IS PARATRANSIT A KEY ASSET FOR A SUSTAINABLE URBAN MOBILITY SYSTEM? INSIGHTS FROM THREE AFRICAN CITIES

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ABSTRACT

In many cities of the developing world, paratransit services –often in the form of privately-owned minibuses– are a key element of the urban mobility system. Yet, charged with causing road congestion and insecurity, they are sometimes considered as a default option for transportation that is set to be replaced by high-quality mass transit, in particular BRT, as economic conditions improve. At the same time, the development of ICT-based mobility services is reshaping paratransit services all over the world.

Based on a field study and survey of local stakeholders conducted in the spring of 2017 in three African cities –Nairobi, Kenya; Cape Town, South Africa; and Addis-Ababa, Ethiopia–, the paper investigates the role of paratransit services in providing low-cost, demand-responsive transportation together with service innovation and employment opportunities. The paper further discusses the opportunity for including paratransit services as one element of the transition towards more sustainable urban mobility systems, provided they are regulated by a competent transportation authority.

Keywords: paratransit, urban mobility, sustainable mobility, Africa

INTRODUCTION

Paratransit usually refers to a flexible transportation mode that does not follow fixed schedules (*1*). In North America or Europe, paratransit services are traditionally known as on-demand services, mostly dedicated to disabled people or non-motorized households living in rural areas (*2*). Yet, the fast-growing transportation network companies (TNCs), among which Uber and Lyft, are an increasingly dynamic addition to the scope of paratransit services in urban contexts (*3*). In the 'developing world', the literature may refer to paratransit as 'intermediate public transport', 'semi-formal transport', or even 'informal transport'. Paratransit services in such contexts are heterogeneous, ranging from licensed minibus services operated on a prescribed route by a formalized company to illegal motorbike services run by informal businesses, and they also have seen the recent addition of shared mobility services proposed by a TNC. Like minibus-taxi or motorbike-taxi services, these technology-enabled shared mobility services have mostly been deployed by the private sector without public financial support (*4*).

Paratransit epitomizes mobility in many large cities of Sub-Saharan Africa. It started developing in the 1980s and 1990s, a period when structural adjustments occurred in many countries following independence, which led to the fall of some publicly-owned bus operators (*5; 6*). Nowadays, African cities are characterized by the fastest population growth in the world, urban sprawl, poverty, and income disparities. This situation results in spatial mismatches between housing and jobs and rapid changes in travel demand (*7; 8*). Motorization rates are still low, but they are increasing rapidly, as the purchasing power of city dwellers has improved and motor vehicles and bikes have become more affordable (*8*). Poorly designed road networks are highly congested and dangerous for cyclists and pedestrians; the air quality is bad, and the concurrent use of many different kinds of vehicles provides complementary mobility options but reduces each other's performance (*7*). In this context, paratransit services are often the only means for many people to travel, but at the same time they are subject to vehement criticism related to reckless driving, vehicle overloading, armed violence, and collusion with corrupt police (*9*).

Facing this situation, public authorities have used different strategies for rationalizing and improving paratransit services, ranging from 'acceptance' to 'prohibition', and including 'recognition' and 'regulation' (*10*). Some experts are in favor of replacing paratransit to promote high-performance transit modes, such as bus rapid transit (BRT). Others advocate upgrading and integrating paratransit in the public transportation network (*9*; *11*) on the grounds that the main assets of paratransit –being flexible, labor-intensive in areas with high levels of unemployment and prone to innovation– could excess its drawbacks.

The research presented here aims at studying the current position of paratransit services in the mobility systems of large African cities and assessing whether these services could contribute to sustainability transitions in said systems. We selected three cities in Eastern and Southern Africa based on criteria of rapid demographic growth, and status of regional hub with relative economic and political stability. The cities of Nairobi, Kenya, Cape Town, South Africa, and Addis Ababa, Ethiopia, are populated by about 4 million inhabitants each, and growing fast. As this paper will further elaborate, these cities present very different national and local organizational and political settings, which impacted the strategies adopted locally in terms of regulating paratransit services and/or organizing their modernization. While they are traditionally seen as a transient state of the mobility system, could a regulated, modernized version of paratransit services in these cities be compatible with their aspirations to become 'world-class cities'? Could they even be a key asset in paving the way for sustainable mobility systems in these cities?

