

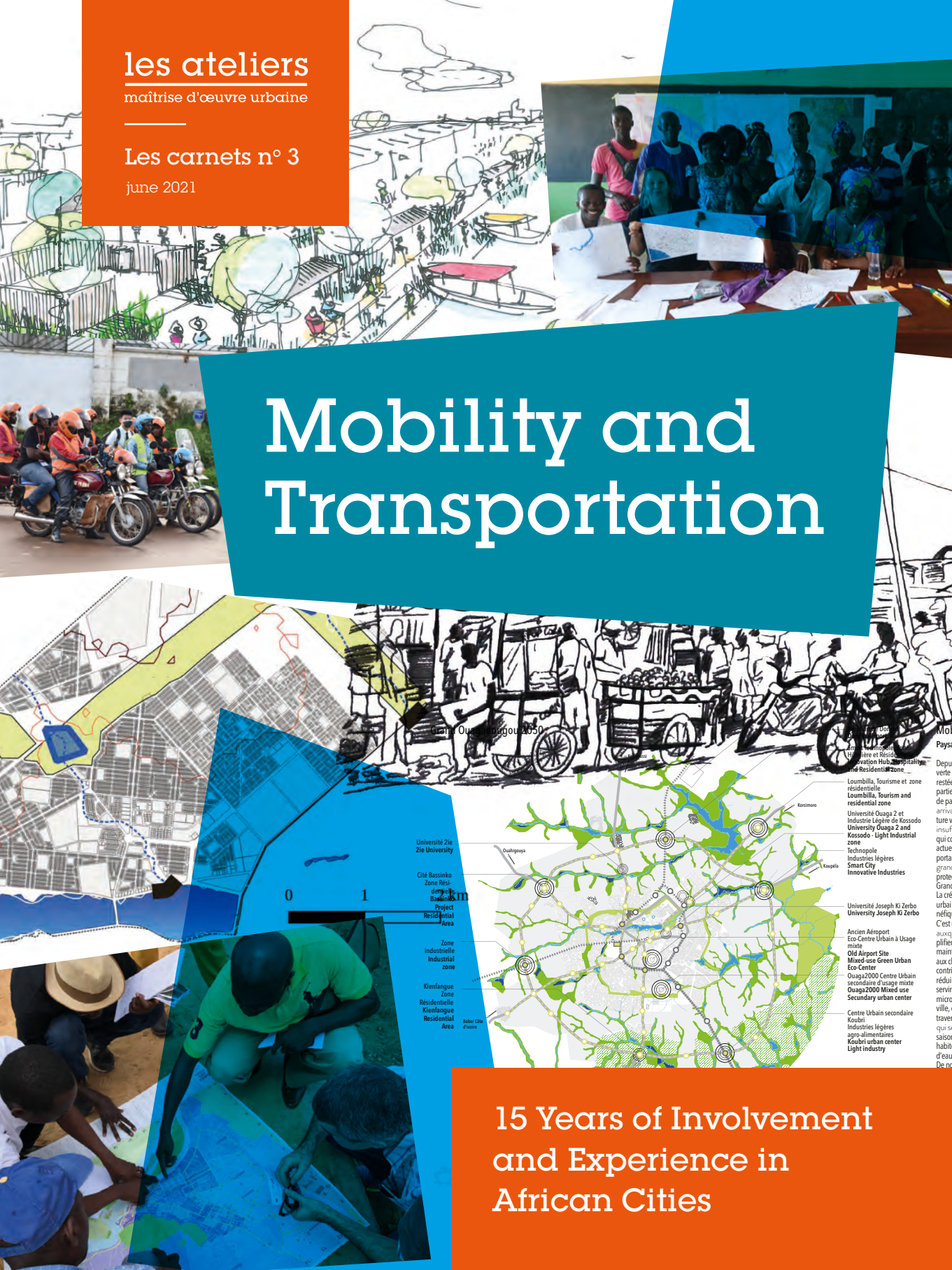
les ateliers

maîtrise d'œuvre urbaine

Les carnets n° 3

juin 2021

Mobility and Transportation



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15 Years of Involvement and Experience in African Cities

les ateliers

maîtrise d'œuvre urbaine

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The maps and sketches illustrating the proposals are excerpts of work completed by the teams of the various workshops. The illustrations and images contained in the open contributions are the property of their respective authors.

