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POSITION PAPER: THE STATE OF KNOWLEDGE AND RESEARCH

# EMERGING BUSINESS MODELS AND SERVICE OPTIONS IN THE SHARED TRANSPORT SECTOR IN AFRICAN CITIES



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## The Volvo Research and Educational Foundations, VREF

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- Schalekamp, H., Saddier, S. (2020). *Emerging business models and service options in the shared transport sector in African cities. The state of knowledge and research.*
- Tiwari, G., Khayesi, M., Mitullah., Kobusingye, O., Mohan, D., Zuidgeest. (2020). *Road traffic injury and transport-related air quality in Sub-Saharan Africa. The extent of the challenge.*
- Venter, C., Barrett, I., Zuidgeest, M., Cheure, N. (2020). *Public transport system design and modal integration in Sub-Saharan African cities. The state of knowledge and research.*

# EXECUTIVE SUMMARY

## Purpose

The overall purpose of this position paper is to provide an overview of current knowledge on specific issues related to mobility and access in Sub-Saharan African cities, as well as to inform Volvo Research and Educational Foundations (VREF)<sup>1</sup> and other researchers in developing a research agenda in this area. One of the core themes identified for future research is emerging business models and service options in the shared transport sector in African cities, which is the topic of this position paper.

Shared transport takes two broad forms. Collective shared transport services carry multiple passengers using the same vehicle, at the same or during overlapping time; these services typically take the role that mass, scheduled public transport plays in other world regions. These services tend to rely on buses, minibus and other forms of light commercial or passenger vehicles. For-hire transport carries different passengers using the same vehicle at different times. These for-hire options include metered taxis and those hailed and paid for through electronic means.

Pooling or ride-sharing services are a more recent, if not yet widespread, form of shared transport, a hybrid between collective and for-hire shared transport. However, what all of these services have in common, and which warrants their inclusion in this paper, is that they run on a for-reward basis, usually in the form of a fare that the passenger pays for being transported.

## Objectives of the position paper

- To outline emerging trends observed in the shared transport sector in Sub-Saharan African cities;
- To describe new business models and service options in the shared transport industry;
- To summarise the state of knowledge, research and research capacity around this theme.

## Key findings regarding the state of knowledge

Shared transport in the African context have a number of common characteristics. These include limited regulation by public authorities, the absence of public subsidies (especially for operations), demand-responsiveness, strong sector-internal competition, and a tendency to rely on older or poorly maintained vehicles. Operations are shaped by the pursuit of individual profit, even for collective modes where operators are organised in route groupings.

Key stakeholders in this sector include passengers (as the main source of revenue in the system), drivers and conductors (who manage vehicles and passengers), owners or operators and the collective representative bodies to which they belong, and the public sector. The latter's role tends to centre on licensing, enforcement, and, occasionally, the use and provision of public transport terminals.

There are three main categories of assets in shared transport operations. *Vehicles* take a variety of forms, ranging in size from buses to motorcycles and bicycles. *Licensing systems* are most evident for minibus-based services, but is also increasingly seen for two-wheeler-based services. These authorisations come in different forms, and can be attached to a driver, a vehicle, or a service.

The *relationship between the vehicle owner and driver* is central to the sector's business model. Drivers usually pay owners a regular amount for the use of the vehicle, after which they enjoy a high degree of independence and make most operational decisions. Owners tend to have little oversight of revenue collection and passenger numbers, except where electronic payment systems are used.

The for-hire and collective business models tend to be stable, with the main trend being the proliferation of the number of businesses as a response to urban population growth.

<sup>1</sup> See <http://www.vref.se/macprogramme>



Although digital ride-hailing platforms are growing in number, in effect all that these have introduced is the ability to hail and pay for for-hire services through digital means.

In the collective services space, Bus Rapid Transit (BRT) is widely seen as a means through which public authorities – typically funded by donor agencies – can absorb or displace collective shared transport services. However, the number of cities on the continent where BRT has been introduced is small, and the instances where shared transport has been effectively curbed or replaced by such introduction is even smaller.

### State of research capacity

There are a number of research groupings and individuals working in Africa or on Africa that focus on shared transport services. This paper is the result of a series of structured exchanges with a targeted collection of these individuals, to gain insight both into their research and related scholarly work, and into their knowledge of work on this topic within their institutions and geographic locations.

The result of these exchanges was a scan of research capacity and activities on the theme of this paper, rather than an exhaustive review of such capacity, or of literature produced on the continent.

In terms of capacity, the exchanges identified the following countries as having hubs of research and other scholarly activities that include a focus on shared transport: South Africa, Mozambique, Kenya, Cameroon, Nigeria, Togo, Ghana, Cote d'Ivoire, Sierra Leone, Senegal, Morocco, and Egypt. In addition, there were university-based groups in France and the United

Kingdom, as well as research and non-governmental entities in the United States of America, with research and teaching links with many of the aforementioned countries.

### Key research gaps

Key research gaps were identified around the following issues:

- The nature and operations of collective, shared transport services;
- The characteristics and impacts of digital technologies in this field;
- The impact of innovations in how business is conducted and services delivered;
- The impact of development-led reform projects and how these have or have not changed the shared transport sector;
- The potential for premium collective shared transport services;
- The role and impact of reformulated public authorities in improving services or enhancing governance;
- Understanding the politics of reform approaches.



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# INTRODUCTION

## Brief and objectives

This paper was commissioned by the Volvo Research and Educational Foundations (VREF). It contributes to the strategic positioning of a new research funding programme, entitled Mobility and Access in African Cities (MAC), currently being developed by VREF. The paper is one of five position papers on urban mobility and access on the continent, which range in focus from issues such as inequality and governance to safety and system design. These papers are intended to provide the VREF and relevant research environments in Africa with up-to-date assessments of current knowledge, as well as gaps in knowledge, within the thematic area, and to do so specifically in relation to current and emergent conditions in practice and in research environments.

The objective of this paper is to present the state of current knowledge, and identify avenues for future research on shared transport in Africa.

## Scope

The thematic focus of this paper is on the different business models evident amongst the privately operated but publicly available urban and near-urban shared mobility or shared passenger transport services across Africa, as well as on ways in which these services are, or may be, improved or developed. Shared passenger transport is a broad thematic cluster that spans a spectrum of operations falling between scheduled mass transport funded, managed, and/or run by the public sector at the one end, and privately owned vehicles at the other end. Often called paratransit, and more recently popular transport, these operations can most readily be identified by the presence of a vehicle driver who takes payment in exchange for a passenger's use of the transport service. The type of vehicle used to render the service might be as large as a bus or as small as a bicycle (see Figure 1).

Shared transport tends to fall into two broad categories. Collective shared transport services carry multi-

ple passengers using the same vehicle at the same or during overlapping times, typically serving the function that mass, scheduled public transport plays in other world regions. These services tend to rely on buses, minibus and other forms of light commercial or passenger vehicles. For-hire transport carries different passengers using the same vehicle at different times. These for-hire options include metered taxis and those hailed and paid through electronic means. Pooling or ride-sharing services are a more recent, if not widespread, form of shared transport that is a hybrid between collective and for-hire shared transport. However, what all of these services have in common, and which warrants their inclusion in this paper, is that they run on a for-reward basis.

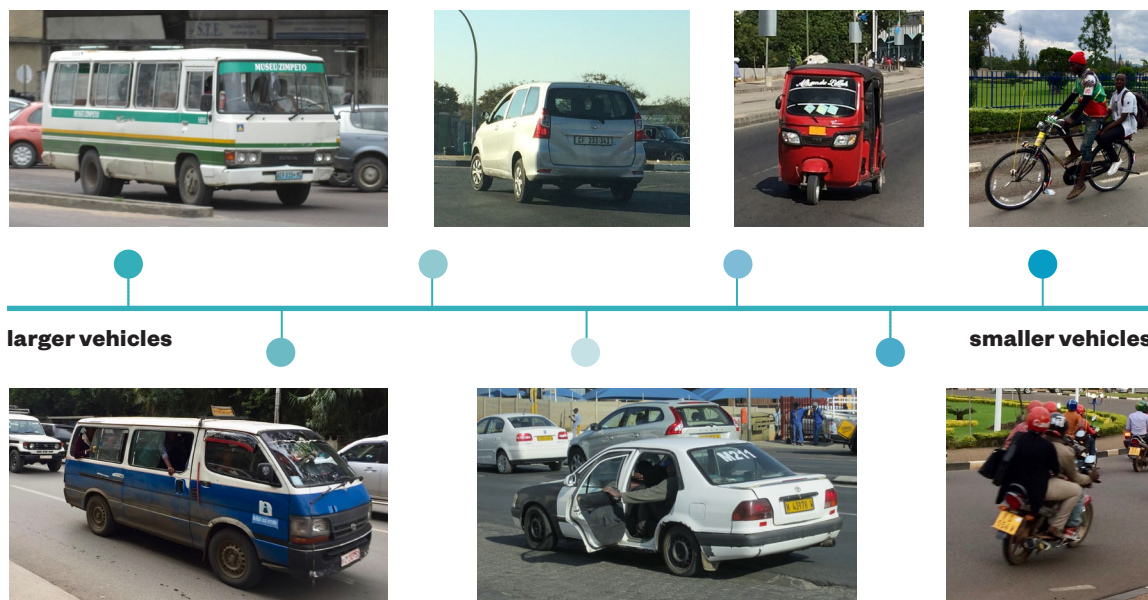
Drivers may be self-employed and own the vehicles they use, rent them from other parties, or may be in the employ of another party or parties owning the vehicle.