This paper is organized as follows. The next section presents the methodology and an overview of the mobility systems for the three case studies. A following section is dedicated to the

description and analysis of the strategic options adopted by the cities with regards to paratransit services. Then a discussion follows on the main assets of paratransit services, as vectors for a more sustainable mobility in these fast-growing cities. Some concluding remarks close the paper.

THREE CASE STUDIES

Methodology

The analysis mainly draws on interviews carried out during a field study and survey of local stakeholders in the spring of 2017 in Nairobi, Kenya, Cape Town, South Africa, and Addis Ababa, Ethiopia. A total of 32 semi-directed interviews were conducted. A wide range of stakeholders were interviewed, including representatives of public authorities (5 interviews), transportation operators (4 interviews), international development agencies (3 interviews), consultancies (2 interviews), NGOs (2 interviews), and start-ups (8 interviews), as well as researchers (8 interviews). The recruitment was not exhaustive but diverse enough to represent different positions on the debate. The interviews were all transcribed and completed by field observations and a literature review based on policy documents, newspapers and academic production.

The minibus taxi industry in Kenya and South Africa has been well-documented, thanks to research carried out at the University of Nairobi and the University of Cape Town, with the financial support of the Volvo Research and Educational Foundations (*12*). The paratransit sector in Addis Ababa is not as extensively documented in the literature as it is for the two other cities. Besides, it can be noticed that TNCs in Africa are the subject of many press releases but few academic papers, unlike in Asia (*13*; *14*).

General Context: Overview of the Mobility Systems in the Three Cities

With approximately the same population size, the three cities present very contrasted situations in terms of urban organization, infrastructure development, motorization rate, and modal share. In all three cities, the unbalanced urban organization is inadequately compensated by the public transport system, especially for the poor. Paratransit represents an important modal share in all three cities.

Nairobi, Kenya

Nairobi is the capital of Kenya. Located in the fertile central highlands, the city has been created by the British as a commercial place on the Uganda-Mombasa railway line. Since independence in 1963, population has grown to reach 3.1 million people in the Nairobi City County (*15*). The racial segregation of early Nairobi has evolved into the current social segregation (*16*). Jobs are mainly located in the Central Business District (CBD). The western side of the city, which is the former colonial city, remains a wealthy area. Low-income populations live in the eastern and southern parts of the city. Five major arterial roads serve the CBD. As the by-pass roads have not been completed, all road traffic converges towards the CBD, which causes heavy traffic congestion.

For public transport Nairobi mainly relies on its minibus services, called '*matatus*', as the public bus services failed in the 1980s. Besides *matatu* services, *boda-boda* motorbike-taxi services are expanding. So are TNC services, especially Uber and its local competitor LittleCab, which respectively operate about 4,000 and 5,000 for-hire vehicles in the capital [interview with an operator]. In 2013, 30% of households in Nairobi were motorized (*17*). The modal share of the private car was 14% and 5% for two-wheelers. *Matatus* accounted for 28% of daily trips, as compared with 12% for buses. Non-motorized transport modes accounted for 40% of daily trips and 70% of road accidents. The use of the commuter train remained marginal (*17*).

Cape Town, South Africa

Located in a spectacular setting in the south-western part of South Africa, Cape Town is a three-century old city. The construction of a railway line to the southern suburbs during the 19th century shaped the urban growth of the city. Accelerated urbanization occurred in the 1940s and resulted in large informal settlements populated by Black African populations in the peripheries. The 1960s and 1970s were marked by low-density suburban expansion. Though somehow limited by the topography, the process was facilitated by the construction of an intra-urban freeway system (*18*). In the first decade of this century, the city proved very attractive, with a population growth of 30% over the decade, reaching 3.7 million inhabitants (*19*).

The current structure of the city still reflects the legacy of Apartheid and the associated policies of deliberate segregation. Cape Town is approximately 30 km x 30 km (19 mi. x 19 mi.). Nowadays the main townships of Mitchells Plain and Khayelitsha in the Cape Flats, about 30 km (19 mi.) away from the CBD, are populated by more than one million people. There are large tidal movements every day.