ISBN

979-10-93009-14-8

Publication date

June 2021

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Mobility and Transportation

The design and building of cities is by nature a collective process. In its forty years of existence, Les Ateliers Internationaux de Maîtrise d'Œuvre Urbaine de Cergy-Pontoise has built up a network of professionals comprised of diverse nationalities, generations and disciplines – architecture, urban planning, geography, economics, landscape design, sociology, art, engineering, environmental studies, etc. – who, after a highly selective process, have chosen to participate in a team-based reflection at the intersection of town planning and urban development.

Each workshop session serves as a space for open proposals, where the collaborative spirit and generous efforts of participants allows for the emergence of innovative concepts, productions and projects for the future of urban spaces in permanent transition.

Informal meetings and exchanges between local representatives – authorities, decision-makers, urban actors and professionals, local stakeholders – and participants shape the course of each session.

This collaborative approach allows for fresh perspectives, the reimagining of scale and the opportunity to look beyond administrative boundaries in order to revisit territories. It thereby enables the emergence of original ideas which is often hindered by the pressures of daily life and institutional roles.

Les Ateliers' unique method is based on listening, exchange and creativity. It is therefore, by its very essence, participative and collective. It has been implemented in a number of cities and territories across Europe, Asia, Latin America and Africa as a means for proposing innovative solutions, resolving complex situations and opening up consensus between contradictory or even opposing parties.

In Africa, nearly 15 sessions have been organized to date; and always, which is essential, with a significant participation by African professionals. From these richly diverse experiences, a picture can therefore begin to be painted.

As such, Les Ateliers has teamed up with participants, pilots and associated experts from these workshops to produce 5 thematic booklets that summarize and synthesize the diversity and complexity of the urban issues encountered during the sessions:

- › Cultures and societies
- › Governance and institutions
- › Mobility and transportation
- › Environment and climate change adaptation
- › Land and the right to the city

Pierre-André Périssol
President of Les Ateliers, Former French
Minister and Mayor of Moulins

Challenges and opportunities of African urban mobilities

Editorial

Jean Grébert

Pilot of the 2019 Kampala workshop,
Head of Mobility Systems at IMD -
Institute for Sustainable Mobility Renault-
ParisTech Foundation, Member of the
Les Ateliers Board of Directors.

Urban mobility within large African metropolises is characterized by a new triptych: BRT (Bus Rapid Transit) - minibus (paratransit) - motorcycle taxis. It is a particular situation – one of fast urban growth, a high deficit of infrastructure provision and a conventional public transport system that is weak or inadequate. Moreover, the modal share of walking is often prominent, with distances being, on average, long.

A continuous, harmonious, balanced, long-term development trend for these cities requires powerful strategies and the implementation of a vision which might aim at:

PLANNING COMPREHENSIVE TRANSPORT AND INFRASTRUCTURE AT THE MACRO- AND MICRO-SCALE

- › Manage resource scarcity: space, time, water, energy, public funds, etc.
- › Create a targeted massive public transit scheme within high density areas through transit-oriented development and regional express networks to link suburban polarities with the city centre while avoiding increased urban sprawl.
- › Provide both infrastructure capacity and more effectiveness in order to promote active modes (walking, cycling) as basic assets for moving around the city. Importantly, substitution and cannibalization effects of a poorly managed modal shift, where pedestrians would use BRT for short walking distances, should be anticipated and avoided. Current road infrastructure should be adapted to accommodate walking and cycling trips.
- › Establish a collaboration between infrastructure at various scales (from macro to micro) in a logical continuity to prevent jumps of scale, gaps, breaks or disconnected areas; and revamp

active modes and non-motorized trips with border-crossing micro-infrastructure across the entire mobility grid.