Vehicle-sharing services such as car-sharing and car-pooling that are not mediated by a dedicated driver are not part of our analysis, nor are institutional transport services, i.e. services operated by publicly owned operators, or private operators contracted or subsidised by public authorities. Our focus is also on services that use motorised vehicles. Though some cities have bicycle-taxis, there are indications that these businesses are converting to using motorcycles; we expect that such motorisation is likely to continue as a result of a ready supply of cheap imported motorcycles.

Processes to change or replace shared transport services are often described as reforms or innovations. Both these terms usually describe two types of actions: i) improving something that exists in a given environment, e.g. replacing old minibuses with newer, safer models; or ii) introducing something new over and above what is already present in a given environment, for instance launching an e-hailing service platform where previously all for-hire transport was supplied by individual operators on a cash basis. Improvement and new service introduction actions are sometimes combined – a well-known



Figure 1. Examples of shared transport vehicles in use in African cities



(Source: Herrie Schalekamp)

example being the introduction of BRT as a new transport mode in Cape Town, Johannesburg, Dar es Salaam, Lagos, and other African cities to absorb and/or replace existing minibuses.

A further cluster of reform comprises the digital services, hailing, and payment platforms making inroads in Africa. Some are established global enterprises, e.g. Bolt, SWVL, and Uber. Others are local firms that provide focussed service offerings, such as GONA for minibus fare payment in Lagos, and SafeBoda for motorcycle-taxi hailing and payment in Kampala and Nairobi. A further group includes international firms that are developing a new service with a particular geographic starting point: VW Move in Kigali for e-hailing new vehicles assembled locally by the company, or Opera's<sup>2</sup> OPay platform for hailing a variety of passenger and goods transport services in Nigeria.

This paper comes at a time when shared transport services are still, after many decades, the main form of motorised transport in nearly all of Africa's sprawling cities. Despite the prominence of BRT, digital hailing, and

payment technologies in the transport policy and development arenas, their impact on daily life in urban Africa pales in comparison to that of shared transport. It is, in fact, a concern among many researchers that shared transport enterprises and their services receive so little political and public sector recognition and support, despite their crucial role in providing urban mobility, employment and alternatives to the private car. This is not to say that shared transport is without fault. Common problems include market (over-)saturation, unpredictable service especially outside peak travel times or directions, and underinvestment in vehicle maintenance.

This state of affairs raises a number of questions. Are public authorities and policymakers playing effective regulatory and planning roles to support common issues in the shared transport sector? What might realistically be done to support shared transport services, whether to improve passenger safety and labour conditions, or more broadly in terms of sustainable urban development, air pollution, and climate concerns? Should shared transport be encouraged, and if so, which types of these services and under which conditions?

<sup>2</sup> Formerly a web browsing company



### Method

In order to build the base from which these and other emergent questions above might be answered, we first referred to a (n=529) literature review commissioned by VREF during the early stages of the MAC planning process covering scholarly publications from 2004 to 2015 (Behrens et al., 2015). The review included shared transport and public transport reform as thematic areas. In order to build on this review, add new developments in the years since then, and cover research and developments in practice that in many cases have not made their way into scholarly publications, as a next step we engaged directly with individuals involved in research, consultancy, advocacy and/or developmental activities related to shared transport in Africa. A wealth of academic and practical knowledge is embodied in these individuals, and this richness does not necessarily make its way into scholarly publications. We wanted to tap into this knowledge directly and report on it by way of this paper.

We compiled the group of contributors by producing a shortlist of people we had met in the course of our own work, and seeking recommendations from VREF and colleagues in our academic and practitioner networks. We then balanced the list to achieve a mix of people who are: in Africa, or are based elsewhere working on Africa; work in academia and in practice; have different disciplinary perspectives; are geographically spread across the sub-regions of the continent; and span anglophone, francophone and lusophone contexts.

Our engagements occurred in three parts. The first part was a two-day work session with a group of 10 individuals (including this paper's authors) that took place in August 2019. The second phase comprised individual work sessions undertaken in the course of the same month with people who could not attend the group work session. All of these work sessions were interactive, included extended group interviews or focus group discussions, and were structured similarly to the heading of the various sections of this paper (see below). The third part of our engagements was a broader process of review. In the first instance, the lead paper author presented the highlights of the first paper draft at a VREF MAC conference in September 2019. This provided the event's audience, of around 60 predominantly African academics and practitioners, the opportunity to provide in-person comments to the authors. In October 2019 we then circulated

the updated draft paper to the original contributors for comment. Finally, we shared the paper with established academics<sup>3</sup> in the field of shared transport for a final round of critical input. The result of the above activities is this paper.

### Outline of this paper

In the next section of this paper we provide an overview of shared transport in African cities. Here we set out different business forms and service types that are found in a variety of configurations across the continent. We also reflect on some of the limitations and emerging trends in relation to these businesses and services. It is not possible to capture the full diversity and richness of the shared transport arena in Africa within the confines of this paper. Instead, we provide four case descriptions that emerged from the work sessions and which provide some pointers as to this richness and diversity. These cases are discussed in the latter part of this section.

In the final section we identify key research areas that are not addressed, or which are insufficiently addressed, in relation to shared transport in African cities. There are multiple issues that might be researched further, but in order to be strategic we limit our discussion to three such issues. We similarly propose three ways in which researchers and researcher environments might be supported to respond more effectively to these priority research areas.

This paper is not intended to be conclusive, but rather to spur thinking around the broadening of knowledge, and of approaches to knowledge production, on shared transport in Africa. As such we do not close the paper with conclusions and recommendations. Instead, we provide a listing of active research environments that we identified prior to writing the paper, and which might well be future partners in expanding research and research capacity on mobility, in general, and shared transport, in particular.

Appendix A provides initial insights into the landscape of research and practice in shared transport in African cities. This takes the form of brief overviews of shared transport research and practice that the paper's authors are currently or have recently been involved in. For context we also provide some details of their general activities in mobility and mobility-related fields.

<sup>3</sup> Anne Kamau, Institute for Development Studies, University of Nairobi; Jacqueline Klopp, Centre for Sustainable Urban Development, Columbia University; Roger Behrens, Centre for Transport Studies, University of Cape Town; Taibat Lawanson, Department of Urban and Regional Planning, University of Lagos.



# OVERVIEW OF SHARED TRANSPORT SERVICES IN AFRICAN CITIES

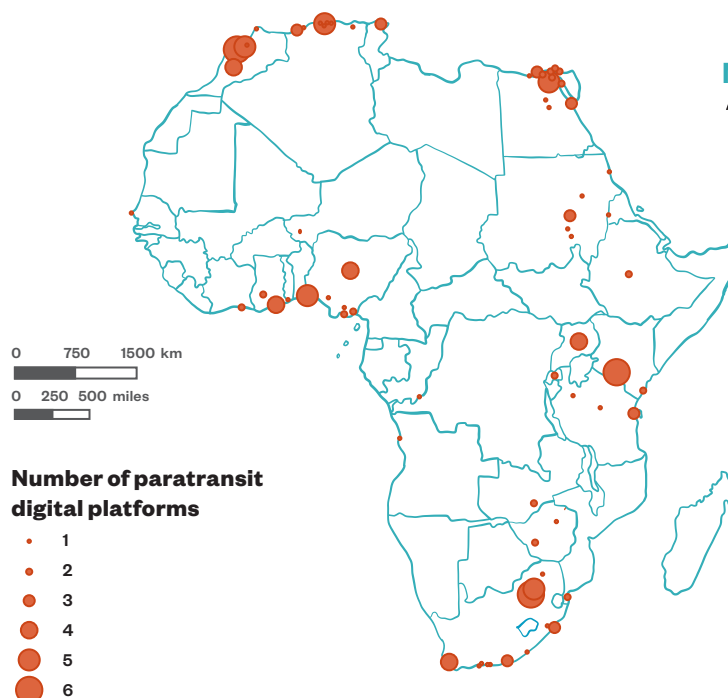
Shared transport covers a multitude of business forms and service types found in a variety of different configurations in cities in Africa. In this section we firstly define what we mean by the term 'shared transport', and then we identify and describe the different components that typically make up the shared transport system. This is followed by a reflection on the limitations and emerging trends that can be observed in relation to reforming shared transport businesses and services. In the final part of the section we present four cases of innovation in the shared transport context, starting with an example from Maputo in the south and working our way northwards. These cases represent recent developments in the shared transport space, and the descriptions of each emerged out of the engagements with the paper contributors.