The modal share of paratransit, here minibus taxis, is relatively low in Cape Town compared to other South-African cities (15% in 2013, as compared with 70% in Johannesburg) (*19*). Minibus taxis are increasingly taking market share from the historical transport mode of the poorest, namely the commuter rail (modal share of 11%) (*19*), owing to persistent problems of under-investment in railway signaling infrastructure (reflected in unreliable schedules), decaying rolling stock (reflected in reduced capacities), inadequate policing (reflected in alarming records of assaults on passengers), vandalism, etc. (*9*). Over the last 30 years, the number of functional train sets decreased by 50%, from 185 down to 85 [interview with a public authority]. Buses, public or otherwise, hold a 15% market share in Cape Town. MyCiti BRT, the latest addition to public transit services in Cape Town, started operations in 2011 and progressively opened new routes. Though emblematic as an urban project, the BRT has had a limited impact on demand (<1% modal share) so far.

Uber started operating in Cape Town in 2015. It has faced strong resistance from the established metered-taxi industry. The number of vehicles operating for Uber in Cape Town could not be obtained from the operator. There are no motorbike-taxi services in South Africa.

The car culture is more strongly established in Cape Town than in numerous African cities: more than half of households owned a car in 2013 and the private car had a 37% modal share (*19*).

Addis Ababa, Ethiopia

Addis Ababa is the capital of Ethiopia (102 million inhabitants), the second most populated country in Africa after Nigeria (185 million inhabitants) (*20*). Located in the central highlands, Addis Ababa is the main commercial center of Ethiopia. It is an important regional and international transportation hub as the Addis Ababa-Djibouti Railway has been influential in the development of the city and Ethiopian Airlines has established itself as the largest airline in eastern Africa.

The population of the city has almost doubled every decade since the 1980s. It has reached 3.3 million in 2016 (*20*). Addis Ababa has also experienced rapid sprawl. This trend is largely based on spontaneous growth, which is reflected in the emergence and development of squatter settlements. Along with demographic and spatial growth, the city has seen a rapid increase in car use. Addis Ababa City Roads Authority (AACRA) initiated in 1998 the construction of a ring road to alleviate congestion on the city roads. Car ownership has been growing fast (from 65 vehicles per 1,000 people in 2012 to 130 in 2015 (*21; 22*)).

Almost 2.5 million persons require public transport every day in Addis Ababa. The transit

and paratransit fleet includes 8,500 Saloon taxis, 7,500 blue and white minibus taxis, 1,800 buses (private and public, standard and express), and 22 trains (*23*; *24*). Minibus taxis had a 34% modal share in Addis Ababa in 2006, as compared with only 6% for buses and 6% for taxis *(25).*

The latest additions to the public transport system in Addis Ababa are two Light-Rail Transit (LRT) lines. Launched in 2015 as an emblematic project for the city, they have not yet reached their expected full capacity of 15,000 passengers per hour per direction (60,000 passengers per hour four the two lines), as the purchase of all the trains originally planned has not been completed.

TABLE 1 Fact Sheet on the Three Cities

	Nairobi	**Cape Town**	**Addis Ababa**
Perimeter	*Nairobi City County*	*City of Cape Town*	*City of Addis Ababa*
Population (million inh.)	3.1	3.7	3.3
Area	696 km^2 (269 $mi.^2$)	2,445 km^2 (944$mi.^2$)	540 km^2 (208 $mi.^2$)
Total length of roads	2,970 km (1,845 m.)	11,700 km (7,270 mi.)	5,915 km (3,675mi.)
Total length of commuter rail network	~ 18 km (10 mi.)	610 km (319 mi.)	34 km (21 mi.)
Motorization rate	100 cars/1,000 inh.	306 cars/1,000 inh.	130 cars/1,000 inh.
Mini/midi bus fleet	~10,000	7,576	~10,400
Metered Taxi/TNCs fleet	> 9,000	n.a.	> 6,500
Trips/day/person	2.34	2.37	1.02
Public transport share	40%	41%	46%
Incl. Mini/midibus share	*28%*	*15%*	*34%*
Private mode share	19%	37%	9%
Non-Motorized Transport share	42%	21%	44%

Sources: For Nairobi: Kenya National Bureau of Statistics - Census 2009 & Nairobi City County Statistical Abstract 2015, JICA, 2014 (2013 modal shares); for Cape Town: Transport for Cape Town, 2015 (2013 modal shares); For Addis Ababa: Addis Ababa city government 2012 (2006 modal shares), World Bank, 2016, *Addis Fortune*, 2015 and 2017.