- › Weave in additional short cycling paths to fill gaps and ensure continuity and safety as well as improve crossings along the cycling itinerary. The idea is to design marginal improvements for the bottlenecks experienced on the existing road infrastructure.
- › Enhance the capacity of intermediary means such as minibuses, and even motorcycle taxis. Dedicated lanes for them may improve traffic density, ease public transport trunk feeding, and provide improved accessibility mainly through the employment of the mud road network.
- › Organize the coexistence of the various transportation modes and orchestrate their hierarchy in order to mitigate bottlenecks.
- › Think about the transformation, creation and maintenance of green and multipurpose infrastructure. They may have a core utility (road, water, energy, public space, etc.), but also offer secondary complementary functions in order to match local needs regarding the use of the space, the hosting of additional services or for specific environmental requirements. Moreover, they can be cost effective since they eliminate the need for multiple investments for each individual function.

HUMANIZING THE MOBILITY ECOSYSTEM AND ADAPTING IT TO THE LOCAL SITUATION

- › Rely on local know-how in managing service delivery from infrastructure conception onwards. Leverage local skills and diverse talents in assembling indigenous solutions.
- › Consider the responsive and customer-oriented informal sector as an essential

link within a formal chain of service delivery, enabling flexibility, agility and the filling of some institutional gaps.

- › Acknowledge that some transportation solutions, mostly informal, act beyond mobility functions as social, political, job-providing powers for the entire society.
- › Optimize the usage of infrastructure through spatio-temporal dynamics in order to provide larger flows and higher capacity for standard infrastructure. Reversible lanes during morning and evening peak periods, as seen in Brazilian cities, are a possible solution. Perfectly organized, they can be implemented in 10-minute increments and enable free-flowing traffic even at slow speeds.
- › Take advantage of the surplus land areas near infrastructure to implement environmental services: urban farming, heat island mitigation, rain-fall absorption and storage, etc.
- › Play with infrastructure to express the soul of the city and the identity of places as well as guide drivers and pedestrians. Provide a positive point of reference by working with local artists. Examples such as the sculpture from the artist Joseph-François Sumégné in the middle of Deïdo Square (Rond-point Deïdo) in Douala and the clocktower in Kampala demonstrate this gateway effect.
- › Obviously artists have a strong say in expressing the soul of the city – its vibrancy, its aesthetics and the stigmas of its past. They gather and mix all of these elements in up-to-date, unique expressions. They are globally connected and can be important messengers for conveying the personality of a town. They participate in designing spaces and can turn areas into trendy places. Artists have a unique sensibility that can enable them to play a trailblazing role by anticipating situations and bringing awareness to entire societies.

SHAPING THE FUTURE TOWARDS SMART AND ZERO-EMISSION MOBILITY

- › Digitize activities to ensure more reliable, more predictable services and provide sustainable business models for entrepreneurs.
- › Combine the electrification of transport so-

lutions to digitization in order to open future prospects for these ecosystems – restructuring existing services, promoting new stakeholders, reconfiguring equilibriums. When applied to “extreme” modes (rail, bus, ...motorcycles, rickshaws), this can underline the issue of balancing the energy mix and promote the use of renewable energies.

- › Turn the threat of the European ban on 48.5 million conventional diesel-engine cars into an opportunity to retrofit part of it into electric taxi fleets for larger cities.

WHAT CAN AFRICA LEARN FROM FRANCE AND HOW CAN WE CONTRIBUTE?

In densifying cities, Bus Rapid Transit (BRT) on dedicated lanes is a worldwide solution adopted in numerous cities (Bogota, Curitiba, Tehran, Beijing, Changzhou, Delhi, Ahmedabad, Dar es Salaam, Addis Ababa, etc.) with more or less successful implementation. BRT is more flexible than tramways and less costly since there is no need to displace existing networks. Tramways are 4 times less expensive than an MRT (underground metro) since they are able to cover 4 times more of a city's surface for the same amount of money. The network effect of a transport system is a major issue and a single demonstration line has low efficiency. As well, the feeding process of the major trunks is important. A tramway or BRT solution is far beyond a technical transportation tool, rather it is an urban renewal and city public space design opportunity to implement urban furniture, street-lighting and tree planting on a larger scale. French cities moved forward with this and experienced tremendous change due to the implementation of tramway projects: Strasbourg, Bordeaux, Tours, Nantes, Grenoble, etc.

