revenues to be able to pay rental costs to owners. Seeking profitability usually translates in a generalised poor service quality. Paratransit operators' aim is to maximise profit, sometimes to the detriment of quality of service. Owners and drivers balance quality and quantity, giving priority to their own personal profitability. This results in technical and organisational choices in the sector that may often be considered detrimental to the public transport system: fragmented ownership, reducing vehicle size, oversupply in certain parts of the city, and disruptive competition among operators.

The co-existence of these two highly different forms of transport can thus become conflicting. But recent literature suggests that the two components of urban public transport are in fact potentially complementary. Many case studies in a wide range of urban situations have focused on the specific role each type of service plays in the city and on the operational relations achieved between paratransit and institutional transport.

Identifying these complementarities requires a reframing of the general overview: instead of considering paratransit as a stop-gap solution to the lack of institutional transport, we should ask to what extent paratransit provides an adequate service, and at what point we can consider that it has reached its limits and that public authorities need to step in to ensure service.

If we look at the typical path-dependencies of Global South cities, we can see that institutional transport and the implementation of regulations must remedy the deficiencies of the paratransit sector, not the other way around. Nonetheless, any analysis of the situation must start with a study of existing paratransit services and identify the critical thresholds where they can arguably become unviable.

The present document will provide a review of the recent literature and seek to characterise the different models of paratransit, illustrated in specific examples of cities with highly contrasted realities. The ultimate aim is to identify key elements that warrant more in-depth analysis.

_Chapter 1

Paratransit services: definitions

1.1 How to define paratransit

In transport systems, two types of services exist: collective transport services (comprising institutional transport and paratransit modes) and "individual" public transport (including mainly motorcycle taxis and metered taxis). Paratransit is generally perceived as an antagonist to institutional transport. It is defined as opposed to formal public transport (which, in some cities, is nonexistent). Paratransit takes many forms and may be defined according to different parameters, depending on the institutional frameworks of each continent.

Many studies have analysed the role of the paratransit sector in the overall public transport system and its impact on the urban structures where it operates. They have highlighted the salient features of this fragmented, often disorganised and inadequately regulated sector.

Several publications give insights into the complexity of this type of transport and its broad range of possibilities in terms of vehicles, regulatory frameworks and service planning. Some recent studies have shed light on new factors shaping the relationship between paratransit and institutional transport (cf. Godard, 2013 & 2008; Salazar Ferro *et al.*, 2012; Venter, 2011; Orrico Filho *et al.*, 2007; Sohail *et al.*, 2006; etc.). Researchers observing the different urban contexts have come to define paratransit based on the following elements.

Lack of efficient regulatory frameworks

The term 'paratransit', used in anglophone publications, emphasises the absence of adequate regulation. Paratransit includes informal and formal public transport services, but within a system that is not highly regulated. According to Cervero (2000), paratransit systems function in a "*laissez-faire*" context in which the authorities allow for a very flexible regulatory environment or even total deregulation. Behrens et al. (2012), who studied cities of sub-Saharan Africa, explain that paratransit services began as unregulated and informal services.

Vehicle capacity

Shimazaki & Rahman (1996) offer a definition of paratransit that includes motorised and non-motorised modes, such as rickshaws, which play a key role in Asian cities. Chapain (2005), who studied the case of Mexico, proposes a definition of paratransit that is centred on the subject of vehicle capacity:

> *We define (…) paratransit as systems of public transport using a variety of motorised road vehicles with a capacity between that of an automobile (1 to 4 people) and that of a large bus (50 people or more). It commonly consists of minibuses (holding 10 to 15 people) and midibuses (i.e. an intermediate capacity of 20 to 40 people). In addition, paratransit offers regular service, though the routes may be subject to change.*[2]

Figure no. 1 shows the heterogeneity of vehicles used for paratransit services.

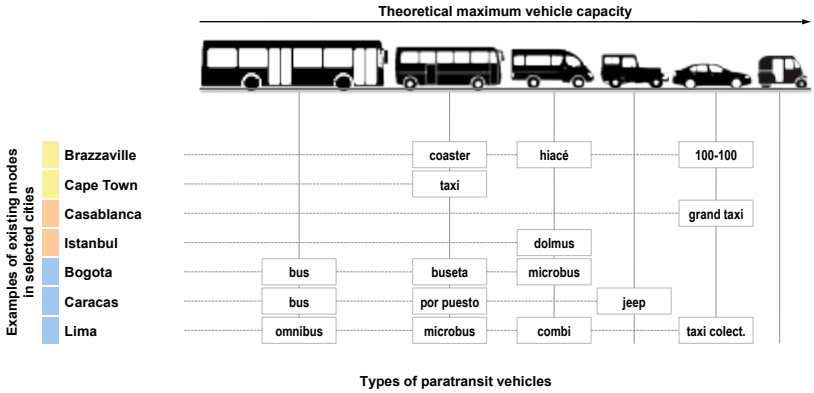


Figure 1 : Types of vehicles for paratransitand examples in some cities[3]

Flexibility of services

Similarly, Wilkinson *et al.* (2012), based on analyses in Africa, conceive paratransit as a flexible mode of transport lacking schedules or frequencies and which features small and medium-sized vehicles, most often ageing minibuses.

Internal organisation of the sector

Xavier Godard (2013, 2008 & 2001), who has focused his substantial research in Francophone Africa, coined the term transport artisanal in French; he considered the term "informal transport" to be inadequate when attempting to describe the sector. The internal structure of the services provided by private operators/drivers is the defining feature of transport artisanal:

> *Transport artisanal designates the operation of public transport vehicles on an individual scale, with highly fragmented ownership, i.e. when the sector is composed of many owners. This mode of operation can function within a framework of more or less restrictive rules developed by trade associations. A degree of ownership concentration may exist, which is why the definition focuses on the modes where it is the driver who is responsible and must manage daily operations, as in many cases where the owner is not the driver of the vehicle.*[4]

2. Source : Chapain 2005:23-24
3. Source : author.
4. Source : Godard 2008:1-2

1.2 Paratransit's market share

Figure 2 : Comparison of paratransit's market share in various cities of the Global South[5]

5. Source : Compilation of various references.

It is commonly held that paratransit fills in the gaps left by institutional transport. Nonetheless, in many cities, paratransit services are in fact the primary form of public transport. As can be seen in the figures below, each city has its own distribution in terms of paratransit and institutional modes to meet citywide demand. From one city to another on the same continent and even within the same country, the market share of paratransit services may vary greatly.

Data on how demand is distributed between the two modes fails, nonetheless, to express the complexity of the role of paratransit services, whose very definition is not the same from one city to another. Also, there may be a share of the market captured by clandestine and illegal services, which is difficult to estimate. Indeed, within one city, paratransit can include legal services and fully clandestine ones. Third, the information on the modal split at the scale of the urban area is not precise enough to allow us to fully understand the role of paratransit. Data on passenger-km is rarely available and, even when we do have these figures, they are not necessarily reliable.

Yet it is obvious that paratransit plays a crucial role in the public transport systems of the Global South (in small cities and large metropolis – Cairo or Mexico City – alike) and it presents two undeniable advantages:

- first, the low cost for public authorities: paratransit requires no direct subsidies from the local or national spheres;
- second, service flexibility: in terms of the areas served, allowing broad coverage that adapts to the constraints of the territory; in terms of operating hours and frequencies; and in terms of demand responsiveness and tailored services to new demands.

1.3 Paratransit's quality of service

Paratransit is generally presented as services that do not fit with the idea of a modern urban public transport system (cf. Gauthier & Weinstock, 2010).

Paratransit is viewed as partially responsible for problems of traffic congestion, pollution and road accidents in cities where it is particularly widespread. Furthermore, questionable vehicle roadworthiness, unsafe driving behaviours associated with paratransit and excessive fare variations depending on traffic conditions are some of the negative characteristics put forward to justify urgent reforms.

A growing number of studies have examined the quality of service offered by paratransit services, presumed to be inferior to institutional transport services by its detractors. A literature review of the literature shows, however, that users, especially captive ones, are satisfied by the frequency, regularity, service hours and comfort of paratransit vehicles. Hence, for particular contexts, paratransit's service quality might be similar – or even better – than service quality of institutional transport services. Pertaining to frequencies, the use of smaller vehicles by paratransit operators allows for reduced waiting times when compared to those of larger vehicles; the reduction in waiting times can help explain users' preference for paratransit services.