HOW TO BECOME A WORLD-CLASS CITY: THREE CITIES, THREE MODELS?

An Analysis in Terms of Demand, Supply and Regulation in the Mobility System

Using a diverse material made of stakeholder interview transcripts, scientific articles and press releases, this research investigates how paratransit is taken into consideration in Nairobi, Cape Town and Addis Ababa. For each case study, data on demand, supply and regulation are gathered and cross-analyzed. Special attention is given to market structure and system organization as they are the main differences between cities of the developing world and cities of the developed world (*26*).

The hypothesis tested here is that each of the three selected cities reflects a different model in this regard. In a context where local governments, consultancies and international agencies refer to these cities as ‘world-class’ cities or cities that are bound to become ‘world-class’ cities (*18*; *27*; *28*; *29*; *30*) (CNN would caption them as ‘cities of opportunities’ (*31*)), this analysis examines how the ‘enduring presence of paratransit services’ (*11*) is considered in relation to such issues as

institutional fragmentation, operational integration with a high-capacity public transport system, and the influence of external (foreign) stakeholders.

Model 1 (Nairobi Case Study): Dominant Paratransit

Genesis and Expansion of Paratransit

Paratransit emerged in Kenya during the colonial period to address the unmet travel needs of the indigenous populations. Indeed, colonial urban public transport was at first designed to service the needs of the colonialists. After Independence (1963), the bus and commuter train services, with dated technologies and management, were unable to handle increasing passenger demand. The national government therefore tolerated informal 'private taxis' went they first started to operate. In the 1980s, the government started to register *matatus* under the category of Public Service Vehicles (PSVs). Institutional bus and commuter train services eventually collapsed in the 1990s, in a context of structural adjustments, reduced government budgets and privatization [interview with an operator] (*9*; *32*). *Matatus* are privately run and demand-driven services; they receive no subsidies from public authorities. Many of them function as cartels, operating with the primary concern of protecting and expanding their territory [interview with a consultant] (*10*), and the secondary concern of maximizing their profit. Fares vary according to the route, the condition and aspect of the vehicle and even the weather [interview with a researcher]. On rainy days, fares could triple. This fare structure excludes the very poor from using the minibus services and once in a while encourages the shift of wealthier users towards TNC services. The industry also has to deal with corrupt police and urban banditry, such as the Mungiki gang who robbed passengers and minibus crews in the 2000s (*33*).

Besides registered *matatus*, smaller-capacity vehicles such as the Toyota Probox station-wagon carrying up to 11 people when equipped with a boot, are operating in the outskirts of Nairobi [interview with an operator]. They are illegal, as are the moto-taxis. Called '*boda-bodas*', motorbike-taxi services are often coined as a 'militia' [interview with an operator; interview with a researcher]. Originally operated at the border of the city, the *boda-bodas* are a recent phenomenon that has now literally invaded the city. Mostly operated by young men, *boba-bodas* target *matatu* users who would want to escape traffic jams as well as lower-income customers (as they are cheaper). As their income increases, middle-class users usually switch to private cars or TNC services. The transport situation in Nairobi raises the question of the extent to which the lack of public transport fosters private car ownership.

A History of Uncoordinated, Time-Inconsistent Planning

The transport system in Nairobi is mostly organized according to a 'hub-and-spoke' pattern [interview with a researcher]. Klopp (*16*) underlines several key features to explain poor transport planning: a large and distorting role of external actors; institutional fragmentation with top-down planning processes, and a very quiet civil society. The consequence is that there is currently no plan for intra-city transport. Indeed, Japan International Cooperation Agency's (JICA) 2014 project for a Nairobi Integrated Urban Development Master Plan (*17*) was supposed to replace the obsolete –and never implemented– Nairobi Metropolitan Growth and Development Strategy of 1973, but it has been not implemented yet. It proposes the construction of a metro system, but several major stakeholders such as the Kenyan Urban Roads Authority, the national government, the World Bank, along with UN-Habitat and the NGO Institute for Transportation and Development Policy, call for a BRT. Yet, up to now, the BRT has not been planned in a coordinated manner, as the 5 proposed lines have been designed by 5 different planners and should be funded

by 5 different international institutions. BRT projects in Nairobi illustrate how institutional fragmentation can lead to project fragmentation.