At the same time, in highly dense areas of cities, tramways and BRT have been the catalyst for active modes such as walking and cycling. The designing of access and the integration of infrastructure within the city are some successful experiences in France. For Africa, the key question is to how to turn high-tech solutions into low-tech innovation. A shared BRT implementation project could be an answer.

WHAT CAN FRANCE LEARN FROM AFRICA AND HOW CAN WE CREATE WIN-WIN PARTNERSHIPS?

Like the System D for the French, the *jugaad* in India and the *jeitinho* in Brazil, Africa's survival cities have developed their own System K (K for Kinshasa, Kenya, Kigali, Kampala, etc.). These "systems" draw on the resourcefulness of populations and their specific know-how to perform activities in contexts of severe constraint and significant lacks in money, space and facilities. In the field of mobility, such frugal and informal solutions provide populations with both effective services (such as last-mile connectivity) and employment, thus filling physical and institutional gaps.

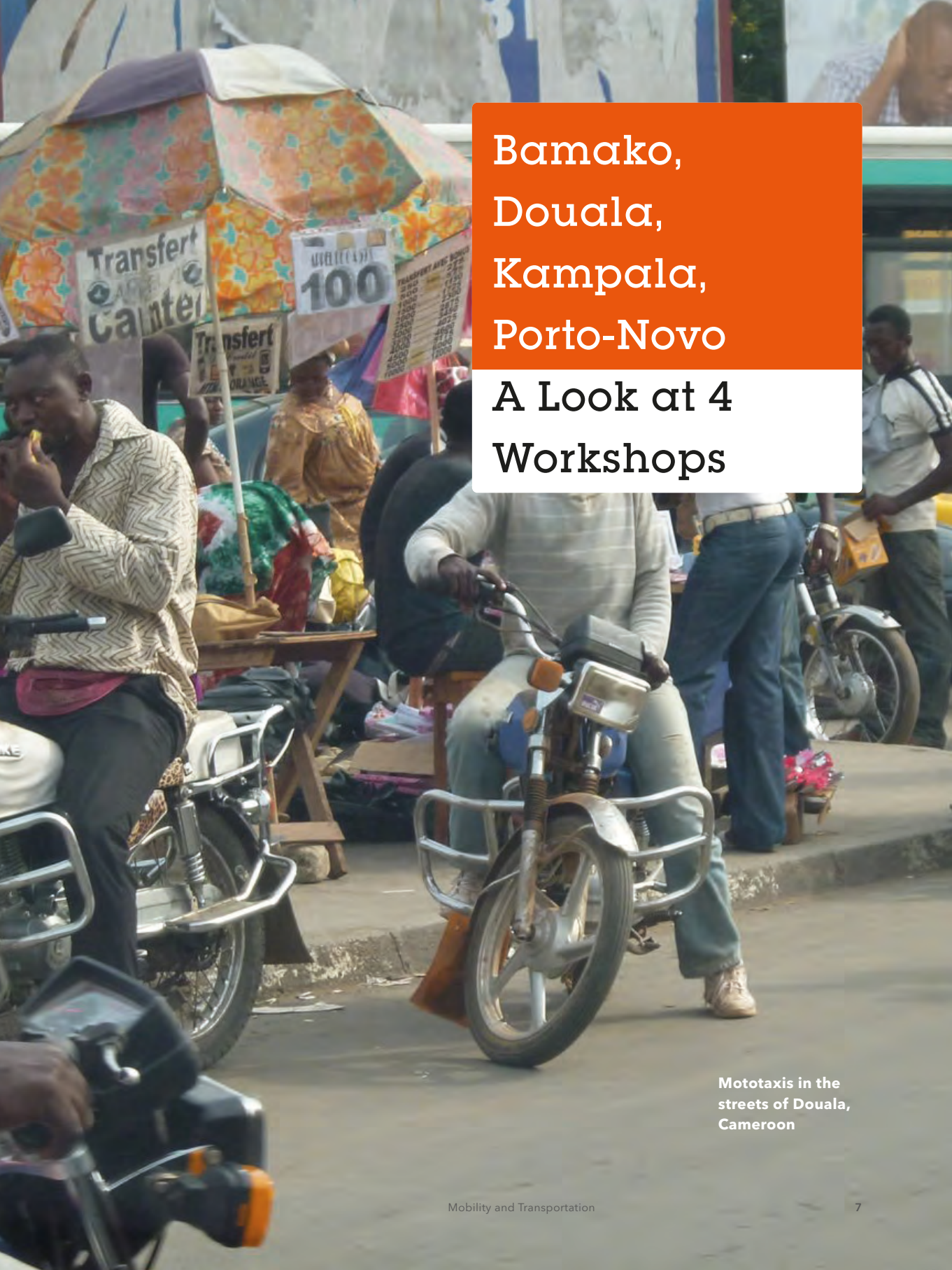
How can these activities be made more sustainable and environmentally friendly? In order to match the needs and requirements of the many, Africa developed a human power-based service network for the transport of goods and people, while France has implemented "contactless" transport systems (automated metros, bike-sharing systems, etc.).