Territorial coverage

Some authors, specifically focussing on the quality of service, especially on aspects of coverage and frequency, have concluded that the paratransit's quality of service is, at the least, comparable to that of institutional transport. Avellaneda Garcia (2007) shows how, in Lima, paratransit is often the only travel solution for remote areas of the city or for poor residents to reach opportunities within the city, since institutional transport cannot meet their needs.

Similarly, an analysis presented by CDIA (2011) of minibuses in Indonesia, in particular the angkot in the city of Solo, highlights the noticeable differences in territorial coverage of various modes, as can be seen in the image below. Irrespective of capacity, the angkot, with their defined routes and mandatory operating licence, are far more present in the city than conventional public buses and the BRT network.

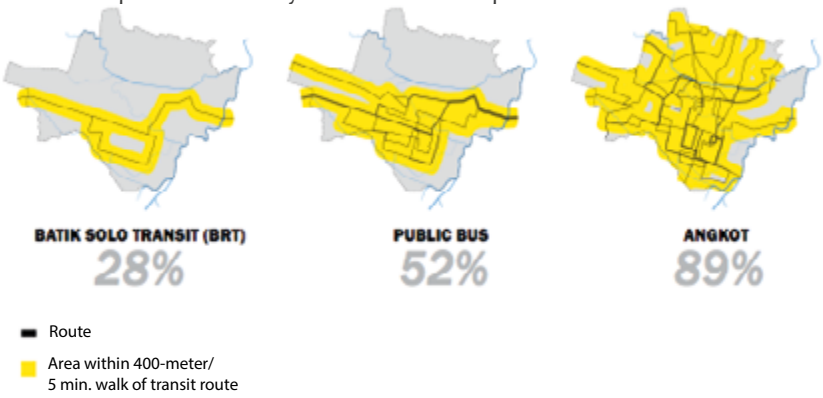


Figure 3 : Comparison of territorial coverage of BRT, standard buses and minibuses in Solo, Indonesia[6]

In the same way, Audard *et al.* (2012), studying the case of Brazzaville, concluded that paratransit offered more diverse mobility solutions (in terms of vehicles and coverage) that suit the needs of cities in the Global South. Disruptive competition can be seen among vehicles of the same size (especially minibuses), but it is not so noticeable between different modes: for example, between minibuses and shared taxis (Audard *et al.*, 2012).

Frequency, regularity and service hours

According to some authors, the frequency and service hours of paratransit is comparable (or even better in some cities!) than those of institutional transport. In Africa, traditional conventional bus companies have steadily declined in terms of quality of service (Wilkinson *et al.*, 2012). Because their operations rely on subsidies, they cannot bear significant increases in operating costs and therefore have limited expectations of improving frequency. In Browning's 2001 analysis of minibuses in South Africa, he shows that these services can be operated at frequencies that are more advantageous to users than if the routes were assigned to conventional buses.

6. Source : CDIA 2011.

Passenger comfort

The rather poorly documented issue of passenger comfort is a source of debate because it depends a great deal on vehicle type. In the poorest cities, where vehicles unsuited for passenger transport are overloaded to meet the demand for mobility, the word 'comfort' hardly applies. In less constrained situations, paratransit vehicles generally provide seating, unlike institutional transport vehicles. However, paratransit vehicles are often overloaded and passengers must share seats. This makes boarding and the journey itself particularly difficult. Also, unsafe driving behaviour and conditions for alighting passengers can make this mode of transport downright dangerous.

_Chapter 2

Characteristics of the paratransit sector

Given the intrinsic variability of the concept of paratransit, it is difficult to define an archetype for the organisation and operation of this mode. In light of the main themes addressed in the literature, we have chosen three attributes to characterise paratransit:

- transport supply and characteristics of operating companies;
- the business model of the sector;
- planning and regulation.

For each of these attributes, we will attempt to identify the characteristics specific to paratransit and to understand the underlying economics, often in contrast with institutional transport modes.

2.1 Vulnerable and variable supply

Structure of the profession: characterised by fragmentation

Various studies have identified three levels in the structure of the profession: drivers, vehicle owners and associations or cooperatives grouping owners and/or drivers. Associations can play an important role in organising the sector by developing a hierarchical structure but, according to some, they form an obstacle to change or to the professionalisation of paratransit operators.

In the literature, descriptions of the system focus on the fragmented nature of ownership and disunity in the sector. In contrast with the institutional transport model, which aims to optimise the operation of a large number of vehicles in coherence with the rest of the public transport system, the paratransit business model is based on the operation of a single or small number of vehicles, working separately from the rest of the existing public transport services.

A survey conducted in Abidjan in 1999 showed that out of 2,100 *gbaka* (15 to 20-seat minibuses) in operation, 80% of them belonged to people who owned only one vehicle[7].

7. Adolehoume et al., 2000.

The literature offers several explanations for this fragmentation. In most cases, historical path-dependencies play a central role: in the beginning, this type of service was more or less legal and was operated by people who, in some cases, managed to transition to a legal status, but without changing paratransit's operating model.

In Latin America, according to Figueroa (2005), the extreme fragmentation in current ownership can be seen as a consequence of deregulation policies implemented during the 1980s and '90s, when newly unemployed city-dwellers used their severance pay to invest in a vehicle and obtained the legal status allowing them to operate collective transport services, taking advantage of the lax rules for joining the system. The example of Lima illustrates this process quite well: following deregulation of the transport market in the 1990s, the number of public transport vehicles increased from 10,500 in the late 1980s to over 60,000 in 2002[8]. Whether for historic or more recent reasons, fragmented ownership is the result of the prevailing original model of paratransit business.

The owner-driver model, as an archetype of paratransit operation, is nonetheless the starting point for many models and organisational structures. Other features may be added, such as the need (or not) for an operating licence, the role of associations in distributing the licences (as is the case in Latin America) or in grouping owners with licences (often the case in sub-Saharan Africa and countries of the Mediterranean region).

In Morocco, for example, 48% of the grands taxis (shared or collective taxis) in Agadir and 86% of those in Ouarzazate have a two-tiered business model (licence holders in the one hand and vehicles owners and/or drivers on the other hand) in which the owner-driver does not have a licence in his own name. Licence holders are therefore considered to be only rental collectors of the system; and the situation becomes source of tensions and an obstacle to systemic reform.

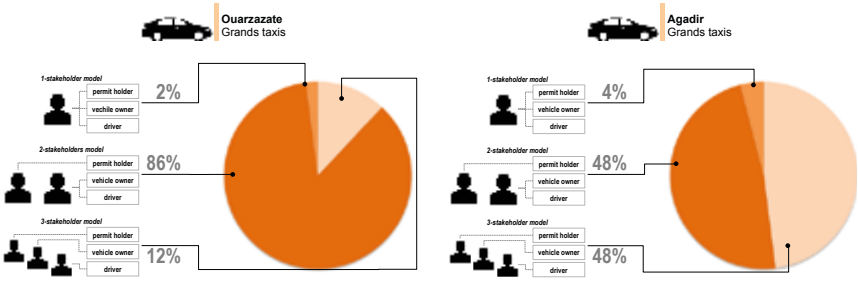


Figure 4 : Examples of organisational models of shared taxis in Morocco[9]

8. Orrico Filho *et al.* 2007

9. Source : ALG 2012 – Data needs to be verified.

In models where owners are not drivers, the rate of driver turnover is an important element. The case studies in Abidjan and Nairobi show that owners easily change or replace their drivers. In Abidjan, according to estimates based on surveys of drivers in 1999, 60% of drivers had been working for the same owner for less than one year[10]. In Nairobi as well, the average longevity of a driver with the same owner was two years[11]. This high rate of driver turnover reflects the generally contentious relationship between owners and drivers on matters of revenue and how it is shared.

Paratransit's structure in each city evolves according to the economic environment, modes of financing and the regulations implemented by the local authorities. In addition to these factors, new forms of paratransit services regularly emerge and become part of the system. The current model is thus the result of a number of factors and urban contexts that change over time.

For example, several cities (Rabat, Accra, Dakar, Cape Town, Quito, etc.) have tried to promote a consolidation of ownership, with the aim of gradually formalising the paratransit sector. These projects have had variable results because the nature of paratransit sector's business model remains complex, even when new forms of organisation are proposed. In his analysis of the system in Bogota, Montezuma (1996) suggested that paratransit modes would be resistant to any type of government initiative to transform the sector.