Some Improvements on the Regulatory Side: the Generalization of SACCOs

Nevertheless, some improvements can be noticed. In 2010, a directive was enacted which ruled that no *matatu* should be registered as PSV unless the owner is a member of either a transport Savings and Credit Cooperative (SACCO) or a private company. Said SACCO (or private company) would make the application on behalf of the vehicle owner, which makes it easier for the government to monitor the licensing process and punish offences [interview with a researcher]. The number of cartels and gangs seems to have declined since implementation of the directive in 2010 (*34*). While there is high compliance with regulations concerning registration with a SACCO, adherence to routes, and payments for use of terminals, the *matatu* industry shows low compliance with regulations related to labor. It is especially reluctant to abandon the 'target system' whereby a fixed income amount (the 'target') has to be paid to the owner by the crew on a daily basis. The government also tried to phase out the 14-seaters to promote larger buses, but this operation created speculations on old 14-seaters and opened up room for *boda-bodas* to develop their market further (*34*).

In 2012, the government created the National Transport and Safety Authority (NTSA), bringing together under one roof the functions of motor vehicle registration, PSV licensing (for *matatus*, but also for *boda-bodas* and TNCs), motor vehicle inspection, road safety, and driver testing. The active NTSA is currently implementing electronic licensing [interview with an operator], but it also plans surprise inspections to control drivers and improve road safety [interview with a researcher], and offers some support for mechanical training, but no management training yet [interview with a researcher].

Some Improvements on the Institutional Side: the Creation of NAMATA

Over the last decade, the institutional framework has evolved. The 2007 Kenya Road Act set up national road agencies to build and maintain roads. Then the 2010 Constitution created the counties, and in 2016 a new road classification system was established that gives more power to the counties to manage local roads. In February 2017, the Kenyan President created the long-awaited Nairobi Metropolitan Area Transport Authority (NAMATA), as a joint transportation organization between the 5 counties of the Nairobi Metropolitan Region and the national government. Its aim is to '*provide the Metropolitan Area with a world-class public transport system*' (*29*). Its '*sustainable integrated public transport strategy*' should lay the groundwork for the '*Metropolitan Area mass-transit system, which incorporates both bus rapid transit and commuter rail*' (*29*). Yet many uncertainties remain, exacerbated by the 2017 elections [interview with an operator; interview with an NGO]. At the moment, the debate related to the BRT focuses more on the location of the stations than on the position towards paratransit, with the prospect that it could become a thorny political issue as it did in Dar es Salaam, Tanzania (*6*).

Some Improvements on the User Side: Communities of Users

Kenya stands out among African countries for its promotion of information and communication technologies (ICTs), the dissemination of smartphones and Internet in the society, as well as the widespread use of mobile payment (M-pesa) [interview with an operator x2; interview with an NGO; interview with a start-up] (*36*). One well-known example of the transformation of the transport system by ICTs is the Digital Matatu project, which used cell phones to create an open-source database and maps of the *matatu* network. The creation of a community of users to

collect the data was an important result of the project (*37*). Other community-based initiatives that rely on mobile-ICT use emerge to improve the quality of paratransit services. The Ma3Route app crowdsources real-time information on traffic conditions in Nairobi. A partnership with NTSA and the Nairobi City Council allows for real-time reporting on bad driving behavior from *matatus* as users send the information to Ma3Route [interview with a start-up].