Facing significant traffic congestion and pollution, air quality is a major concern in African cities. Shifting from conventional fleets of taxis or delivery vehicles to electric mobility modes is relevant, especially when implemented through dedicated partnerships with local people to foster frugal and indigenous innovation. These could include innovative business models for accessing energy, such as the swapping of batteries, second-life battery use, vehicle-to-grid solutions and battery recycling.

Resilience and adaptation is a common priority challenge worldwide in view of the growing magnitude of climate disasters, the acceleration of change, the increasing scarcity of resources and the preservation of natural ecosystems.

Even if mobility was not the central focus point of any of Les Ateliers' African workshops over the last ten years, it has been part of many of the proposals due to existing situations and has been integrated in a holistic manner within most of the projects. It is necessary to play with it at various levels in order to implement change, for example through travel behaviour, better awareness, new consumption choice arbitration, etc.

How can African cities implement an "organic mobility" that is at once adaptative, self-regulated, and environmentally friendly as well as based on the circular economy and local zero-emission objectives, and which could ultimately help to create resilient cities?



Bamako, Douala, Kampala, Porto-Novo

A Look at 4 Workshops

Mototaxis in the
streets of Douala,
Cameroon

Bamako 2011: An urban system to relieve congestion in the urban centre

A look at the workshop

Charlotte Klein

Workshop assistant pilot, architect-landscape designer



Bamako, faced with its rampant urbanization, is now forced to take a long-term approach to its development and organization as a multi-million dollar metropolis. The objective of the workshop was to define a system of urban centralities adapted to the city's extraordinary growth that could be articulated by an efficient public transportation network and which would encourage densification.

Please consult [Les Ateliers' website](#) to discover all of the documentation related to the 2011 Bamako workshop

Bamako: New Centralities

Territory of study

The Bamako Metropolitan Area - Mali

Pilots

Vincent Bourjaillat, engineer-urban planner;
and Franck Charlin, urban planner

Dates

8-22 July 2011

Participants

21 participants from 9 countries (England, Burkina Faso, Cambodia, Cameroon, Côte d'Ivoire, France, Hungary, Mali, Chad)