Choice of vehicle type: small, used vehicles

Most definitions of paratransit services also mention the small size of the vehicles. In addition, there is a gradual trend towards progressively smaller vehicles[12]. This comes in response to two factors: the need of paratransit operators to adapt to difficult terrain (topographical limitations, urban fabric constraints and the overall state of road infrastructure) and the need to ensure the profitability of the routes.

On the first point, Figueroa (2005) showed that the city expansion into steep surrounding terrain creates an urban territory that renders impossible the use of high-capacity vehicles. The small vehicles used by paratransit operators offer flexibility and access to areas that cannot be served by larger conventional public transport vehicles.

On the second point, it is the balance between supply and demand for mobility (organised in a more or less competitive manner) that determines the profitability of an asset. To make a return on an expensive asset, such as a large or new bus, it would have to be utilised to the maximum. If this cannot be achieved due to a small number of runs or weak demand, then the fixed costs – and therefore the investment – must be kept to a minimum.

In each city, a balance is thus found with a certain standard type of vehicle for paratransit services, as can be seen in the image below. Jitneys (as well as motorcycle

10. Source : Adolehoume et al., 2000.

11. Source :Teurnier & Domenach, 2000b.

12. Source : Finn & Mulley, 2011; Kumar & Barrett, 2008.

taxis) found in Southeast Asia are the solution to the poor state of infrastructures and to the lack of profitability for large-capacity vehicles that are forced to operate routes with insufficient demand and with operational characteristics that are not suitable to their strengths (reduced operational speeds and "in the market" competition with other modes)[13]. In the same way, in Sub-Saharan Africa, minibuses are the solution to the low profitability of standard-size conventional buses, caused by lower demand (and therefore lower occupancy) on certain routes. If critical mass is lacking, then minibuses, which are cheaper to purchase and easier to fill, become profitable without the need for subsidies[14]. This view is shared by Wilkinson et al. (2012) who see the minibus as a response to problems of quality and profitability of institutional transport services (especially conventional buses), even though their total cost per seat may be higher.

The desire to reduce fixed costs and ensure profitability is also what explains the large number of used vehicles, even though they are often more costly to operate.

Figure 5 : Minibuses in sub-Saharan Africa

13. Source : Cervero, 1991.

14. Source : Kumar & Barrett, 2008.

There are a few rare examples of paratransit using higher-capacity vehicles. In Dhaka, paratransit operators have adapted to demand and now operate conventional buses. These experiences show that a number of factors influence owners and operators in their choice of vehicles for paratransit services. In India, high demand, along with policy restrictions on rickshaws in Delhi – which were not included in the vision for a modern transport system – partly explain why paratransit operators use conventional buses[15]. In Santiago as well, before the launch of the Transantiago programme, owners and the associations controlling the paratransit routes, were encouraged to replace their vehicles to help reduce pollution and, as a result, vehicle sizes remained stable[16].

BOX 1

Algiers: ever-smaller vehicles![17]

In 1987, following a crisis in passenger transport in the country's large cities, Algerian authorities issued licences to paratransit operators to cover urban routes. They were supposed to use high-capacity vehicles but the private operators did not follow the recommendations and instead chose to use minibuses with a capacity of approximately 24 seats per vehicle.

One year later, in 1988, authorities decided to deregulate the system in order to allow for the development of micro-companies to encourage young adults job creation. In 1989, only two years after issuing the first licences, the authorities estimated that there were 107 private operators, of which 67 were using minibuses, with an average of 1.2 vehicles per operator.

In the early 2000s, when the authorities tried to re-introduce regulation in the system, the number of micro-entrepreneurs was growing sharply: according to estimates, there were about 2,800 micro-entrepreneurs in the year 2000 and the number had risen to 4,000 by 2004.

These figures show that the fragmentation of the paratransit sector goes hand in hand with a steady decline in the size of vehicles used for public transport. A study of profitability in the sector would be necessary to better understand the forces at play.

15. Source : Tiwari, 2002.

16. Source : Fernandez Koprich, 1994.

17. Sources : Matouk A. & Abeille M. (1994) and Chanson-Jabeur C. (2004)

■ Operation and maintenance: an old and overused fleet of vehicles

Paratransit vehicles have an extremely long service life (see figure 6). The longevity of a vehicle's service depends on the availability of spare parts and the capacity to perform repairs at a local level (which isn't always the case for institutional transport vehicles). Significant repair may be necessary depending on the vehicle's age and local driving conditions: overuse and overloading on a daily basis, bad road conditions etc.

In order to meet profitability targets, drivers have to work long days. Vehicles that are shared by several drivers may cover considerable distances. However, our ability to estimate these distances remains limited. In Abidjan, three lines of gbakas studied by Adolehoume et al. (2000) presented an average of between 10 and 15 round trips per day, with the mean passenger ratio of 0:9, while ratios of above 1:0 were also found during surveys. Similarly, in Bamako, studies of three minibus lines revealed that the number of round trips was between 9 and 10 per day[18].

To reduce repair costs, owners look to the informal economy. This is how the paratransit sector generates a large number of informal, indirect and generally unstable jobs. Both the repairs industry and paratransit model subsist because of this dynamic. According to Le Tellier (2007), in Morocco, the owners of grands taxis are against renewing their transport fleets partly because the vehicles they use can be repaired with parts that are locally available and with the aid of mechanics that are experienced in repairing these vehicles.

18. Source : Cusset & Tounkara, 2000.

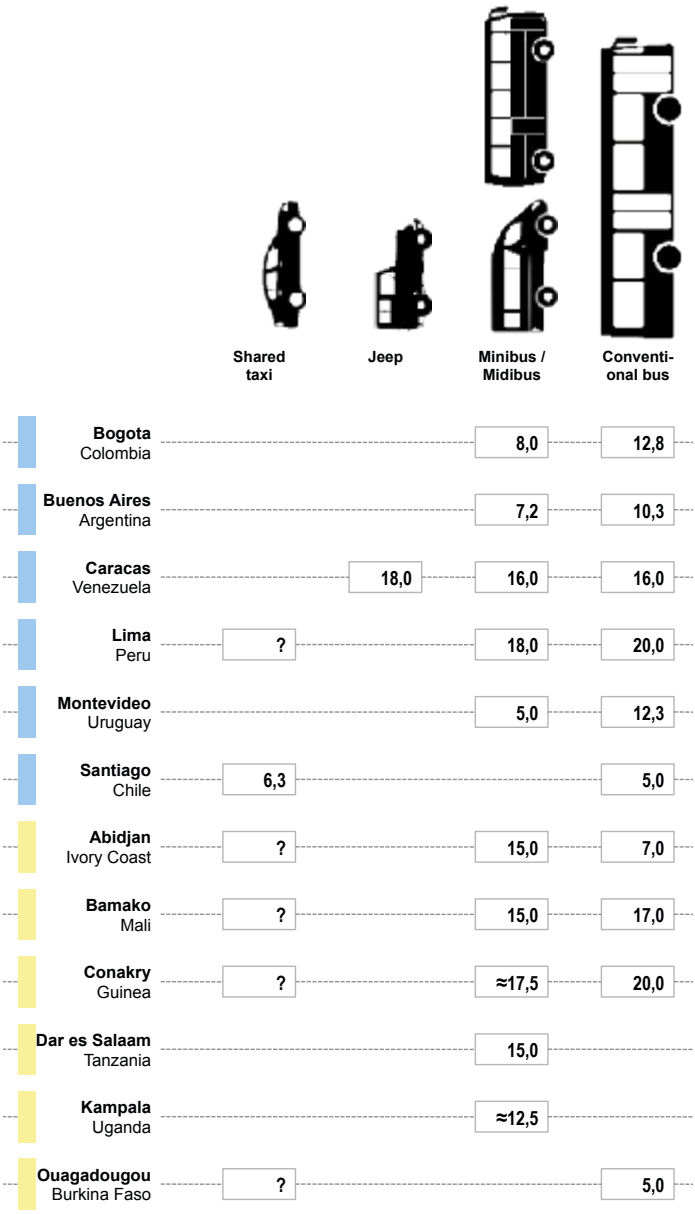


Figure 6 : Average age of public transport vehicles in certain cities[19]

19. Note : For South American cities, the average age of the bus has been calculated grouping together paratransit and institutional transport vehicles. For African cities, the buses are considered as institutional transport services.

Source: CAF 201 ; Kumar & Barrett 2010.