Model 2 (Cape Town Case Study): Paratransit as a Component of a Dual, Hybrid System

Minibus Taxis, from Fighting 'Taxi Wars' to Embarking on the BRT Project

The minibus-taxi industry developed in Cape Town during Apartheid mostly to carry poor people living in the townships to workplaces in the CBD. It started operating illegally to compensate bad commuter train services. In 1987, the industry was deregulated which led to overcapacity and what was coined as 'taxi wars' (*10*; *38; 39).* In the post-Apartheid era, the situation became less violent with attempts at regulating the industry, but the quality of service decreased. As is the case with the drug business, the primary objective of minibus-taxi operators is to conquer new territory, to extend market share, even more so than to increase profitability [interview with a consultant]. Legal and illegal taxis are completely integrated, as the former help the latter to live off the system until they are eventually integrated into it. The authority is always 'on the back foot', as 'transgression is absolutely part of the deal' [interview with a consultant].

Faced with the great difficulty of improving commuter rail services (partly due to lack of appropriate capability in the national rail authority) [interview with a local authority], and with the prospect of upcoming Soccer World Cup in 2010, the planning of BRT services, branded as MyCiti, began in 2006 (*40)*. The model of 'best practice' BRT inspired by South-American cities and promoted by international development agencies was one of total –though possibly gradual– replacement of paratransit services by a trunk-and-feeder network in which all remaining operators are formal bus companies (*11*). Eviction of paratransit services from the BRT project was then a sort of evidence, as '*it is the inverse relationship between wealth and informal transport that prompts public authorities to attempt to ban them in hopes of conveying a modern, first-class image*' (*40*). Therefore, when the first trunk-and-feeder services of the first-phase BRT were launched in 2011, they were operated by 3 contracted bus companies, two of which had been formed out of the incumbent minibus-taxi operators that used to operate within the corridor (*40*).

A major debate then started about the size of the vehicles that would be appropriate to serve as contracted public transport on feeder routes. To avoid giving credit to the minibus-taxi industry operations (usually based on 15-seaters), the decision was made that the smaller vehicles contracted as public transport should have 25 seats [interview with a local authority].

Why Minibus Taxis Will Not Just Go Away

Although some would argue that the current BRT system is a success story –as it is considered the first reliable bus system, with a cost recovery close to 50%, and much appreciated too by some portions of the population [interview with a consultant]–, others criticize it as both over-expensive for users and more costly than anticipated for public authorities (maintenance costs were initially underestimated), as well as inadequate to actual travel needs of the target population (inflexible with regards to stops for pick-up and drop-off, not serving some of the poorest, most populated areas, and using very rigid, high-tech ticketing based on Europay-Mastercard-Visa cards) [interview with a researcher x2]. For these reasons, and because public authorities had underestimated the tensions that would arise with the implementation of BRT around the inclusion of the previous transport investors and workforce in the new system (as was the case in other

contexts too (*6*)), the minibus-taxi services are still operating on feeder lines for the BRT. The potential costs of the compensation program originally envisaged for minibus-taxi operators would only be another cloud on the horizon [interview with a researcher].

Towards a 'hybrid model': the 'regulatory innovativeness' of the Municipality of Cape Town

Yet, unlike Johannesburg, the City of Cape Town has recently been operating a shift in perspective, and is now considering the integration of paratransit services into the BRT project [interview with a consultant]. The city even officially acknowledged in 2015 the benefits of a 'hybrid model' that would '*combine MyCiTi buses and minibus-taxis to provide scheduled and unscheduled services alongside each other without competing for passengers*' (*41*). The very concept of the 'hybrid model' was developed at the University of Cape Town around 2008/2010 and was only much later exported to the municipality [interview with a researcher]. Such 'hybrid models' have long been a '*common feature of developing world cities*' but may have been overlooked for some time as possible fertile ground for '*the best possible urban transport system for a city*' (*42*; *11*). No agreement has been reached so far in Cape Town as to what forms the hybrid model shall take, whether the remaining minibus-taxi services would be scheduled or not, how individual licenses could be transferred to the newly-created Taxi Operating Companies, etc. [interview with a researcher].

One of the upsides of the hybrid system, from the demand management perspective, lies in the concept of 'peak lopping', whereby investment in infrastructure and rolling stock to handle peak hours can be reduced by relying on the minibus-taxi industry and its flexible fare system to spread the demand peak [interview with a researcher].

Yet two measures actually hint at the 'regulatory innovativeness' of the City of Cape Town [interview with a consultant]: first, the creation of the Transport and urban Development Agency (TDA) in 2016 (aggregating human settlement, urban design, transport, and environment); second, the organization, with support from the University of Cape Town, of capacity building sessions for the management of minibus-taxi operators (helping them create a reliable service for non-scheduled operations).