Local Partner

City of Bamako

Institutional Partners

AFD and Agence d'Urbanisme de l'Aire
Métropolitaine Lyonnaise

AN URBAN PROJECT TO RESPOND TO GROWTH

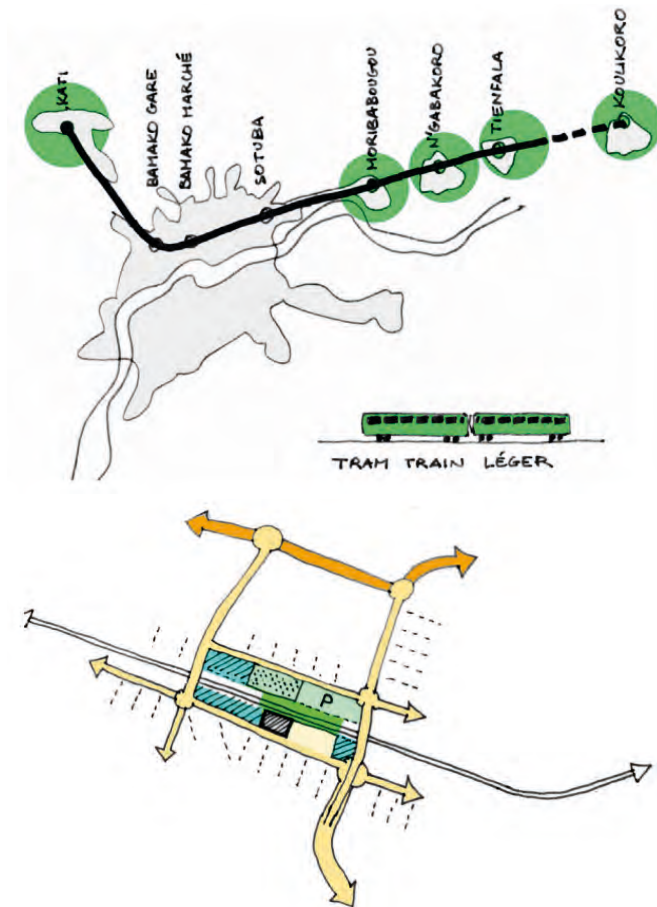
In the early 2010's, Bamako underwent a major expansion southward, on the right bank of the Niger River. Spontaneous urbanization and a low population density are the face of this West African metropolis. Despite the marked development on the right bank, the city has very little infrastructure and few economic activity centres. The historic centre of Bamako remains the beating heart of the city, with its emblematic market, its administrative and political core as well as its healthcare and education facilities. This configuration results in heavy traffic congestion because the city lacks polarities that could help unburden its central area.

The Malian State and the Municipality of Bamako decided to tackle the problem by launching a fourth Mali Urban Project and Bamako's first urban development forum, a framework in which the workshop is enrolled. Until this point, urban policies had been focused on targeted and sectoral needs (drinking water, schools, etc.) as opposed to offering a long-term, comprehensive vision despite the existence of the World Bank-supported Mali Urban Projects programme. The invitation of international experts as part of the workshop shows Bamako's willingness to move towards a more global vision of its urban policy. The workshop's challenge was to question Bamako's status as a metropolis by reflecting on Bamako's centralities and the infrastructural links between them.

THE NIGER RIVER AT THE HEART OF THE CENTRALITIES

The overall strategy proposed by the participants was to ensure the city's metropolitan status through seven major strategic points. The main idea was to strengthen the historic centre on the left bank by freeing it up from wholesale trade





Light train line linking Bamako to neighboring cities Kati and Koulikoro and urban implementation of the station, as imagined by participants of the workshop

and reinvesting in more urban functions and a renewed identity (better public spaces, peaceful traffic, etc.). Urban growth would be articulated in the south around the two major access roads to the city. Badalabougou Hill, aka "the Hill of Knowledge", would be reinforced through its academic and cultural functions and would serve as an attractive landmark on the right bank. The site of Sogoniko, with its bus station and indoor markets, would be renovated and reorganized to welcome additional urban functions. These centres would be organized into a hierarchic layout and served by a public transportation network. Thinking in terms of public transit led to the design of well-kept public spaces where the various users would be able to co-mingle without distress. Beyond the development of these new centralities, the overall reflection for

the city proposed new ways of occupying space. This included densifying buildings, but also the maintaining of traditional Malian ways of life (e.g. a concession where an extended family lives). As such, it would be up to architects to invent new forms of building, both dense and capable of accommodating the community life that is typical of Malian "big families".

This new urban system would revolve around the Niger River, which would become a multi-functional space – both a support for river-based public transport but also a public space of nature. Its place is today reduced to the bare minimum, although it does shape Bamako's identity and can offer a high-quality natural space to the people of Bamako. The river must become a link that underlines the new complementarity between the two banks.