## Definition and characteristics

Shared transport includes collective transport services that carry multiple passengers using the same vehicle at the same or during overlapping times, or that transport different passengers using the same vehicle at different times. Paratransit and public transport are included in the former, while the latter would be what is typically understood to be for-hire transport, e.g. metered taxicabs and motorcycle-taxis. The rise of transport network companies and online hailing platforms create the possibility of ride-pooling, which is increasingly blurring the distinction between what is for-hire transport and what is public transport. The extent of this rise can be seen in the below map of digital platforms in use amongst shared



*Figure 2. Map of digital platforms in use amongst shared transport services in large African cities (see Boutueil and Quellerier, 2020). The map was produced using an exhaustive sampling survey, and spans multiple share transport forms, e.g. ride-hailing, taxis, and microtransit.*



transport services in large African cities (see Boutueil and Quellerier, 2020). The map was produced using an exhaustive sampling survey, and spans multiple share transport forms, e.g. ride-hailing, taxis, and microtransit.

Seeing as many of the operations delivering this range of services are highly organised internally, and in many cities have regulatory regimes imposed by the public sector, the use of the term 'informal transport' is also only of limited relevance. Ultimately, 'shared transport' is a middle ground that covers all of the above variations that have emerged over time and that are present in different combinations across the continent.

Shared transport in the African context is generally characterised by the following attributes:

**Limited external regulation:** while they are often subject to some form of licensing by public authorities, shared transport operations are generally self-regulated. National and local government sometimes control prices (through fare-setting policies) or quantities (by defining quotas on the number of licenses that are issued), but rarely intervene to define obligations in terms of quality of service (e.g. frequency, location of stops).

**The absence of public subsidy:** shared transport operations are run on a commercial basis, whereby all their costs have to be paid from the farebox revenue. In the absence of protective regulations, operators are subjected to the laws of the market. They tend to generate thin profit margins and often operate at survival levels.

**Demand-responsiveness and flexibility:** these services are highly versatile, and appear (and disappear) where demand manifests itself. They adapt their operating hours, routes, and sometimes their prices based on passenger needs and willingness to pay.

**Strong internal competition:** as market entry is weakly regulated, competition in the market is often fierce, including between members of a same operators' group, association, or union. This induces operational and economic inefficiencies, as well as negative externalities (aggressive driving, traffic law infractions, overloaded vehicles, poor customer service, etc.).

**Old or unsafe vehicles:** operators generally do not have the financial capacity to purchase new or higher

quality vehicles, and turn to second-hand minibuses or low-quality imported motorcycles. In order to maximise the profitability of their business, they seek to expand the lifespan of their vehicles to the maximum – resulting in large fleets of rickety vehicles on the roads of many African cities.

## The shared transport system

Although the organisation of the shared transport system is highly context-specific, several of its components and dynamics are similar across the continent. This sub-section proposes a simple typology to describe this system, dividing its components into three categories. The first category comprises 'stakeholders', defined as the individuals or legal entities responsible for making the decisions that shape the system. The second category is made of the physical and intangible assets that are used to run the system. The third category comprises the relationships connecting i) the various stakeholders between themselves, and ii) the stakeholders to the assets used in the system. As this paper focuses on business models, these relationships are primarily analysed from the perspective of financial flows, and considered from a transactional perspective.

Modes of transport cannot be considered in isolation, as they typically feed into each other to make up consecutive portions of a trip. On the passenger's side, ticketing and information systems are enablers that can increase the accessibility of transport services (or decrease it, in cases where these systems are not adapted to user needs). Although the rapid development of digital technologies opens far-reaching avenues for improvement in these areas, it has not yet revolutionised the shared transport sector on the African continent. This dynamic is nevertheless a critical one to acknowledge, in that it greatly contributes to blurring the distinction between collective transport and for-hire services.

### Main stakeholders

Irrespective of the mode of shared transport considered, the following groups of stakeholders are generally found to play a structural role in the system:

**Customers/passengers/users:** variations in terminology reflect different perspectives on shared

transport services, and can be used as an indicator of the level of maturity of the industry in a given context. The term 'user' denotes a passive role, where the user benefits from a service on which they have little control or influence; the status of 'customer', on the other hand, comes with expectations in terms of quality of service and interactions with the provider. The 'passenger' designation is a more neutral one, used as a generic term in this paper. Beyond the question of definitions, these semantic distinctions may reveal evolutions in mindsets, and the emergence of new segments on the shared transport market.

On the African continent, paratransit users have traditionally been characterised by limited financial means, making them captive users in cities where no institutional form of public transport is provided. For this reason, paratransit users typically exhibit a high sensitivity to price, and are willing to accept longer travel and waiting times in order to keep their transport cost as low as possible. However, this perception of passengers as a homogenous group is being challenged by the growth of the middle-class in many African cities. Predominantly young, urban, and professional, this new segment of the passenger market is made of 'choice users', who prefer not to use or own a private vehicle and are willing to pay a premium for a more comfortable, reliable, and efficient service.

**Drivers and conductors:** drivers play a critical role in the shared transport system, as they are responsible for service delivery, fare collection, and everyday operational decisions (see sub-section on Transactions and relationships below). Drivers are in charge of operating their vehicles, and can be assisted by a conductor in the case of collective vehicles – in particular, in the minibus sector. The conductor collects fares, touts for customers, and assists passengers in boarding and alighting. As the position of conductor does not require formal skills or training, it represents a good employment opportunity for youth with limited education, and often provides a first job to young workers having recently migrated to urban areas. In some instances conductors also act as apprentice drivers, in time becoming full-time drivers themselves. The driver, on the other hand, requires an official authorisation (see next sub-sections), and is responsible for paying the rent of the vehicle to the owner, as well as remunerating the conductor. That position is therefore

generally occupied by more senior workers, often having started their career as conductors.

**Operator groups:** although a shared transport operator is generally defined as the holder of an operating licence, this might cover different categories of actors depending on the context. Operating licences can be held by vehicle owners (as it is predominantly the case in South Africa), by driver groups or unions (as in Ghana and Nigeria), or by third parties. In most countries, operators are required to constitute groups or associations in order to apply for operating licences. These structures range from empty shells established for administrative purposes to fully-fledged organisations that regulate internal competition. They constitute an important pillar of the system in being the main link between public authorities and the industry.

**Public authorities:** public intervention in the shared transport sector is generally minimal in Africa. The authorities have historically taken an adversarial stance towards the industry, and seem to alternate between denial and laissez-faire, playing only a minor regulatory role. Their main engagement with shared transport provider is through licensing, enforcement, and occasionally around the use of public transport terminals. Although they provide the bulk of transport services in many African cities, shared transport operations are surprisingly excluded from the scope of most urban and transport planning bodies.

### Key physical and tangible assets

Shared transport services make use of three main categories of assets in their operations: vehicles; licences and authorisations; and infrastructure.

**Vehicles:** a wide variety of vehicles is used in shared transport operations, providing different types of services, and addressing the specific needs of various categories of users. Micro-, mini- or medium-sized buses offer services ranging from short to medium distance. Although they are sometimes assigned to a feeder or distributor role, they often also provide trunk services, competing, completing, or replacing institutional mass transport services. In some countries (e.g. Senegal, South Africa), fleet-renewal programmes have led to a modernisation of the types of vehicles used for shared

transport operations. These programmes can be leveraged to implement wider reforms of the sector, such as the formalisation of transport businesses and the corporatisation of operator associations or unions.

In most instances, however, the fleet of minibuses is composed of second-hand vehicles typically imported from outside the continent, e.g. from Japan, to righthand-drive markets along the east coast of Africa. These vehicles are often former utility vans retrofitted for passenger transport, which poses serious safety issues as these vehicles have not been designed for that use. Vehicles used as shared taxis are generally smaller in size, comprising pick-up trucks, large sedans, and other saloon cars. When used as shared taxis, these vehicles frequently carry more passengers than they are legally permitted to. They can also deliver for-hire services, and will sometimes alternate between the two types of services depending on the time of the day. Smaller modes of transport, including three- and two-wheelers, are essentially used in for-hire services.

**Licences and authorisations:** while their possession is not always enforced, licences are required to operate most shared transport services. This is most evident for minibuses, but is also increasingly the case for two-wheeler-based services. These authorisations come in different forms, and can be attached to a driver, a vehicle, or a service. In addition to a driver's licence corresponding to the type of vehicle, some countries require that drivers obtain a specific licence authorising them to transport passengers for reward. In most countries, public transport vehicles are also subject to ad-hoc licensing and inspection obligations by the national vehicle licensing authority – which can be materialised by licence-plates of specific colours, embossed on the body of the vehicle, or displayed in a medallion. Finally, permits are generally issued by national or local authorities to regulate the type of service that the driver and vehicle are allowed to operate.