Environmental externality and accident rates: renewing fleets and prohibiting certain practices

The age of a public transport fleet has a direct impact on an area's pollution levels. If we take Mexico City as an example, in 2004 there were 3.5 million vehicles on the road. The microbus fleet represented 1.5% of the total fleet (i.e. 35,000 units), However, these vehicles were responsible for approximately 22% of local pollutant emissions (carbon monoxide, nitrogen oxide, unburned hydrocarbons, particles) and 10% of GHG emissions[20]. Therefore, renewing this fleet could become a matter of public health and a vector for reform.

Modern paratransit transport vehicles would make sense in terms of CO_2 emissions, particularly as they tend to carry more passengers. The graph below shows a study of CO_2 emissions per passenger-kilometre according to vehicle type. Equivalent performances are recorded based on an occupancy threshold of 35 passengers for a conventional bus, 14 passengers for a minibus and 11 passengers for a microbus. Consequently, depending on how popular the lines are, the introduction of smaller, paratransit-operated vehicles may be justified.

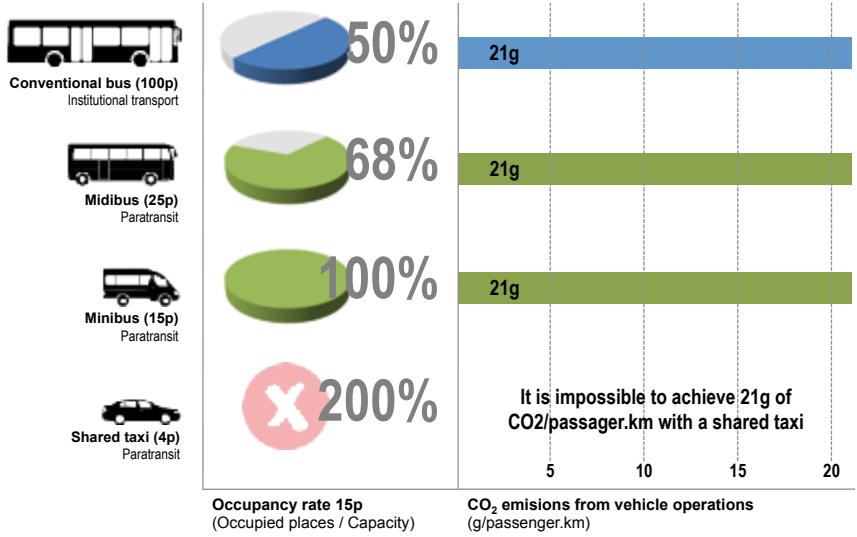


Figure 7 : Energy efficiency by vehicle type, CO_2 emissions[21]

Finally, accident numbers in the paratransit sector seem to be a substantial problem. Even without reliable data, we know that in Sub-Saharan Africa, dangerous driving behaviour is the main cause of accidents (fatal and non-fatal) involving minibuses. A study of the accidents on the road to Kampala and Accra suggests that a large

20. Source : FFEM 2004.

21. Source : Godard 2008.

percentage of drivers do not possess a valid or genuine driving license and that their working days are excessively long with very short rest periods[22].

This is a common situation in countries across the African continent. Moreover, Benmaamar (2003) explains that the competition to pick up passengers in the street produces a situation where cars are driving too fast and are overloaded, which are the two main causes of fatal accidents.

Employment: a sector that generates (unstable) jobs

When comparing access to the paratransit industry versus access to the institutional transport industry, we can see vast differences: while institutional transport is based on formal companies recruiting and training drivers as well as other professionals in the transport service sector, paratransit is far less regulated, but also far less stable.

In Latin America, following the deregulation of the public transport sector in 1990, new paratransit operators were able to integrate the sector[23]. Sometimes it was merely a case of buying a vehicle and becoming a member of an association. No training was required and there were very few obstacles to prevent the addition of new vehicles. Moreover, the relevant authorities (local and national) exercised no control whatsoever to cap the number of vehicles in the system.

These practices have been taken to the extreme in Lima, where, following the deregulation policy implemented by the Fujimori government, any car owner who has employment can operate a share taxi service. Share taxi drivers look for passengers who are headed in their direction, be it their home or their place of work, thus offering a share taxi service twice a day.

Similar forms of access to employment in independent transport are seen in other parts of world. In Africa, West Africa in particular, urban share taxis remain a largely informal mode of transport. There are few pre-requisites for setting up an independent business. The only requirement is to pay membership fees to associations or pay a 'lease' to operate along a certain route. Contrary to institutional transport, independent transport offers fairly easy access to employment, albeit unstable.

The most common compensation model in the paratransit sector is entirely dependent on the drivers: they must minimise expenditure and maximise revenue in order to cover fuel and maintenance costs. At the end of the day, they must pay various recipients and touts, if any. The driver must also pay the vehicle rental and the operating licence if they are not the owner. Their pay, therefore, is variable.

22. Source : Benmaamar, 2003.

23. Source : Figueroa, 2005.

2.2 An unreliable business model

Little is known about the financing of the paratransit sector. Few studies have successfully collected reliable data in this area[24]. The differences between legal and illegal taxi drivers are vast. Similarly, the financing and accounts of a share taxi and those of a minibus are significantly different within the same city.

A risky but profitable business

One of the essential characteristics of paratransit is the absence of direct subsidies from local or national authorities (this excludes the use of urban infrastructure that are sometimes considered indirect subsidies). The sector's only source of revenue is the paying passengers. As mentioned above, independent transport operators depend on this revenue to cover all of their operating costs.

The profitability of paratransit routes and the prices set by drivers and owners are central to this model. The operating accounts can be categorised thus:

- wages for drivers and other recipients,
- variable costs (fuel, parking, small repairs, etc.),
- fixed costs (insurance, licence, membership in an association, etc.),
- upkeep and maintenance,
- return on investment and provisions for replacement.

The two extremes represent, on the one hand, purely independent models and, on the other, models that have evolved towards an operation akin to that of institutional transport companies. In the first instance, the paratransit operators, namely the informal owner-drivers, often neglect to budget for unforeseen costs and/or costs related to depreciation of their vehicles in their accounts. These operators rely on day-to-day revenue from which they subtract fuel costs and, if need be, repairs. Furthermore, nothing is set aside for the eventual replacement of the vehicle. For them, the profitability of a route varies from one day to the next. Nevertheless, the experience they gain and their knowledge of fares enable them to choose more profitable routes, often by shadowing institutional transport lines[25].

In Indonesian cities, minibus operators and motorcycle taxi drivers receive similar revenues, even though the motorcycle taxi is a less regulated mode of transport. In the city of Solo, the revenues of *angkot* drivers vary between 2US$ and 5US$ per day, while those of motorcycle taxi drivers fluctuate between 2US$ and 6US$ per day[26].

In cases where a driver rents a vehicle from the owner (who pays the insurance, upkeep and repair), several models of compensation exist. The driver's salary generally consists of a very small fixed amount, which the owner provides, and another variable amount that depends on revenue (once all costs have been covered). Drivers, therefore, must continually evaluate the profitability of a line,

24. These sources include: Adolehoume et al., 2000; Cusset & Tounkara, 2000; Teurnier & Domenach, 2000a & 2000b; CDIA, 2011.

25. Source : Lammoglia et al. 2012.

26. Source : CDIA 2011.

the same way independent operators do. The charts below show that in these four case studies, between 13 % and 22 % of revenue must be allocated to cover salaries, between 5 % and 38 % to fixed costs, and between 20 % and 36 % to variable costs. It is also interesting to note that, because of likely increased oil prices in many cities of the Global South, variable costs are therefore likely to increase accordingly.

Owners manage their risk using the monthly rent they collect. An owner's net income, therefore, depends on how much they have to spend on maintenance and repair. When a more professional approach to investment is taken, provisions are made to replace the vehicles or to increase the fleet. This is the model in some cities in Africa and Latin America. It functioned well in the 1990s, with predictable rates of profitability, however the current urban transport crisis has meant that a surplus of paratransit supply prevents newcomers from being profitable[27]. Because of low revenues, some paratransit operators are forced to withdraw from the system[28].