Douala 2013: Opening up the city through adaptive infrastructure

A look at the workshop

Christophe Bayle

Workshop co-pilot, architect-urban planner



In Cameroon, the port city of Douala is experiencing an unprecedented population growth. Such rapid development raises questions about the response of the informal sector to this influx and the over-crowding of public spaces. The

workshop sought to provide the Urban Community of Douala with tools for thinking about these dynamics spatially as well how to enable informal activities to participate in the urban economy while maintaining Douala's role as the economic capital of Cameroon.

Please consult Les Ateliers' website to discover all of the documentation related to the 2013 Douala workshop

Douala, "The Intertwined City": How can informal and formal activities share the urban space and fertilize each other?

Territory of study

Douala, Cameroon

Pilots

Christophe Bayle, architect-urban planner; and Marion Talagrand, landscape designer-urban planner

Dates

22 June–6 July 2013

Participants

21 participants from 8 countries (England, Benin, Burkina Faso, Cameroon, Spain, France, Haiti, Italy, Lebanon, Senegal, Chad)

Local Partner

Douala Urban Community, Ministry of Housing and Urban Development (MINHDU),

Institutional Partner

French Development Agency (AFD) via a C2D (Development and debt reduction contract)

MOTORCYCLE TAXIS AT THE HEART OF MOBILITY ISSUES

The city of Douala is currently plagued by heavy traffic congestion. The dazzling emergence of motorcycle taxis, known as *bend-skins* or *benzikins*, in the public space and their interdiction in the central zone reveals both a lack of means and the difficulties in their management.

The question of how the urban space is shared between formal and informal activities is inseparable from that of travel. In 2012, the team at Les Ateliers de Cergy proposed the creation of an exclusive public transit right-of-way in Douala as a possible solution to its congestion problems. Mr Fritz Ntone, a delegate for the government, responded that it "would bring 50,000 *benzikineers* (bend-skin or benzikin drivers) to his office the next day". This senior official in charge of Douala's city governance wanted to underline – and explain to the members of Les Ateliers – that any urban strategy that ignored informal activity would be doomed to fail.

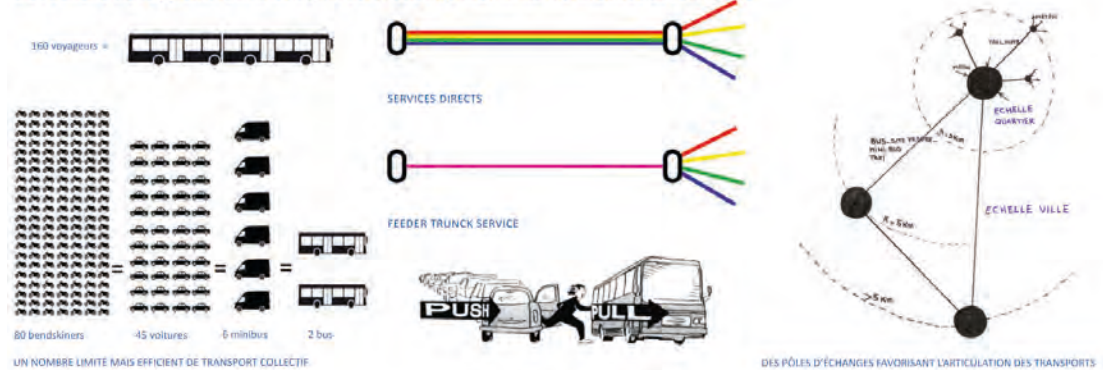
The proliferation of informal transportation in Douala dates back to the economic crisis of the 1980s and the massive layoffs that the IMF demanded of the Cameroonian government which led to an increase in unemployment and lower household incomes. Douala has 2.4 million inhabitants today, and by 2025 will have 3.7 to 4.9 million inhabitants and an informal sector that employs three out of four workers.

The informal sector operates in a state of lawlessness – occupying streets, empty or vacant plots; coming into conflict with merchants who carry out their activities in compliance with the regulations; sheltering sales of prohibited products; and leading public authorities to a feeling of powerlessness.