For collective modes of transport, permits are generally attributed to groups of operators rather than to individual owners or drivers. Permits define the routes or areas that an operator group is authorised to service. Because they are commonly delivered at the local level and recorded in paper form, it is often difficult to have an overview of the depths and breadth of licensed transport services at

the metropolitan level in most African cities. For-hire services may also be subjected to permits (especially taxicabs), but frequently fall into a grey area when provided through transport network companies.

It is also possible that shared transport representative bodies impose fees that operators and/or drivers have to pay in order to be part of that particular grouping and be allowed onto a particular route or area (e.g. in South Africa or Nigeria). Such fees may have two distinct components: a lump sum that must be paid upfront to join the grouping; and a subscription-type fee that is paid on a recurring basis. Where in place, such fee systems exist in parallel to official licences, and both the lump sum and subscription components may exceed the official licensing fee by a few orders of magnitude.

**Infrastructure:** shared transport operations can use both public and private infrastructure. The roadway on which vehicles drive is a public infrastructure, owned and maintained by public authorities. Terminals and lay-byes can either be public or private properties. Some operator groups run their operations from a main terminal, containing loading and waiting areas, office space, and ancillary functions such as mechanics, vulcanisers, and panel beaters. Land and buildings can be owned by operator groups themselves, leased by a private owner, or lent by local authorities. In the latter case, municipalities typically charge operators a daily fee for using their terminals, although it is often difficult to trace this revenue back to the public coffers.

### Relationships and transactions

Central to the shared transport business model is the relationship between the vehicle owner and driver. Although the driver is technically selected and employed by the owner, they may enjoy a high degree of independence. Female drivers are a small minority or absent. In comparison with institutional transport services – where the driver is an employee tasked with operating a vehicle – a specificity of the shared transport sector is the fact that drivers are responsible for making most operational decisions: they choose when to work, which routes to ply, where to stop, and what the best strategy is to maximise their revenue. This relationship is also characterised by owners having little oversight of revenue collection. The driver (sometimes through the conductor) is responsi-



ble for collecting fares, but in the absence of a ticketing system, the owner has no way of knowing what total daily fare takings actually are.

It is difficult for owners to know how many passengers their vehicles transport along the course of a route, and ticketing/payment systems can be bypassed by crews (e.g. offering discounts to passengers for not using the payment system and then pocketing the fare). For this reason, although some drivers are remunerated on a fixed-salary or commission basis, most of them work with a 'target' or 'deliver' system (described later in this section). Technological solutions can assist owners in monitoring operations and increase driver accountability (e.g. through GPS tracking or video monitoring), but cannot in themselves guarantee that all fares collected by the driver are reported to the owner. E-hailing services offer built-in revenue control capabilities, but it is always possible for drivers to keep serving passengers on the side.

Stemming from the dynamics described above, shared transport operations are shaped by the pursuit of individual profit, even for collective modes where operators are organised in route associations. In cities where the right to operate on a specific route is not strictly defined (or enforced), any transport demand that is not met by a legitimate, licensed operator is at risk of being captured by a competitor. Operators therefore have to be flexible, and adapt their work schedule to the fluctuating needs of their passengers in order to contain competition from other groups and illegal operators.

Competition also exists within operator groups, as each driver is trying to maximise his or her own revenue. At the local level, this competition is often destructive, as a fixed number of vehicles are contending for a fixed transport demand – any increase in a particular driver's earnings therefore mechanically translates in a decrease of another driver's income. Yet, drivers are caught in a form of prisoner's dilemma and generally choose to compete rather than to cooperate, since they have no guarantee regarding the behaviour of their peers. This has been demonstrated to significantly raise operating costs, as it increases fuel consumption, maintenance needs, and the risk of road crashes.

### Prevalent business models in the shared transport sector

The dominant business model in the shared transport sector is a landlord model where an owner rents his or her vehicle to a driver against a fixed sum of money, on a daily or weekly basis. Depending on city and country there are instances of a commission-based system for sharing revenue between drivers and owners, and this may also be combined with the landlord model in different ways, e.g. using one above a certain fare revenue threshold, or one or the other during different times of the day or week. The landlord model is particularly widespread in the collective shared transport subsector, as it is more capital-intensive than the for-hire sub-sector. Buying a collective vehicle (e.g. a minibus) requires an amount of capital that can be difficult for an individual to assemble. It often requires access to financing, or the capacity to pool funds from different sources. This encourages a concentration of ownership in the hands of a smaller number of entrepreneurs who are in a position to make the initial investment.

Evidence suggests that there is a higher share of owner-drivers in the for-hire sub-sector, as smaller vehicles are more readily affordable to an individual buyer. This is particularly true of the three-wheeler and motorcycle-taxi industry, where inexpensive vehicles imported from China are typically purchased by young micro-entrepreneurs. Alternatively, riders of these small vehicles may have a rent-to-own agreement, under which they work on the target system for a set period of a year or two and then the vehicle becomes theirs.

In both the shared transport and the for-hire markets, the ownership structure of the businesses and of the vehicles is generally difficult to ascertain. The reason behind this is partly that ownership data is not collected in a systematic and reliable manner, and partly that vehicle owners are reluctant to disclose their identity – owning a transport business may contravene their official functions or expose them to paying tax on profits thus generated.

### The target system and its negative incentives

Stemming from the landlord model is a remuneration mechanism known as the 'target system'. The owner of

the vehicle (and, in some cases, the owner of the licence) rents it to a driver for a set price. The driver is then responsible for operating the vehicle, and generating sufficient revenue to cover the price of the rent and pay themselves. In addition, drivers are generally responsible for refuelling the vehicle, and may have to cover small maintenance and repair cost out of their own pocket – depending on the arrangement with the owner of the vehicle. In the case of larger vehicles, drivers may also have to pay collectors.

The price of the rent constitutes the absolute minimum ‘target’ that the driver must meet in order not to lose money. Since this amount is due irrespective of conditions affecting the performance of operations on any given day (congestion, rain, police operations), drivers tend to be under a lot of pressure to carry as many passengers or make as many trips as possible in order to meet their target. Any amount collected in excess of the cost of the rent (and that of fuel/maintenance, if applicable) constitutes their remuneration. To maximise their profit, drivers are therefore incentivised to maximise seat turnover, drive aggressively, and compete for passengers on the road. This results in a number of well-documented negative externalities such as road crashes, violation of traffic rules, and poor customer service.

### **An overly extended vehicle lifespan**

In most African countries, there are no stringent regulations regarding the age of shared transport vehicles, or actions to take old vehicles off the road. Notable exceptions to the latter are vehicle scrapping and replacement programmes in South Africa, for minibuses, and in Egypt, for sedan taxis. Operators are usually allowed to import second-hand cars and minibuses and keep them on the road as long as they remain operational. In order to optimise their profit, operators tend to stretch the lifespan of their vehicles far beyond what would normally be the end of their economic life – through regular maintenance, repairs, and the occasional replacement of critical parts. This extreme extension of vehicle lifespan can also be attributed in part to the limited business-planning capacities of operators. Once they have realised the initial investment required to purchase a vehicle, operators generally seek to reap the immediate benefits of their investment. This often means that they insufficiently take into account the amortisation cost of the vehicle, or neglect to provision funds towards its renewal.

The ability to keep a public transport vehicle in working condition for hundreds of thousands of kilometres, over periods of time that can sometimes reach multiple decades, is one of the defining characteristics of the shared transport industry, and particularly so amongst collective shared transport services. While it constitutes a strength from a business point of view, it clearly poses threats from a road safety and environmental perspective, as it results in unsafe operating conditions and high level of emissions.

## **Typical service options and their limitations**

### **The ‘fill-and-go’ system**

In an attempt to organise competition and guarantee a minimum revenue for each trip, collective shared transport operators typically implement a ‘fill-and-go’ system, whereby vehicles queue at their origin terminal and only depart after loading passengers to full capacity. This system can be seen as a way to mitigate the financial risk associated with thin profit margins: by leaving the origin terminal with all their seats occupied, vehicles are guaranteed to collect enough cash to cover a certain share of their operating expenses. In a largely informal sector where time has limited value, keeping a vehicle and a crew idle for a large part of the day is not necessarily perceived as a source of inefficiency – operators seek to avoid operating costs linked to fuel consumption and maintenance needs as a priority. This, of course, creates a suboptimal situation for passengers, since i) waiting times at the terminal are unpredictable and can be long during the off-peak period when demand is sporadic, and ii) it makes it difficult to find a seat in a vehicle on the first portion of the routes as all vehicles are full when they leave the terminal.

### **For-hire service options**

For-hire services (e.g. taxicabs and motorcycle-taxis) do not present the same level of complexity from an operational point of view, as each driver is generally free to roam the city looking for customers or position themselves at a location of their choice to wait for a ride. In terms of business models, the vehicle can either be operated by its owner, or by a hired driver following the target system

described above. Because for-hire vehicles are generally smaller and more affordable than collective ones, it is likely that there is a higher share of owner-drivers in this sub-sector, although there is a lack of exhaustive data to back that claim.