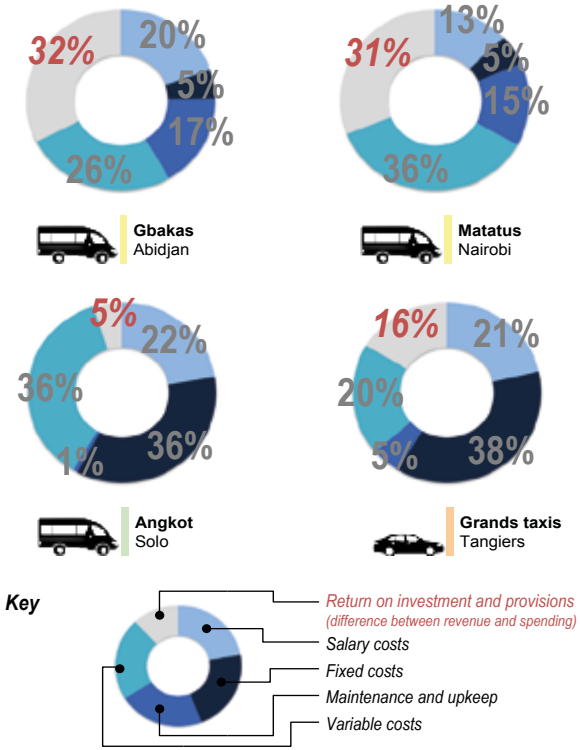


Figure 8 : Breakdown of operating costs of four independent transport lines[29]

27. Source : Avellaneda Garcia, 2007.

28. Source :Figueroa, 2005.

29. This data has been calculated based on estimated real operating costs published in the references. The data show lines which are profitable and operating conditions fairly good; the results do not reflect an average.

Sources : Adolehoume et al. 2000; ALG 2012; CDIA 2011; Teurnier & Domenach 2000.

In each of these examples, the two key factors of the paratransit dynamic are occupancy rate and the profitability of the route. Low profitability routes are often operated by independent drivers with smaller and older vehicles, while more profitable lines are generally operated by companies and associations of owners of standard vehicles.

■ Restricted access to capital

In general terms, drivers and owners of paratransit services encounter severe difficulties in accessing the various kinds of funding options. Capital expenditure is necessary when the driver first enters the system, when a vehicle is replaced, and when the possibility of acquiring an additional vehicle arises. In each case, there are three funding options:

- funding through formal loans (especially from banks);
- funding through personal savings, or even those of family or close-social-network members;
- informal loans.

Access to bank loans remains limited, and often develops only after businesses have been formalised and then assisted by the local authorities. This involves funding for fleet renewal, but which often, in return, requires existing drivers to consolidate and corporatize. In Dakar, the minibus renewal programme supported by the World Bank initially planned to consolidate operators and introduce new regulations.

A first group of 1300 vehicles benefitted from renewal loans. This first experience, covering about 20% of the city's total minibus fleet, is considered a success, although the introduction of additional regulatory measures (regarding service quality in particular) was strongly contested by all the drivers[30]. Interestingly, participating drivers' revenues increased but so did operating costs.

In Cape Town, national authorities' renewal programme excluded new drivers and sought to introduce minimum safety standards. However, the objectives were not met: initial capital expenditure required from drivers was often far too high, thus ruling out the oldest vehicles. Furthermore, post-analyses estimated that new vehicles would produce operating costs far higher than those of the vehicles being replaced[31].

Due to these bank-loan access restrictions, paratransit drivers depend on informal loans and personal or family savings. System entry costs, if the services are not illegal, include the cost of the vehicle and the cost of joining an association or an entry fee. Generally, owner-drivers must use their savings and also an informal loan to be able to enter the system. Multi-vehicle owners normally have capital that enables them to find other solutions when they consider buying an additional vehicle. In both cases, capital is accessed through close social networks and through self-funding; the operators know relatively little about funding arrangements through the banking system.

30. Source : Kumar & Diou, 2010.

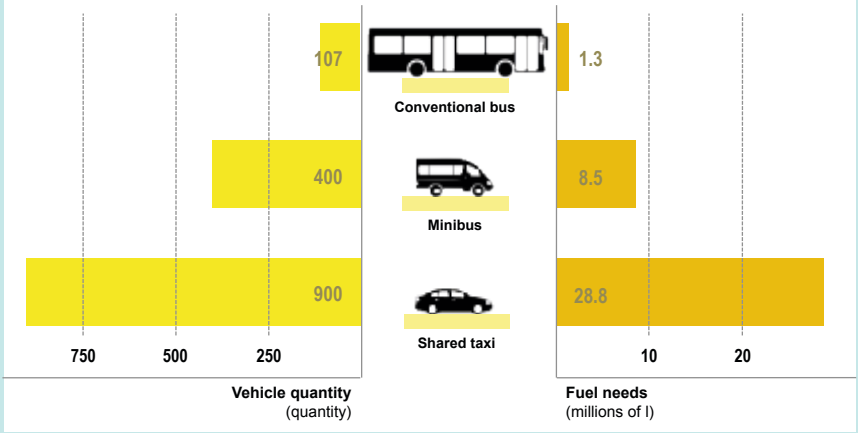
31. Source : Grey, 2006.

Accra: a theoretical analysis of fuel consumption by buses, minibuses and shared taxis

To demonstrate the utility of transforming the public transport system of the city of Accra, analyses of fuel consumption (and especially diesel) have been conducted. The estimations for three modes of public transport are shown below[32] : conventional buses belong to the formal transport sector, while minibuses and shared taxis are defined as paratransit services.

	Shared taxi	Minibus	Conventional bus
Occupancy rate (percentage)	160%	150%	90%
Diesel consumption (km/l)	6.4	5.3	3.0
Capacity (passengers)	4	12	75
Consumption (pax/km/l)	1.00	0.29	0.04

The estimations of consumption per km and per passenger show the utility of having conventional buses with fairly high occupancy rates on major high-demand corridors, when compared with shared taxis and minibuses. Transporting 7000 passengers over 45 km in Accra would take about 100 conventional buses, or 400 minibuses or 900 shared taxis; with a 1:20 ratio for total fuel consumption.



32. Sources : UITP & UATP (2010)

The sector's tax contribution: a subject seldom documented

One of the unexplored subjects of paratransit services is its tax contribution. If we make a distinction between relatively formal and fully informal, as the paratransit drivers' business activity is recognised by the authorities, a limited number of studies have been conducted on the issues relating to the taxes paid by these entrepreneurs.

In general terms, three types of tax are applied to the paratransit sector. Firstly, taxes relating to vehicle operation include the price of operating licences when these are regulated by the local authorities, and other taxes specific to each city. Secondly, taxes on the price of fuel and the cost of buying a new vehicle are substantial indirect taxes. Lastly, if the business is legal and declared, the driver must pay income tax.

Studies would be required to be able to differentiate the paratransit nature of services, and distinguish them from fully informal or illegal businesses that do not pay the regulatory minimum.

2.3 Variability of regulatory frameworks for paratransit services

Whereas the regulation of institutional transport covers three dimensions (quality regulation, including vehicle safety; quantity regulation that pertains to the number of vehicles operating a line or in the system; and fare regulation), paratransit transport can be completely unregulated or benefit from inefficient regulatory frameworks and lack of adequate enforcement from authorities. The figure below shows an interpretation of the regulatory conditions for certain types of paratransit services.

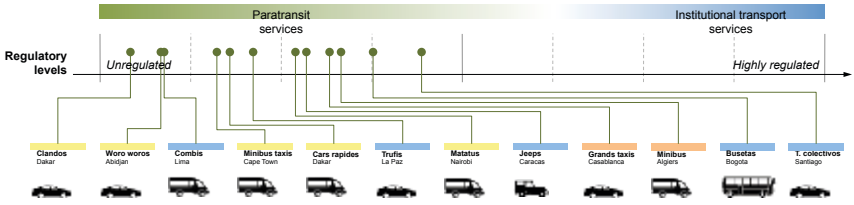


Figure 9 : Level of regulation of paratransit services – a selection of cases

Theoretically, competition "in the market" would be a form of self-regulation by the paratransit sector. But in reality, excessive and disruptive competition between drivers seeking to maximise profits leads to problematic situations where users are forced to travel in vehicles which are not roadworthy, generally overloaded, and do not adhere to minimum safely rules. Regulatory frameworks to resolve these difficulties vary in laxity from city to city.

Deregulation: perfect competition is economically untenable

There are several examples of fully deregulated paratransit services, especially in Latin America. In Santiago, Chile, during the 1980s and '90s, the bus and shared-taxi sector underwent complete deregulation (Fernandez Koprich, 1994) – although the authorities kept control over fare pricing. Likewise, the transport system in Lima, Peru, was also, for a long time, an example of a largely deregulated public transport system, with highly permissive enforcement by the local authorities (Avellaneda Garcia, 2007).