Model 3 (Addis Ababa Case Study): Paratransit as an Integral Part of a Hierarchized Public Transport System

A Diversity of Public Transport Services Owing to the Preservation of Historic Operator

Addis Ababa claims to be an exception among Sub-Saharan African cities in a number of respects, and especially in respect to its urban and transport setting [interview with an international institution]. Because the Italian occupation of Ethiopia was short-lived (1936-1941), Addis-Ababa was not molded by colonial segregation considerations to the same extent as other cities of the continent (*43)*, and until very recently it would commonly display highly-mixed settlements and activities in its very center [interview with a researcher x2] and could be said to have an '*organic structure*' [interview with a researcher].

From a transport perspective, Addis Ababa has managed to preserve its public large-bus company, Anbessa, owing to strong public support. The company dates back to 1952, was nationalized in 1974, and was transferred to the City Administration in 2010 (*44*). Besides Anbessa's bus fleet of 600, large buses are operated by other public and private (Alliance) companies on some designated routes or demand segments (e.g. civil servant commuting); and Sheger Express bus services (42 seats) were launched in 2016 on 4 designated routes (e.g. to the airport).

Yet paratransit services in the form of minibus taxis, locally known as '*wuyeyet*' (*45*), have developed alongside public transport to absorb the fast demographic growth of the city. Until 2009, minibus taxis could freely choose the routes or areas in which they would operate (*46*). Due to lack of restrictions on market entry, the number of minibuses (and midibuses) grew fast, reaching 10,400 in 2014 *(21)*. Minibus taxi fares are controlled by the city government (*46*), and so is now the route allocation process. Besides minibus taxis, Higer midibuses (27 seats) have operated on 24 designated main routes since 2007. They qualify as paratransit as they can flexibly choose their stops along the way (*45*).

A Highly-Hierarchized Transport System Backed by Strong Political Will for Planning

The federal and local governments in Addis Ababa have strong political will for planning [interview with an international institution]. The City Administration released the Addis Ababa Transport Plan in 2007 and the Transport Policy of Addis Ababa in 2011. The latter makes provisions for the rejuvenation of Anbessa City Bus Enterprise, and the introduction of BRT (7 lines) and LRT systems (2 lines) along major corridors. The LRT and BRT systems are to form the backbone of the city's transport system.

The feasibility study for the BRT system funded by the French Development Agency AFD in 2010 identified seven potential routes, including an initial demonstration route (B2) travelling through the city from North to South. A different, temporary corridor has however been used for demonstration since 2012 –on a route that should become an LRT corridor–, allowing both Anbessa buses and private midibuses to operate along the corridor in the absence of exclusive BRT services (*45*).

Yet Addis Ababa's BRT projects have been delayed, partly because of the opportunity to build the LRT system with significant assistance and funding from Chinese stakeholders. Two LRT lines totaling 32 km have been constructed under a design-build contract signed in 2011 and started operating in 2015. Some experts consider Addis Ababa's LRT project as emblematic of the 'panda model', whereby a Chinese company, the China Railway Engineering Corporation (CERC), designs and builds a system funded with Chinese funds, secured from the Export-Import Bank of China, and operated (at least in the initial stages) by a Chinese operator, the Shenzhen Metro Group [interview with an NGO].

(Minibus) Taxis as Cog in its Due Position in the Wheel of the Mobility System

With the delays in BRT implementation so far (one BRT line was in the planning phase in 2014 (*21*)), and the rapid expansion of the city (including major settlement projects far beyond the reach of the LRT system) (46), minibus taxis and other forms of paratransit will have a major part to play in the supply of transport services in many areas of the city [interview with a researcher].

Besides, congestion on the LRT is already very high (for the record, the two lines have not reached their expected full capacity as not all 41 trains could be funded as originally planned), and safety (theft) and health (lice) issues have arisen on board the trains, which are reflected in the preference of many passenger for paratransit over LRT [interview with an international institution; interview with a researcher].