The profitability of for-hire services is largely determined by the level of competition to which they are subjected on the market. Contrary to the collective shared transport market, where operator groups receive authorisations to operate on specific routes, the for-hire market is by and large atomistic and homogenous, which means that the profitability of operations is heavily impacted by the total number of actors allowed to operate on the market. Other factors impacting profitability include: i) the availability and performance of alternative modes of transport (particularly, institutional mass transport systems); ii) congestion, which results in low commercial speed and low passenger-kilometres travelled; and (iii) the presence of cartels that demand a share of the profit to allow vehicle to ply certain routes.

Because of loose or inadequate quotas on the number of licences, the for-hire sub-sector is generally overtraded. Combined with rampant congestion, this generally translates into low profitability outside of selected areas (e.g. airport) where special operating licences are typically required.

### Emerging trends in the industry

This section outlines some of the emerging trends observed in the shared transport sector, in response to the challenges described previously. Case studies presenting significant innovations are included in more detail in the box insert below.

The factors leading to the emergence of new business models and service options in the shared transport industry can be summarised as follows:

- Growing urban populations and worsening congestion, affecting all motorised modes despite relatively low motorisation rates in comparison to industrialised countries. Congestion decreases the attractiveness of driving a personal car (which becomes both more unpleasant and more expensive),

and gives a comparative advantage to smaller vehicles (in particular, motorcycles).

- Socio-economic evolutions, resulting in the growth of the middle-class and the development of new mobility needs. With an increasing share of the population working office jobs based in the urban core, often remote from residential areas, a new category of shared transport users is emerging. Either not quite able to afford private automobility, or not interested in driving their own car, these users are ready to pay a premium for comfortable and reliable collective transport services.
- Digital innovations associated with the development of smartphones have the potential to deeply transform or even disrupt the organisation of shared transport operations. These innovations are fuelled by two main categories of technology. First, geo-location technologies (primarily GPS) have enabled the development of various services using spatial information. Second, portable connectivity (in the form of 3/4G mobile networks) has opened new avenues for matching supply and demand, managing payments, and monitoring operations.

Against this backdrop, transport network companies have developed relatively quickly, growing their market share to the detriment of regular taxicab and motorcycle-taxi operators. Using demand-matching algorithms, these companies dispatch their vehicles more efficiently and reduce dead-mileage. Their prices might be higher than those of traditional for-hire operators, but they have the advantage of being set by a third party (saving the passenger the need to haggle), and generally offer a higher quality of service in terms of vehicle comfort and customer care.

Despite the vast potential for growth of these emerging services, it should be acknowledged that the shared transport sector is transforming at a slow pace, and is far from undergoing an organisational or a technological revolution. In most African cities, collective and for-hire modes continue to operate in a traditional way, and to suffer from the inherent limitations presented above. While technological innovations may gradually transform the for-hire sector, it is unlikely that technology alone will be able to uplift the collective shared transport sector. Important efforts from public authorities will also be

required in the form of enhanced regulation, enforcement, and providing operators with an environment conducive to change through capacity building, sound governance, and appropriate financial support.

In some cities on the continent, fleets of shared transport vehicles in the 15- to 35-seater range may number in the thousands, positioning them as the providers of mass transport. Not calling such operations *de facto* public transport does a disservice to, and is an underestimation of, the importance of these operations in the functioning of many African cities. Moreover, we know that some of these transport operations utilise bus- or minibus-sized vehicles that follow fixed routes *and de facto* schedules; these would conform to a general definition of public transport were it not for the absence of public-sector financial support and/or contractual agreements between operator and authority. It is therefore inaccurate to use a blanket term such as 'paratransit', which implies a form of erratic behaviour.

Despite the relatively stable business and service models and the persistent mass transport role of collective services, there are isolated instances of transformation

in the sector that do point to potential future pathways for change, if not yet emerging trends. In the box below we provide four examples of such novel pathways.

The first example, from Mozambique, is the pursuit of ownership collectivisation to concentrate capital and rearrange fleets and labour, supported by concerted public dialogue. The second, from Kenya, is improved sectoral organisation, service standards, and financial practices among operators. The third example is from Nigeria, where a cashless fare payment system was introduced in the collective transport sector, potentially mirroring the penetration of digital technology seen in the for-hire segment. The final example is from Egypt, where there is hybridisation between the collective and for-hire sector facilitated by digital technology, with both positive and negative consequences.

These cases highlight recent developments, but also the need for intensified research efforts: many of the details and impacts of these cases have not been documented. As such we provide the inserts, below, not only to demonstrate the beginnings of novel paths to reform, but also to spur research action.

### FOUR CASES OF INNOVATION IN SHARED TRANSPORT

#### **Forming bus cooperatives from Maputo's *chapas* (minibus) businesses**

In a process that started in 2016, the Mozambican government has been procuring large buses to complement minibus (*chapas*) operations on several major transport corridors in the Maputo metropolitan area (comprising the city of Maputo, and adjacent Matola, Boane, and Marracuene). The Maputo Metropolitan Transport Agency (AMT in Portuguese), set up by the national government in 2017, has been

assisting the *chapas* owner route associations to form cooperatives to operate these buses. Though AMT would initially own the buses, the cooperatives would in time assume such ownership through a leasing scheme managed by AMT. Since 2016, nine cooperatives have been formed, together operating a fleet of approximately 400 buses. AMT derives its revenue from the bus lease fees, and the agency has monthly meetings with the cooperatives to coordinate planning and operations.

The reform programme came about after the International Monetary Fund made continued fiscal support to Mozambique contingent on the national government abandoning a fuel subsidy. The cessation of the subsidy increased the cost of running *chapas*, which have and are still subject to a government-imposed cap on fare levels. The fare cap places a significant damper on service supply, resulting



in passengers often physically battling one another to secure a seat on an arriving vehicle. The government saw that a shift from *chapas* to cooperative-run buses might be a way to reduce the cost to owners for operating transport services and increase public transport supply, as well as a mechanism to mitigate the potential for a popular backlash against the withdrawal of the fuel subsidy.

However, the efficiency gains are not as pronounced as initially hoped. Fares on the new buses are still capped, though slightly increased over the *chapas* fares on the same corridors. The buses are also slower than the *chapas*, and do not have dedicated rights-of-way. As the state does not have the resources to provide an operational subsidy, the cooperatives have insufficient revenue to properly maintain the new buses, and overall public transport service supply remains insufficient.

The business model has also not changed, as the former *chapas* drivers are still employed by the cooperatives on a target basis on the new buses. Drivers suffer from inadequate training to manoeuvre a significantly larger vehicle, impacting negatively on road safety. However, the introduction of the bus cooperatives has contributed to professionalising the public transport sector: there is a new 'management class' that runs the cooperatives that did not exist before, which will be further bolstered by a planned business planning and management training programme. Passengers benefit from a scheduled night service, which *chapas* do not offer.

Overall, the absence of a financially sustainable long-term plan means that the bus cooperative programme in its current form remains a quick fix. This is exacerbated by the fare cap: it is a political imperative and helps the substantial number of poor households in the metropolitan area, but as long as the cap is in place it will continue to suppress service supply that is intended for those same poor households.

### ***Boda boda* (motorcycle-taxi) professionalisation in Kisumu**

Kisumu is the third largest city in Kenya. Unlike in the two larger cities, *matatus* (minibuses) have not been

the main provider of shared transport; this role has been filled by *boda boda* (two-wheeled motorcycle-taxis). In 2016, Kisumu's *boda boda* operators formed the Kisumu County Boda Boda Riders Co-operative Union (KOBROU), adding a new branch to the existing national Boda Boda Safety Association of Kenya. The Union is also sub-divided into wards and bases (individual ranks numbering in the dozens), which means there is now a complete hierarchy of representation, from the local to the national.

A key motivation behind creating a hierarchical representative structure was to be able to provide systematic social benefits for people working in Kisumu's *boda boda* sector. A National Health Insurance Fund and National Social Security Fund have been in existence for some years, but due to the day-to-day cash nature of small and micro-businesses – including *boda boda* operations – people in these businesses struggle to accrue sufficient funds over a month-long horizon in order to pay the monthly KES500 (EUR4.30) premium. The government adjusted the scheme to allow for daily payments of KES20 (EUR0.17), but even this failed to attract much interest from the small business sector. Kisumu's *boda boda* operators reported a lack of knowledge about the programme and benefits package, and of the flexible payment options, as the main reasons for their limited interest. They were also distrustful of government-administered schemes, rather keeping the money in their own sphere by forming their own social benefit programme, with backing from private sector service providers where needed.

A *boda boda* welfare programme is now in place, and popular among operators. A defined and stable representative structure was a prerequisite for the benefit programme, but the existence of both have also had multiple positive effects in the sector. Operators' confidence in their own sector has been boosted, so more of them now invest in owning their own motorcycle rather than renting it from an outside party. The union provides loan access services, so motorcycles are newer and better maintained. Operators increasingly hold accident insurance policies.