In theory, perfect competition in the market produces a system where the least efficient drivers gradually leave the system, which thus becomes homogeneous in quality and price. But in this situation, where paratransit practically turns into a "commodity", it becomes increasingly difficult to turn in a profit! Experiences in Latin American cities have shown that the free market led to unexpected anomalies, especially increases in the number of fully informal transport vehicles and reduced in-vehicle occupancy rates – an untenable situation. Indeed, when lacking adequate information on quality and quantity components of the transport system, deregulations can result in perverse practices in the system. What is more, paratransit operators can organise and erode perfect competition by negotiating within the sector. As shown in the graph below, in Latin America this approach has resulted in fare increases to maintain private operators' profitability.

Because of this, competition "in the market" where different vehicles compete directly is untenable: both for operators, whose profits disappear; and for users, whose travel conditions deteriorate.

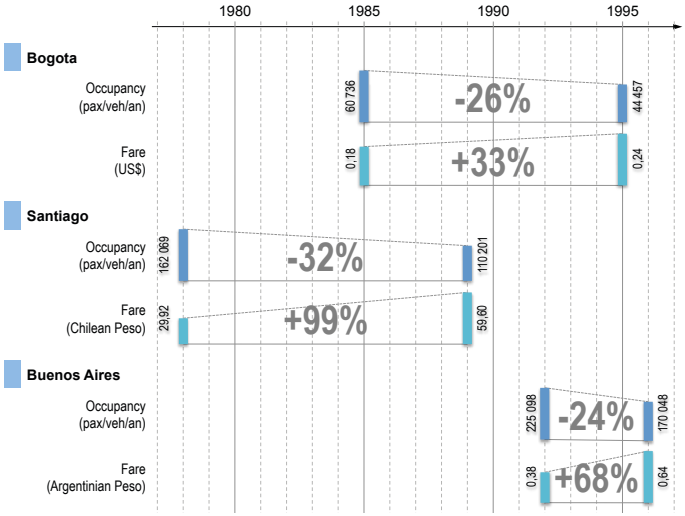


Figure 10 : Occupancy rates and fares in urban public transport in three Latin American[33]

33. Source : Authors based on Figueroa (2005).

Fare regulation

Fare regulation is another key point of divergence between institutional transport services and paratransit services. These two types of service must often adhere to fares set by regulatory authorities. A relatively common practice is to align paratransit's fares with those of institutional transport. Similarly, when lacking fare regulation for paratransit services, institutional transport can be forced to maintain similar fare prices in order not to lose patronage to paratransit vehicles. Institutional transport services can thus offer relatively competitive prices against paratransit services. However, the fares applied by minibuses (paratransit mode) can be lower or higher than those of buses (institutional mode) (see table 1). In many metropolitan areas, authorities attempt to protect the institutional services.

Fare regulation for paratransit services proposes rules with which operators do not always comply. Contrary to institutional transport practices, fares are commonly negotiated between user and driver, resulting in reductions or even gratuitous trips.

City	Bus fare (USD 2007)	Minibus fare (USD 2007)
Sub-Saharan Africa		
Abidjan, Ivory Coast	0,40	0,40 – 0,70
Addis Abeba, Ethiopia	0,25	0,12
Bamako, Mali	0,25 – 0,30	0,20 – 0,25
Conakry, Guinea	0,18	0,21
Dakar, Senegal	0,30	0,18
Kigali, Rwanda	0,28	0,28
Lagos, Nigeria	0,40 – 0,56	0,38 – 0,39
Latin America		
Bogota, Colombia	0,51	0,58
Caracas, Venezuela	0,37	0,37
Mexico City, Mexico	0,18	0,23
Lima, Peru	0,30	0,30
Rio de Janeiro, Brazil	1,17	1,17

Table 1: Comparison of fares of institutional transport and paratransit services in cities in Latin America and Sub-Saharan Africa[34] [35]

Conversely, drivers apply fare increases according to congestion, time of day, and weather, for example. In Nairobi, passengers may be asked for a surcharge in rainy weather (Graeff, 2009). Fares for the two modes (institutional transport and paratransit) can thus be regulated, but with paratransit operators allowing themselves some flexibility.

34. Note : Most fare prices do not change with distance.

35. Sources : Kumar & Barrett (2008) for Sub-Saharan Africa; CAF (2010) for Latin America

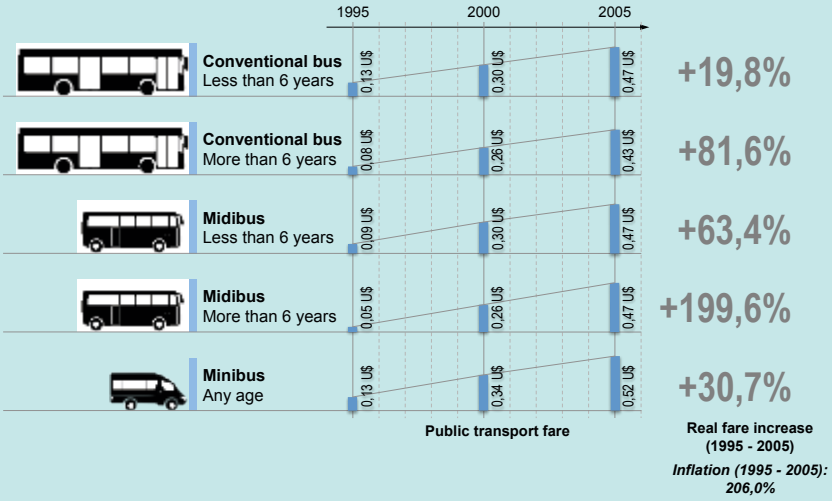
BOX 3

The perverse effects of fare regulation on independent transport services in Bogota

In Bogota, before the Transmilenio system was introduced, occupancy rates of public transport vehicles paradoxically fell while fares kept increasing. The public transport system had an excessive oversupply of vehicles, even if paratransit lines maintained attractive profitability for operators.

Estimates showed that the number of passengers per day per vehicle in paratransit services gradually fell to extremely low levels of productivity. Average occupancy of buses in the paratransit sector was 250 passengers per vehicle per day, whereas optimum international standards dictate an average of 800-1000 passengers per vehicle per day.

Paratransit operators forced and convinced authorities - the Transport Ministry which is in charge of fare regulation –, to modify the equation that defined fares for their services. In the new equation, fares increase as the number of passengers per vehicle per day decreases. Operators can thus distort the fare-calculation method by adding vehicles to the system. Furthermore, and given that fares can be reviewed every six months, operators continuously transfer the costs of over-supply to users.[36]



36. Sources : Ardila Gomez A. (2005, 2007)

Regulation of access to the profession via licences

Most cities in Sub-Saharan Africa have very flexible regulatory frameworks for minibuses[37] and in general for all modes of the paratransit sector. In Morocco there is fare, quality and quantity regulations for grands taxis, but this has not often been updated and operators enjoy indulgent control, although efforts have recently been made to address this subject.

When operation of a paratransit vehicle requires a licence, there are two main options: licences awarded to vehicles, or licences awarded to a line. In general terms, the first type is common in Sub-Saharan Africa and the Mediterranean region. In Morocco, operating authorisations for *grands taxis* (shared taxis) are granted to a person. This person can, without necessarily going through operator associations or cooperatives, rent out this authorisation. However, a specific feature in Morocco is the need to have a "trust licence" (*permis de confiance*) to operate a taxi; this licence, issued by the Interior Ministry, is an additional form of regulation in the system.

The second type of licence is the norm in Latin America. In these cities, licences for a line are granted to associations. These associations, which do not necessarily own the vehicles, rent out the licences to the vehicle owners. Associations are thus responsible for regulating quantity in the system. It is common for the licence-holding associations to focus on one line, which results in a large number of associations.

The role of professional associations: a form of self-regulation

Given the limitations of competition, and as local authorities are often absent, the sector is often self-regulated. The owner associations and/or cooperatives task themselves with defining profession-wide rules.

Paratransit associations are often responsible for regulating the number of vehicles on lines. In Sub-Saharan Africa, especially, they take part in line management by defining the number of vehicles that operate between two terminus stations, as well as frequencies and timetables.

In Accra, a single association includes the great majority of operators (nearly 90% of the city's minibuses) and acts as the city's regulatory entity, replacing public authorities[38]. In Brazzaville, similarly, the system self-regulates by assigning roles to the various types of vehicles.