DISCUSSION

Paratransit services, albeit in heterogeneous forms, are a common feature of the transport systems of all three cities examined here. Inadequacy of public transport services might have been the initial trigger for their development. Yet, the fact that paratransit services have maintained or even developed their presence in all three cities, which present contrasted situations in terms of political management style, urban organization, infrastructure development, and motorization rate, points to some of their intrinsic qualities, namely: labor-intensiveness, flexibility, and innovation-readiness. Acknowledging such qualities is key to sketch some ideas about the role that paratransit services could play in the transition towards more sustainable mobility systems.

Providing Jobs in Cities that Need Them

As local socio-political conditions usually have an influence on the development of transport services (*6*), paratransit's labor-intensiveness makes this industry a valuable source of outcome to tens of thousands of people in the type of cities considered here. Depending on the context, it provides jobs to 'drop-outs' as well as 'graduates' (cf. the minibus-taxi industry in Nairobi) [interview with an operator], to township residents as well as immigrants (cf. respectively the minibus-taxi industry and the TNC industry in Cape Town) [interview with a researcher], and thereby contributes to alleviating poverty and empowering low-income populations. The opportunity to '*run their own business*' is even the main argument made by Uber in Cape Town and Nairobi to recruit '*driver partners*' [interview with an operator]. By comparison, decisions to implement BRT systems can in some instances be associated with job losses for the local poor and profit-making for large, sometimes foreign, companies (*6*).

Flexibility as Paratransit's Main Asset

The fundamental asset of paratransit, which might well be what makes it an integral part of most transport systems in developing world cities, is its essential flexibility. Notwithstanding regulation, paratransit services are first of all, to a greater or lesser extent, flexible in time (no schedule, adaptability to peak and off-peak hours) and in space (no fixed routes, or no fixed stops along routes, adaptable routing in peak/off-peak hours, capacity to reach city outskirts and informal settlements). Besides, depending on the context, the choice of vehicle, the fare structure, etc., paratransit is also adaptable to different categories of users, from very poor to middle classes. As Cervero and Golub would coin it, paratransit is a '*gap-filler*' (*40*), providing accessibility to demand segments that are not addressed otherwise.

ICT-Based Modernization

It can be argued that innovation-readiness is another main asset of paratransit's *(47).* ICTs play a major role in the numerous initiatives which are under way to modernize the paratransit industry in the three cities examined here, be it in the form of cashless payment, digital mapping of paratransit route networks, crowdsourcing of traffic information, app- or SMS-based passenger information, smartphone-enabled traffic and revenue surveys, computerized fleet management, etc. Surely enough, ICT-based modernization in such contexts has its challenges, as illustrated by the postponed implementation of the cashless fare collection requirement for minibus-taxi licenses in Cape Town (*5*), the decision by Uber to introduce cash payment in Nairobi (despite the widespread use of M-pesa mobile payment) [interview with an operator], or yet the decision by ride-hailing start-ups ZayRide and ETTA in Addis-Ababa to set up conventional call centers after the Internet access was shut down pursuant to the state of emergency [interview with an operator x2].

CONCLUDING REMARKS

This research has highlighted several features that are commonly found in paratransit services, regardless of context, and can become assets in the (far from secure yet) sustainability transition of mobility systems in developing-world cities, namely: their labor-intensiveness, their flexibility, and their innovation-readiness. In a context of rapid growth in private car ownership and use, a regulated, modernized version of paratransit services may have what it takes to provide large portions of the population with an efficient mobility alternative to the private car. If so, paratransit services could play a key role in supporting more sustainable mobility systems in the developing-world cities of tomorrow.

This is not to deny, however, that many other, less positive features of paratransit services in the three cities examined here, are yet to be dealt with for paratransit operators to even become credible actors in this transformation process. Such features include, but are not limited to, reckless driver behavior, poor vehicle maintenance practices, poor management capabilities (*1*; *10*).

Further research would be needed to grasp the full extent of opportunities and risks in the inclusion of paratransit services on the way towards more sustainable mobility systems in developing-world cities. More research could be needed also to investigate the transferability to developed-world cities of the paratransit experience of developing-world cities, as the former are currently experiencing the fast rise of TNCs in a context where urban mobility systems mostly relied on the established duo of private automobiles on the one hand, and (mass) public transit on the other hand.

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