The Union expects operators to have a valid rider's licence and a public service vehicle licence

registered with the National Transport Safety Authority; at the same time the Union runs a riding school, which adds meaning to being licenced. Operators are expected to carry these licences, a Union membership badge, and proof that they have been to the riding school; this, together with the expectation that they maintain a neat and tidy appearance, has boosted their image in the public eye. The professionalisation process has raised the status of being part of the *boda boda* sector: operators now even have direct contracts with hotels.

Perhaps the most notable social outcome of the professionalisation process is that there are now visibly more women working in the sector than was previously the case. The Union is aware that there are still sectoral issues that require attention, e.g. overloading on school runs during which some *boda bodas* carry up to six children at a time, the need for riders to have first-aid training, and that roadways are not designed to accommodate *boda boda* operations. It is working on remedial actions with the relevant stakeholders.

### **Cashless *danfo* (minibus) fare payment in Lagos**

*Danfo* in Lagos typically have a conductor on board in addition to the driver. Conductors are tasked with managing passengers' fares on behalf of the driver; this speeds up operations as it allows the driver to focus on manoeuvring the vehicle. As smaller currency denominations are in short supply, it is common for conductors to use the phrase 'enter with your change' when passengers are boarding, to avoid problems with providing change on board. Passengers with higher denominations run the risk of not being permitted to board, of conductors refusing to give them change, or of being forced to borrow change from other passengers during the trip and then settle the debt after. In extreme instances, passengers and conductors get involved in heated arguments, resulting in the passenger insisting on alighting immediately without having made fare payment, or without returning cash borrowed from fellow passengers.

In August 2019, Gona, a local financial technology enterprise, launched a cashless fare payment plat-

form aimed at addressing the *danfo* fare change issue. Drivers sign up for the scheme via Gona vendors currently located at multiple terminals in the city. A Gona decal is provided and applied to the outside of the minibus, as is a sticker with a QR code unique to each vehicle. Passengers download the Gona app on their mobile phone and link the app to a debit card. Upon entering the vehicle, a passenger scans the QR code, enters the fare amount due, and authorises the transaction with a personal security code. Passengers who do not have access to a smartphone can also perform the fare transaction via USSD (unstructured supplementary service data), a feature available on any GSM-based mobile phone. At present neither passengers nor drivers pay to use the service, thus Gona as yet has no revenue stream and relies on venture capital (a common, and potentially unsustainable, situation in which transport network companies find themselves across the globe).

The Gona system seems to be unique: while mobile phone-based cashless payment is ubiquitous amongst for-hire services in Africa, Gona's *danfo* app appears to be the first application of this type in urban collective share transport operations in Africa. Its potential impact and scale are thus significant. Passengers need not be concerned about carrying correct change, though they do need a debit card, and ideally a smart phone, to make use of the service. Internet access can also be erratic, mobile data is costly, and many people are unbanked, especially in peri-urban areas.

Every day vehicle owners or owner-drivers are able to receive and monitor the revenue their vehicles generate, creating the possibility for future planning. Drivers who are not owners might be remunerated, rather than working on the target system. *Danfo* drivers need no longer employ conductors and can avoid onboard conflict; conductors thus stand to lose their position in the system, which might be a new nexus of conflict. This form of technology can also increase the appeal and attract new, tech-savvy choice users to *danfo*.

Due to the newness of the service, the public sector does not yet have a regulatory framework in place,

but the platform does provide a channel through which tax revenue can be extracted. While such tax revenue could be used to improve the *danfo*, its extraction could also repel owners and drivers from signing up, as they are unlikely to wish to reveal their revenues and profits to tax authorities.

### **Premium scheduled minibuses (minibuses) in Cairo**

SWVL is a transport network company based in Egypt, but also active in Kenya and aiming to launch in Nigeria. Unlike the ubiquitous for-hire e-hailing services, in Cairo SWVL offers a fixed-route service with set departure times scheduled primarily in the morning and afternoon peak hours. Though originally using 14-seater minibuses, the fleet has been diversified to include 24- and 29-seater small buses. This service is aimed at longer-distance intra-urban routes, including some routes that connect the new satellite cities outside Cairo's established urban area with the inner parts of the Cairo, where the supply of scheduled and collective shared transport operations is limited. The premium service targets professionals who do not want to, or cannot afford to, own a car in order to commute between home and work.

Prospective passengers book a seat on a specific route and scheduled departure time, and make payment through the SWVL app (cash payment was recently introduced as an option). Initially the company paid drivers a set fee to operate, but this has changed and at present drivers must bid to SWVL to offer the service; those who offer the lowest per-kilometre rate stand a greater chance of being allowed access to the hailing platform. In order to maintain service quality in line with the SWVL brand, the company appointed operational advisors who direct drivers on how to manage their service and interface with passengers.

The premium microbus service has had both positive and negative impacts. It is popular amongst women as it is more accessible and safer than collective public transport, but it remains a niche offering. It has

formalised parts of the shared transport business model – hailing and fare payment – but labour conditions are still tenuous, especially since the shift to the bid-for-service model. The SWVL service does not have formal ranks, and thus passengers can only use the app to access a vehicle, and drivers must make their own arrangements to store vehicles during off-peak periods.

While it offers an alternative to single-occupancy car travel, and costs only about one-third of car-based e-ride-hailing, its fares are also low enough to entice travellers out of public transport. Trips cost as little as three times the price of high-quality public buses (Mwasalat Misr) and around four to six times the price of minibuses. The company does not release data on the size of its fleet, but it is evident that the number of premium minibuses in circulation is in the hundreds. If taken in conjunction with similar services that Careem, Uber, and Buseet have launched in Cairo, these offerings present a real threat to the viability of public transport.

In relation to service quality, the centrally managed star-based rating system is new in the minibus-type shared transport space. Central management via a digital platform also allows for more efficient supply and demand matching compared to collective minibuses, though not across different modes as it remains a private platform. The public sector's ability to impose fair competition with existing travel options is also limited, as the SWVL model exploits a legal vacuum: at present the premium minibuses qualify for tourist service licences, even though they serve a commuter purpose.

There are broader concerns that the new service model brings to light. Private cars consume predominantly petrol, but the growing fleet of premium minibuses uses diesel, the only available grade of which is a poor-quality 5000ppm. Due to the lack of accurate quantitative data, it is not possible to calculate comparative fuel consumption and environmental emissions on a seat-by-seat basis; irrespective of that, the reliance on dirty diesel is problematic.

## KEY RESEARCH GAPS

One of the 2015 MAC literature review (Behrens et al., 2015) focus areas was on shared transport as we define it in this paper (i.e. paratransit and related for-hire transport services). The publications reviewed focussed principally on: i) investigations and descriptions of paratransit reform projects aimed at improved regulation, service upgrading or incorporation into scheduled public transport; ii) ways in which paratransit operators were organised internally and responded to public sector interventions in this sector; and iii) descriptions of the rapid rise of motorcycle-taxis particularly since 2010 in West Africa. The review identified the following gaps in research: variations among and detailed operations of paratransit businesses across the region; and potential reform alternatives, and operators' attitudes to these, over a wider range of contexts. The geographic focus of this research was foremost on South Africa, followed by Kenya and Nigeria, and with a small but notable focus on Ghana. This pattern was mirrored in the location of the most productive research environments, all of which were universities bar the South African Council for Scientific and Industrial Research.

In this section we build on and update the 2015 study's findings in this thematic area in two ways: by discussing gaps that the contributors identified in relation to research on shared transport as they appear in 2019; and by reflecting on how research, research environments, and dissemination can be supported in a context-appropriate manner. The section closes with a listing of further research environments that the contributors to the paper identified.

Here we focus on three research areas that we consider to be in need of concerted further study: business innovation and transformation projects; the politics of shared transport, including the role that corruption plays in the shared transport field; and market forces for change, and their impact – or lack thereof – on social equality.

### Business innovations and transformative projects

Shared transport remains an emerging research field. There is much scope for further research to fully understand the nature and operations of collective shared transport services in cities across the continent, be that whether they use a landlord revenue model or a commission-based system, or if it is drivers that are in charge of most business decisions or owners taking an active role in managing their businesses.

There is, similarly, a need to describe the characteristics and impacts of the more recent wave of digital technologies in this field. Geographically, the research conducted from an African base still largely reflects the patterns from 2015. Looking specifically at business models and new service options in this field, there is little documented research on the impact of innovations in how business is conducted or services delivered, or on how sector-, public- or development-led reform projects have transformed the shared transport sector.

Questions that need to be investigated include the following: Who is intended to be served by a reform project or initiative? Who was the implementer, the driving force behind change? What were both the successes and failures of the project or initiative? Why are technologies working in some cases and not in others? Can pre-conditions for a disruption be identified, and, if so, what might these be in different geographical contexts? Did an initiative in the end serve the intended target individuals and groups as well as the implementer's aims, or were there winners and losers?

Each city and type of shared transport business has its own unique set of physical and social circumstances; thus responses to these questions must be located within descriptions of such local contexts and variations, as well as in the structure and quanta of different shared transport forms found in such contexts.