The practice of "taking turns" is therefore very common in this region. Associations or unions managing a rank are responsible to coordinate vehicle departures. As a result, rank localisation in the urban structure becomes a key component of the system. Drivers, who do not necessarily have a pre-set route but rather a departure point and an arrival point, wait at the departure point until the vehicle reaches full capacity before leaving. This practice guarantees a certain profitability and enables them, when seats become vacant, to carry extra passengers on the journey.

37. Source: Kumar & Barrett, 2008.

38. Source: Finn, 2008.

In Latin America, regulation of quantity takes a very different form. In Bogota, before the recent reform, a new paratransit route was implemented as follows: the route associations, which are relatively well structured, identified a new need. An association representative then collected a number of signatures in order to prove to the need for a new transport route. Once enough signatures had been gathered, they were presented to the authorities, which, in turn, granted a certain number of licences for the route.

Associations are then tasked with renting out these authorisations to the vehicle owners and/or drivers. In this case, profitability is provided by very long journeys combining two starting-points and destinations, enabling operators to maximise the number of users over the total route distance (cf. Gilbert, 2008; Ardila Gomez, 2007).

Anomalies due to this operational mechanism are commonplace. They are reflected in aggravated congestion because the paratransit routes, which start in mainly residential districts on the city peripheries, cross the city centre, where several routes converge.

Within these rules, drivers of urban public transport vehicles can in turn distort the supply/demand balance. The practice, typically observable during off-peak periods in Latin American cities, consists of reducing driving speed – but without changing the frequency of departures from the starting terminus – in order to carry more passengers along the whole route. This practice forces users to wait for longer, and creates complex traffic conditions in the city.

Another anomaly in systems self-regulated by driver and owner cooperatives is a cartel mentality. Organisations use quasi-mafia-like practices, which go as far as obtaining positions in the city's political spheres in order to influence administrative decisions.

BOX 4

Paratransit routes: a network that expresses the nature of paratransit services

Paratransit routes are not always clear: indeed, for certain services, a route takes the form of a myriad of variable paths between two points or two ranks. Such type of "route" is therefore difficult to present in a map as it is not static and it becomes the driver's responsibility to choose its path depending on demand, traffic conditions and competition with other types of services.

A second type of route exists. Routes of this family have a clearly defined path and drivers can only decide operating speeds and stops along the way. Nonetheless, for authorities, these routes cannot be considered to be components of an optimised network. The final route is often too long and it can have various turns and detours between its initial and its final stops (see figure below that depicts one such type of

route in Caracas)[39]. These routes are rarely a direct or optimised path between an origin and a destination.

Routes have different objectives: to maximise fare –box revenues and profitability and to link different landmarks of the city. Considering urban forms and structures of the Global South, it results in routes that, after originating in urban peripheries, cross the main activity area (usually the historical CBD). In summary, paratransit routes often allow users to arrive to their destination without requiring transfers between vehicles or services.

Independently of the type of route, the resulting paratransit route network is therefore not an optimised network in terms of vehicle choice and complementarity between routes. The network develops as a sum of routes created in an isolated manner and based on competition. It is therefore a sum of "desire routes" and not a result of planning and operational efficiency decisions. Most routes are the unique option on one peripheral area, but that same route is in competition with the rest of the network when converging towards the CBD. Santiago's former paratransit network is a good illustration of this phenomenon (see image above) .

For paratransit operations, the resulting network from the sum of isolated routes is based on services that are at the heart of the concept of "competition in the market"[40] [41].

39. Source : Ocaña Ortiz et al. 2002.

40. Image is only showing bus and midi-bus routes ; shared taxi network is not shown.

41. Source : Jara Diaz 2007

_Chapter 3 Towards recognition of institutional-paratransit complementarity

Although, in the literature, paratransit services are often defined in contrast to formal transport services, some recent sources tend to recognise the role of paratransit services and aim to identify the possible operational complementary arrangements. Worth citing here are the work of Le Tellier (2007) on shared taxis in Moroccan cities; Audard *et al.* (2012), who studied paratransit services in Brazzaville; Diouf (2002), who analysed minibuses in Dakar; and Tangphaisankun (2010), who proposed a feeder role for motorcycle taxis and *songtaews* in Bangkok. Figueroa (2007) described the project to integrate shared taxis into the transport supply in Santiago; and Salazar Ferro and Behrens (2013) analysed the transformation of paratransit sectors in Bogota, Quito and Santiago.

In addition, studies by Gwilliam (2005), Orrico Filho *et al.* (2007) and Wilkinson et al. (2012) enabled an assessment of the reintroduction of regulatory frameworks in several cities of the Global South (in particular Bangkok, Bogota, Colombo, Dakar, Dar es Salaam, Johannesburg, Lagos, Nairobi, Rio de Janeiro and Santiago). These studies must be considered in light of the work done by Xavier Godard (1999), who very early on studied the resistance to reform by the paratransit sector in Africa. Two approaches dominate current perspectives on this subject:

- reform or professionalisation of the sector coupled with the introduction of new regulatory measures;
- transformation and stricter regulation of paratransit services through a catalytic citywide programme (often, the introduction of a new mode of formal mass transport).

3.1 Guaranteeing "public service obligations": internal improvement of the system

One of the limitations of paratransit is compliance with a "public service obligations" type specification: environmental and safety standards; off-peak services, especially in the evening; extension of certain routes, etc. These services are not spontaneously handled by paratransit operators because they are likely to result in financial losses and require intervention by public authorities. This intervention results in "soft-touch" regulation with a view to internal improvement of the system. One might imagine that the authorities would authorise higher fares in off-peak periods, and even subsidise paratransit supply; but no such case has been documented.

Most of the time, this intervention by the authorities to enforce compliance with a specification by paratransit operators involves fleet renewal programmes or an attempt to professionalise the sector.

In Accra, the public transport system is dominated by minibuses (*trotros*) and, to a lesser extent, by shared taxis. The city's transport system is generally described as chaotic, disorganised and vulnerable due to paratransit services[42]. In 2008, the Transport Ministry undertook an ambitious programme to gradually upgrade the paratransit sector, especially incumbent minibus services. The ultimate objective is to gradually develop a system where each type of vehicle has its place: minibuses, conventional buses and possibly BRT. The intention is to reintroduce regulatory mechanisms for vehicle quality, at the same time as the *trotros* sector is asked to organise itself through the large association of bus owners. In this way, the Ministry will assist operators as they create their companies, and while they gradually undergo professionalisation.

The approach chosen in Dakar to upgrade the paratransit sector has been to renew the fleet of *cars rapides*. This was achieved by encouraging operators' consolidation and facilitating access to funding for the purchase of new vehicles. The stated objective was to encourage paratransit stakeholders to organise their operations. Minibus operators were asked to form economic interest groups (EIGs) – a form of ownership consolidation – in order to receive a lump sum intended for the purchase of a new minibus.

Subsequently, the authorities hoped to introduce minimum standards of frequency, punctuality and operating hours for services benefiting from the project. But whereas the first renewal experiment (covering 20% of drivers) was considered positive[43], the introduction of regulatory measures aimed at greater complementarity of services was not executed as initially planned. Operators did not accept all the proposed measures, which they found too restrictive.

Another experience of fleet renewal for paratransit services is that of Cairo, launched in 2008. The paratransit sector, comprising minibus and taxis (shared and traditional) met 36% of the city's transport demand in 2008 (with shared taxis being responsible for most trips)[44]. Nevertheless, since the early 1970s, fleet distribution had shown a trend of gradually smaller size: the relative quantity of minibuses fell, while that of shared taxis increased. As taxis are old, high-polluting vehicles, the growth of the taxi fleet generated congestion and pollution.

To fight pollution, a national taxi renewal plan was implemented in 2008. To encourage drivers to renew their vehicle, the authorities offered several financial advantages (exoneration from purchase tax, scrapping allowance, exoneration from licence fees for a time). The initial results of the programme have been positive for taxis, but the political upheaval in Egypt has prevented the project's extension to minibuses.

42. Source: Obeng-Odoom, 2009.

43. Source : Godard, 2013; Kumar & Diou, 2010.

44. Source : Godard, 2013.

3.2 Meeting the concentration of demand: the need for dedicated infrastructure

■ The limits of paratransit services: densely-populated trunk routes

As we saw above, paratransit can adapt vehicle size to both the urban context (narrow streets) and to demand, to guarantee occupancy sufficient for profitability. The wide array of paratransit modes (from conventional buses, to minibuses, to *tuk-tuks*) enables operators to adapt vehicles to diminishing demand. The profitability of supply can be maintained in low-density areas in low-demand contexts.