Also, in seeking answers to these questions, we urge a distinction between research and documentation: while there may be investigations into these topics and led by questions like the above, the resulting findings might not necessarily be documented in the scholarly literature or forums or might not be in the public domain, e.g. due to political sensitivity or intellectual property held by a non-academic entity. Creative investigation and descriptive techniques will be needed and need to be cultivated.

### Market forces and (in)equality

On the spectrum of motorised mobility by passenger volume and unit size, shared transport occupies a broad central position between institutional mass public transport and private car reliance. In many African cities, collective shared transport has effectively taken the place of mass public transport, while for-hire shared transport provides an alternative to private car use. As the case study of Cairo's SWVL example showed, technologies from for-hire shared transport are also migrating to collective shared transport; in the same city, the Uber microbus service is gaining in popularity to the extent that it is threatening the much more established collective microbus services.

Overlaps among, or shifts between, these different transport service forms offer opportunities for more nuanced investigations into competition in the passenger transport market than the more ubiquitous positions of 'public vs private' transport. In the three areas of transition highlighted above – collective shared to mass transport, for-hire shared to private car use, for-hire shared to collective shared – lies much of interest that is not currently researched. In light of the variety of urban development dynamics, socio-economic conditions and governance structures found in different cities in Africa, there is a need to build comparative understanding of the variety and attributes of shared transport forms as they stand at present; forms of competition and transitions between shared transport and other transport options; and factors in different cities that led to such competition and/or transitions, as well as to resistance to change and conflicts between different services (e.g. traditional taxis versus e-hailing services or bus operations versus minibuses).

A further key research gap is on the existing impacts and future prospects of digital network technologies, to attract passengers away from both the more mass end of the service spectrum and from private car reliance at the other end. The introduction of such technologies may have livelihood and labour implications for those who work in the sector at present, as such changes tend to imply the formalisation of employment structures.

Another topic deserving of research is the potential for the premium collective shared transport services that are currently emerging to be a car-competitive option for wealthier households living in the sprawling suburbs of Africa. A question then emerges about the social equality of offering more expensive collective services that are inaccessible to poorer individuals but who might be employed in those same suburban households.

Finally, perhaps the most glaringly absent at present, is the persistence and growth of the private car in urban Africa. If the factors that are keeping people in cars and sustaining the channels of vehicle supply are not explored and documented, what foundation is there for proposing new shared (or mass) transport that is car-competitive? If, for example, car reliance has a gender dimension – as the Cairo case suggests – then shared transport services must be responsive to such factors.

### Governance, corruption and politics

There is an evolving relationship between shared transport operators and public authorities in many cities (the case studies offer some high-level examples). This evolution often starts from a base of distrust, or in the absence of any formal recognition of the legitimacy or role of shared transport. Change processes, whether originating from internal or from external pressures and motivations, tend to encourage shifts in the governance structure and activities of both the public and shared transport sectors, e.g. through the formation of transport authorities and of collective operating entities.

However, what is poorly studied is the actual role or impact of the reformulated public authorities in improving services or enhancing the governance of transport. There is, likewise, a scarcity of investigations into the

governance of newly established transport operating entities; such studies might offer insight into their viability and longevity.

There is also little work that describes the often invisible yet powerful dynamics of politics and of corruption, another facet of governance in the shared transport arena in Africa. Corruption is prevalent in the transport sector, including in shared transport, but problematic to study by its very nature. Politics are often covert, hard to study, and challenging to report on, particularly in public forums. Understanding shared transport in Africa, and processes of change impacting on or driven by shared transport interests, requires not only insight into the technologies and actors that are involved in producing or transforming services and businesses, but also into the relationships between such actors, the political and financial interests involved, and the agreements reached behind closed doors that materially impact on services, businesses, and change processes.

Understanding the politics of developing 'transport master plans' and 'silver bullet' reform approaches (such as

BRT installation) forms part of understanding these political dynamics. Multi-national development institutions and their advisors, as well as international investment corporations, are key players in the urban transport arena in Africa. These entities tend to each have their recommended approaches, which often end up complicating rather than simplifying urban reform processes.

Studying these politics is difficult not only because the mentioned interests and individuals are hard-to-reach research subjects. Scholars embedded in local universities are also limited in their ability to ask awkward questions of political leaders, for many universities and academic positions are state-funded – even if research projects might not be – and are thus dependent on maintaining cordial relationships with the powers that be. The assumption cannot be made that being located in the academy guarantees freedom of exploration or expression. Yet, if scholarly research in shared transport in Africa is to work for the public good and be societally relevant, or even just comprehensively descriptive, it must engage in answering these questions of governance, politics, and corruption.

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# APPENDIX A: A LANDSCAPE OF RESEARCH AND PRACTICE IN SHARED TRANSPORT

The work of the contributors to this paper represents a microcosm of the transdisciplinary research and research-informed practice in the field of shared transport. In this section we provide a snapshot of this body of knowledge and experiences, through describing the contributors' research and practical interests in shared transport in urban Africa, and through brief descriptions of the contributors' broader work and interests in urban mobility as context to what they know and do in relation to shared transport.

**Herrie Schalekamp**, the main author of this paper, is a research officer at the University of Cape Town's Centre for Transport Studies. His research initially focussed on documenting minibus-taxi (minibus) operators' business aspirations, interests, and responses to public transport reform in Cape Town. This work included investigations of a national minibus recapitalisation programme, and a national programme to introduce BRT and absorb minibus businesses in the country's main cities. In partnership with the Cape Town municipality and its consultant team he subsequently convened a three-year professional development programme for leaders and young talent in the minibus industry. This led to his being commissioned by the World Bank and National Treasury to play a lead role in identifying and documenting cases of minibus reform and innovation across South Africa (see Schalekamp and Klopp, 2018), as well as further work for the Treasury on three of the unearthed cases and on public transport-focussed teaching and learning programmes in the country.

Drawing on this experience, he participated in a multi-country research advisory project commissioned by the Africa Transport Policy Programme (SSATP) aiming to support eight African countries to develop more sustainable urban mobility and accessibility policies; he was part of the country team working with the Rwandan government. At a broader geographical scale Herrie

studies the spread of BRT in Sub-Saharan Africa, and the interface between this phenomenon and existing shared transport operations. Within this thematic area he is currently working for the World Bank to prepare a proposal to professionalise the *dala dala* (minibus) industry in Dar es Salaam against the backdrop of a partially complete BRT system.

**Simon Saddier**, the paper co-author, works with Transitec Consulting Engineers, where he manages the Cape Town office. Prior to joining Transitec he was a project team member for the French Development Agency (AFD) in Accra with oversight over the agency's involvement in the implementation of a bus rapid transport system in that city. The project aims included, amongst others, the incorporation of *trotro* (minibus) operations in the new system and the establishment of a transport authority, the Greater Accra Passenger Transport Executive. After moving to Transitec he was involved in a project to support the Tunisian Ministry of Transport to develop an improved approach to regulate shared mass transport services in the country. Transitec was the lead party on the abovementioned SSATP policy advisory project, with Simon being part of the group working in partnership with the government of Kenya.

Simon is currently part of a multidisciplinary team contracted to the Cape Town municipality to develop and implement a pilot project to strengthen the organisational and operational practices of minibus operators (see Saddier et al., 2019). This work is part of the municipality's revised public transport reform programme, which is moving away from the implementation of BRT towards a more pragmatic and fiscally affordable approach. The aim of this work is to collectivise the management and vehicles of individual minibus businesses in order to achieve greater operational efficiencies and offer the prospect of a contracting for services rather than the present individual licensing system.



**Ofentse Mokwena** is a lecturer in the Department of Transport Economics and Logistics Management at North-West University (NWU) in Mahikeng. From this base he conducts research among shared transport services in the Northwest, Limpopo and Gauteng Provinces of South Africa. One of his key areas of interest is in seven-seater neighbourhood taxis, which typically operate under the regulatory radar yet serve as a crucial last-mile extension to minibus-taxi (minibus) operations as well as being the main shared motorised mode of transport in less densely populated settlement types. He also works with students and in partnership with local minibus operators and municipalities to examine ways in which these operators can better match service supply with passenger demand patterns, as well to understand their utilisation of vehicular infrastructure (e.g. roadways, storage and ranking facilities) and additional services they provide such as contracted scholar transport.

At the industrial scale he is investigating the supply and manufacturing of minibuses used in shared transport, including the potential for the electrification of these vehicles. NWU has an agreement with the North West provincial government to provide support to municipalities in the province to prepare legislated transport plans; through this work he has furthermore developed an interest in the formation and capacitation of effective transport authorities.

**Joaquin Romero de Tejada** is an urban mobility expert based in Maputo. He is a core member of the public interest think-and-do-tank, Waza and Maputo's upcoming Urban Mobility Observatory. Under Waza's banner Joaquin has been active in mapping higher-volume shared transport operations in the Maputo city region in close collaboration with chapas (minibus) operators. This work is notable for having mapped not only chapas' routes but also their operating structure, vehicle frequencies and fleet sizes per route. The first Mapa dos Chapas (minibus map) was released in 2016, and since converted to OpenStreetMap and General Transit Feed Specification (GTFS) formats. The Mapa dos Chapas project used the map as a basis for fostering transport stakeholder dialogue – including an annual public dialogue on transport – in Maputo. This has been instrumental in bringing the importance of chapas to the attention of government stakeholders, with the local authority now embracing the map. Since then, the map was renamed 'Maputo's map

of collective transport'. The latest version of the map includes public bus and rail lines; in partnership with local advertising company UBI this map has been displayed on digital advertising billboards in the city since 2018, with another version being designed in collaboration with Architects Without Borders for placement on bus shelters.

**Clemence Cavoli** is a research and teaching fellow at the Centre for Transport Studies at University College London (UCL). She is an expert in sustainable urban mobility policy-making and planning who has worked for and advised supranational, national and local policy-makers. She has worked with Joaquin, above, in documenting the Mapa dos Chapas project and its impact (see Klopp and Cavoli 2017; 2019). She is also the co-investigator and project manager of the T-SUM (Transitions to Sustainable Urban Mobility) impact-led research project. This project aims to identify the conditions under which pathways to sustainable and inclusive transport and land use development can be accelerated in growing cities in the Global South. This project initially focuses on Maputo, Mozambique, and Freetown, Sierra Leone, as relevant examples of growing urban economies in Sub-Saharan Africa. T-SUM is an interdisciplinary and cross-sector collaborative project led by UCL. It involves a range of local partners in both case study cities including: universities, think tanks, local and national authorities and international partners such as Waza Think Tank, Eduardo Mondlane University, UN-Habitat, the World Bank and the French Development Agency. Thus far the work has included mobility, accessibility and land-use assessments, stakeholder interviews and focus group discussions with local residents in Maputo and Freetown.

**Paschalin Basil** is joint coordinator of the Kenya Transport Researchers Network (KTRN), a research dissemination and dialogue community under the auspices of the Institute for Development Studies (IDS) at the University of Nairobi. The network was born in 2015 out of a prior VREF-supported project to reimagine Nairobi, undertaken in partnership between IDS and Columbia University. The core network activities are a quarterly forum and a managed WhatsApp group; frequent topics of exchange include the *matatu* (minibus) and *boda boda* (motorcycle- and bicycle taxi) industries, as well as the Nairobi BRT project. The network is open to researchers, practitioners, policy makers, young scholars in transport as well as public transport workers. It initially comprised

16 people, growing to its current complement of more than 150 active members. Paschaline is also a part-time research assistant at IDS.

Since 2017 she has been supporting research on the social protection of transport, petty trade and construction workers in Nairobi and Kisumu, covering amongst others their access to pension schemes, health insurance, maternity benefits and secure employment contracts. This research project is funded by Danida, and is being undertaken in partnership with the Roskilde University and IDS, and in Tanzania through Mozumbe University.

**Tonny Omwansa** is the director of the C4DLab (Computing for Development Laboratory) at the University of Nairobi, as well as a lecturer at this university's School of Computing and Informatics. His focus is on information systems, with his initial research interest focussing on the rise of mobile financial services in Kenya. These services have been expanding into the arena of shared transport fare payment, and there is a wave of technology enterprises entering, or wanting to enter, this arena as it offers new opportunities for local economic development and employment in the country. Building on C4DLab's involvement in the Digital *Matatus* minibus mapping project in partnership with Columbia University, MIT and Groupshot, in 2018 the lab was successful in attracting a Transformative Urban Mobility Initiative (TUMI) award to roll out an incubation programme to support new mobility start-ups. This was the first transport-related work at the lab, which was first launched in 2013. It has been a successful undertaking: the TUMI award enabled the lab to successfully support eight mobility start-ups in the first year, and work is now underway to prepare for a next cohort to enter the programme.

**Peter Elias** is an urban planner and a senior lecturer at the Department of Geography at the University of Lagos. He leads the Lagos Urban Studies Group at this university. Peter is also a member of the Urban Mobility Group of the Centre for Housing and Sustainable Development, an African Research University Alliance Centre for Excellence at the University of Lagos. A core focus of this group in the last three years, in partnership with the Universities of Ghana and of Portsmouth, has been on a research project in the Leading Integrated Research in Africa for Agenda 2030 (LIRA 2030) sponsored by the Network of African Science Academies (NASAC) and In-

ternational Science Council (ISC) to unearth and collate data that can allow the implementation of the Sustainable Development Goals for communities and cities in Lagos and Accra. This led Peter to connect with the World Resources Institute (WRI), which commissioned him to develop a profile of shared transport services in Lagos, including *danfo* (minibuses), car taxis and *okada* (motorcycle-taxis). This work helped to build understanding of the relationships between minibus, motorcycle-taxi and bicycle-taxi unions and operations, government agencies, and the parties involved in the Lagos BRT system. The latter bus system has been a research focus area of his for nearly a decade.

In response to another mobility technology that has risen to prominence in the years since – that of transport network companies (TNCs) and platforms – he and colleagues have been engaging with traditional metered taxi operators to understand how this technology is impacting on their ridership. Two of the prominent TNCs in Lagos shared their ridership data with the university team, which the team has used to demonstrate the ridership shift and alternative owner-driver-rider relationships to traditional operators.

**Solène Baffi** joined Codatu (Cooperation for Urban Mobility in the Developing World) in 2019 to take up a role as training and research projects manager. Prior to this she was a researcher at the Université de Paris 1 Panthéon-Sorbonne and at the University of Stellenbosch, where she investigated various aspects of public transport and its spatial and governance dimensions in South Africa. Two particular areas that she investigated in this time were the interfaces and complementarities between minibus-taxis (minibuses) and the BRT system in Cape Town, and the role that digital technologies could play in minibus-taxi improvement endeavours. This research continues to inform her work at Codatu, where she now plays a lead role in delivering the two master degree programmes in transport and sustainability mobility in African cities that Codatu is a partner in. These programmes are offered annually in Lomé (with EAMAU [École Africaine des Métiers de l'Architecture et de l'Urbanisme], Senghor University and CNAM [Conservatoire National des Arts et Métiers]) and in Rabat (with Senghor University and INAU [Institut National d'Aménagement et d'Urbanisme]).

Part of the scope of Solène's work also includes her overseeing the biannual Codatu conference, the next iteration of which will be held in Dakar in 2020. In relation to the research portfolio, Codatu advises AFD on its mobility investment and support activities in developing countries. In this capacity Solène has been tasked with identifying and preparing proposals for implementation in Africa, which range thematically from shared mobility and motorcycle-taxi service improvement projects to transport sector professionalisation and alternative motive power systems.

**Virginie Boutueil** is deputy director and researcher and **Gaële Lesteven** a researcher at LVMT (Laboratoire Ville Mobilité Transport), a multidisciplinary partnership between the École des Ponts ParisTech, the French Institute of Science and Technology for Transport, Development and Networks (IFSTTAR) and the Université Paris-Est Marne-la-Vallée. Virginie is a transport engineer and economist, and Gaële a geographer in the behaviour and politics of urban mobility. They are also part of the Renault Sustainable Mobility Institute and ParisTech, which aims to build understanding around e-mobility and promote research on mobility in Africa. In these various capacities the two of them have undertaken a range of research projects around the African continent, many of which have also involved their students. In specific countries and cities these include projects on: the electrification of vehicles in rural Senegal; the use of energy in transport in East African countries; understanding new mobility and shared mobility in Cape Town, Nairobi and Accra; the electrification of shared taxis in Kigali; and mobility patterns in dense rural parts of Tunis.

With a wider geographic focus, they have conducted research on motor vehicle and motorcycle ownership in Africa as well as a census of digital mobility platforms in African cities (see section 3.1). Their research and teaching programme also includes a satellite programme in Morocco, with another soon to start in Cote D'Ivoire. The above activities also provide regular opportunities for them to engage directly with the World Bank, AFD and Unesco.

**Mohamed Hegazy** is director and one of the founding members of Transport for Cairo (TfC). TfC is a non-governmental enterprise that set out – and has made significant progress – to quantify all public transport in the Greater Cairo Region. While initially the TfC team's focus was on mapping microbus (minibus) operations, their scope of work has since incorporated bus and metro services as well as private vehicle travel. Across these different forms of transport TfC undertakes detailed data collection, consultancy and data science work, and provides maps, educational services and research and policy publications. While the metro serves as a transport backbone in the core city of Cairo, mass transport is absent in the multiple satellite cities that are being built in the desert outside this core. Through their accessibility analyses TfC has highlighted this mismatch between urban form and transport planning; metro routes to these outlying cities are still a relatively distant prospect. In recognition of TfC's contribution in this regard it is now advising the World Bank on where the bank should invest in mass transport in the GCR. Much of this investment is likely to take the form of BRT services.