Paratransit can also adapt to meet demand in higher-density corridors. In South Asia, paratransit is also operated using conventional buses to serve dense trunk routes. In Africa, the weakness of institutional transport and the absence of high-capacity modes are giving paratransit services an essential role in dense areas.

However, this bus-led densification, in the absence of proper traffic management, soon reaches its limits. In rush hour, even "bus-trains" cannot satisfy demand. Stuck in congested traffic, the operators themselves cannot circulate enough to remain profitable!

It is necessary to develop supply with greater capacity, including dedicated lanes or new infrastructure. This type of project, which requires investment in infrastructure and is led by public authorities, concerns formal transport, even though it can include paratransit stakeholders.

Such a project is based on the trunk-and-feeder model, where the feeder element is provided by paratransit services while the trunk element is operated by institutional operators. This maximises the advantages of the paratransit model: flexibility, coverage, and a demand-responsiveness. These characteristics have been deemed positive by several authors, who see, in the urban structures of Global South cities, urban forms that are sprawling and changing rapidly .

Trunk-and-feeder arrangements are not the only model that seeks to combine the benefits of institutional- and paratransit modes. There are other possibilities (Salazar Ferro & Behrens, 2013), notably the following:

- peak-lopping, where paratransit is allowed to operate institutional-transport routes during peak periods in order to increase the overall route capacity;
- shared lanes, where exclusive infrastructure is open to paratransit services on a given route;
- parallel services, where, with the objective of optimising operating speeds in two parallel streets, institutional transport cater for metropolitan demand (mid distance) and paratransit services are assigned to local demand.

Because of this, some authors consider that paratransit has a role to play in the transport systems of cities of the Global South.

BOX 5

Bangkok: paratransit offers services that complement that of formal modes[45]

In Bangkok, as in other cities of the Global South, formal transport is concentrated on urban routes, where there is mass demand for public transport. However, when users leave these trunk routes, they must deal with inadequate supply from institutional transport services, especially in the form of feeder services, in order to reach their final destination. Users then turn to paratransit modes. In Bangkok, there are two types of paratransit services:

- services with well-defined routes, which use vehicles carrying about 14 passengers (*songtaews* and vans);
- services with user-defined routes, in the form of *tuk-tuks* and motorcycle taxis.

These two paratransit modes offer complementary services as feeder elements of the system. The findings of a first study shows that the current benefits of motorcycle taxi and *songtaew* services can be used to create complementarity in the system. For users living within 2 km of a station of the institutional-transport network, motorcycle taxis are, despite their relative discomfort, the preferred option because of their speed and flexibility. For users living further away than 2 km from a station, the preferred option is *songtaews* and vans that offer a cheap, safe service with acceptable timetables. The benefits in terms of spatial coverage and service frequency are thought to matter more to users than the drawbacks of vehicle quality and comfort.

The contribution of paratransit when a mass transport system is deployed

Transformational programmes often involve the implementation of a new high-capacity transport mode, with different approaches aimed at paratransit services: the most radical reforms envision immediate substitution of paratransit services; conversely, other options consider that incumbent operators can be included in the project without substantial transformation. Between these two extremes, there are various examples. The political and social influence of paratransit weighs heavily on arbitration between various options.

In Santiago, the introduction of the Transantiago programme in 2007 resulted in overnight substitution of most of the city's paratransit services. The model based on seeking optimised operations did not accept the operating logic of the *micros amarillos* (one of Santiago's paratransit services). The operators were thus offered a choice: either formalise and consolidate in order to take part in a tender for feeder services for the future BRT lines, or simply withdraw from the transport system.

45. Sources : Gwilliam K. (2005) and Tangphaisankun A. (2010)

Trunk BRT lines in Santiago were awarded to bus companies that were not part of the previous system. The new bus system, sometimes considered excessively rigid[46], has lost the advantages of the *micros amarillos* system. Consequently, as explained by Jouffe & Lazo Corvalan (2010) after a survey of a district on the city's peripheral zones, it resulted in some residents losing access to bus services. As Transantiago was implemented, they found themselves even more isolated than before.

Quito illustrates a radically different experience. The first BRT line, which was implemented in 1995, did not include operators from the paratransit sector. In 2001, the city authorities proposed paratransit operators to consolidate and corporatise to create a company that would operate the second BRT line. Finally, following problems during the company's creation, the city's officials decided to award this BRT line to a public company and to leave the feeder services for paratransit services. This decision led to operating difficulties between the main BRT line and its feeder services. In 2005, when the third BRT line was implemented, a cooperative of paratransit operators appointed to run the line.

Consequently, with BRT programmes multiplying in countries of the Global South, one emerging solution would be to encourage the creation of operating companies created by a group of former paratransit operators. Drawing insights from Latin American experiences of implementing BRT networks, other cities have adopted this model to various degrees, including or not incumbent paratransit operators. This is the case in Lagos, Johannesburg and Cape Town.

In Lagos, operators have set up a cooperative to operate the city's first BRT line. This entity is the first step toward a gradual formalisation of small operators, which involves their professionalisation. In Cape Town, the original objective was to create companies that brought together certain minibus associations and the city's formal bus company. The minibus owners were required to hand in their operating licences in return for a stake in the new company. This objective was later modified: the long-standing bus company and the new companies formed by minibus operators operate separately the BRT services and the feeder services to the new stations.

46. Source : Forray & Figueroa, 2011; Briones, 2009.

_Conclusion

Development trajectories for an urban transport system

After decades during which paratransit was denigrated by development models inspired by Western models, the recent literature is tending to highlight its positive aspects. Whereas in many countries institutional transport appears inefficient and very costly, paratransit is commended for its flexibility, the fact that it meets a large part of demand, and its low cost to the public.

This literature review on the subject of paratransit service is the starting-point for a future, more in-depth piece of data collection and analysis to describe in detail the following subjects, for which we have very little data:

- the business model of paratransit: a precise analysis of occupancy rates and financials would allow a study of the profitability levels of this transport mode in various contexts and in various configurations (owner-driver, presence of powerful associations, etc.);
- the link with urban development and the quality of road infrastructure: the literature shows that paratransit makes a place for itself in particularly constrained areas that often have a concentrated poor population, or in cities where traditional public transport vehicles are unable to operate;
- user perception and the social issues associated with this transport supply: paratransit has a strong presence in cities where living standards may be low and where access to motorised transport is limited. It would be advisable to look at the needs expressed by the often-captive users of paratransit services;
- experiences of regulatory reinforcement, fleet renewal, and complementarity with mass transport: although ever more articles are being published on these subjects, it would be advisable to monitor the results of the various experiences in cities that experiment with operations on business formalisation, fleet renewal, incorporation within a BRT network, or integration with mass transport services, etc.

The whole challenge of development trajectories is therefore to find the correct action levers and the appropriate regulatory mechanisms to retain the advantages of paratransit services, and to intervene only when it reaches its limits or when situations deemed to be problematic begin to develop. In this perspective, we should look at the services developed in industrialized countries, such as ring-and-ride transport, designed to provide greater flexibility and better territorial coverage by public transport.

One of the original conclusions of this review of the literature could thus be that it prompts us to revisit the "prevalence" of roles between paratransit and institutional transport, according to context. And especially in cases when "institutional" capacity is low: instead of considering that institutional transport is "first" and that paratransit plugs the gaps, one could reverse this reasoning and consider that paratransit is "first" and that the public authorities' job is not to eradicate but to regulate it, or to replace it by institutional transport when it reaches the limits of relevance – limits imposed by the density of demand and its inability to provide, unsolicited, a whole range of services.

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In most cities of the global south, two types of public transport exist: institutional and paratransit. They operate according to very different models and co-exist in a complex relationship that varies from one context to another.

Paratransit, often referred to as 'informal' or even 'illegal' transport, operates on the fringe of the institutional transport system. It is most often described as a poorly organised and inefficient sector in terms of operations (route duplication, excessive length of routes, surplus supply of vehicles on certain routes, etc.), and it is considered partly responsible for road accidents, traffic congestion and air pollution.

Nonetheless, it fulfils a type of demand that generally can only be met by the paratransit sector. Paratransit plays a crucial role in the public transport systems of the Global South and it presents two undeniable advantages: the low cost for public authorities and service flexibility.

The present document will provide a review of the recent literature and seek to characterise the different models of paratransit, illustrated in specific examples of cities with highly contrasted realities. The conclusion identifies key elements which warrant more in-depth analysis.

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