RÉORGANISER ET DÉVELOPPER LES MOBILITÉS DE LA VILLE DU 21^E SIÈCLE

De l'échelle de l'agglomération aux quartiers, des déplacements hiérarchisés et connectés



Hierarchised and connected transportation systems are part of the solution to face congestion

MULTIPLE RESPONSES

In this context, the participants of the session made three proposals concerning mobility:

- › They took up the idea of a charter of obligations associated with each mode of transport – cabs, motorcycle taxis, minibuses as well as informal transport means – and, most notably, in return, the creation of nodal points for motorcycle taxis and customer service counters, which would also serve as rest areas equipped with amenities, such as showers for drivers. These proposals were very much appreciated by the motorcycle taxi union for the immediate future.
- › Another proposal suggested that a portion of the underutilized railway tracks could be developed as a pedestrian walkway. This is a popular area for its tranquillity and greenery. A first action consisted in identifying the sections of the railway track most used by pedestrians and as-

signing a part of the railway track right-of-way to this pedestrian function that would cross the entire agglomeration of Douala.

- › A third proposal found a broad consensus around the valorization of the drainage channels in the city of Douala, a project led by the French Development Agency. The drainage channels appear to be a real asset for the city, provided that they are used in a self-regulated network that is attractive for urban transport and therefore respected by local residents. The aim is to restore the city's relationship with water, to solve the problem of recurrent flooding and also to provide a new image for the city. This third proposal was developed during a second workshop in 2016 with the goal of creating links between different areas of the city partitioned by its railway infrastructure and industrial rights-of-way. The issue of mobility is at the heart of the future of the city of Douala.

Kampala 2019: Finding one's way or getting lost in Kampala

A look at the workshop

Thomas Pendzel

Director of the Kampala workshop short film, and
Annet Twinokwesiga, Workshop assistant pilot



Kampala enjoys a unique geography, characterized by its numerous hills, the proximity of Lake Victoria and its precious wetlands. These valuable assets are nevertheless being endangered by an unprecedented growth – a source of environmental threats. The workshop looked at the resourcefulness and entrepreneurial capacity of residents, private actors and municipalities to find some perspectives on how to make Kampala a sustainable and resilient capital city.

Please consult [Les Ateliers' website](#) to discover all of the documentation related to the 2019 Kampala workshop

Green and Innovative Kampala

Territory of study

Kampala, Uganda

Pilots

Jean Grébert, architect and mobility specialist,
and Blanca Calvo Boixet, architect

Dates

26 October 2019–8 November 2019

Participants

18 participants from 11 countries (Italy, Botswana, Uganda, France, Ethiopia, India, South Africa, USA, Kenya, Peru, Comoro Islands)

Local Partner

KCCA (Kampala Capital City Authority)

Institutional Partner

AFD

GETTING LOST IN KAMPALA

Kampala is above all a city of red and green. The land is a bright and powdery ochre, which is most apparent in the informal neighbourhoods where the colour is baked onto the walls of houses or swept over the few sidewalks and pavements that exist. The variations of green come from the omnipresent and invasive trees as well as the countless micro-farms that help to partition the metropolis and encourage dreams of a sustainable future.

It's easy to get lost in Kampala: 27 hills are far too many to orient oneself. One feels the geography of the city more than one sees it – the dimensions being so large that they are hard to grasp. There are two historic hills in the centre, which almost nobody visits. Next to them is a dense business district whose many buildings are both opulent and reminiscent of the modernist architecture of the 1980s. They create a singular image like that of a sculpture by Bodys Isek Kingelez erected in red earth.

But when on a street in the centre of the city, there is only poor infrastructure, no public transportation and no street lighting. You can get around during the day by foot or by hailing a *boda-boda*, these motorcycle taxis which, thanks to a very popular mobile app, are also known as SafeBoda and come equipped with a helmet for the driver and passenger. One can thus navigate from hill to hill, between a litany of informal neighbourhoods, overcrowded streets and underused railroads, between a sobriety fantasized as happy and infrastructure projects in uncertain states of progress.

Nevertheless, the *boda-boda*'s trajectory capacity remains too limited to fully grasp the territory's geographical reach that now extends fur-



The «nodes» are a proposal from the workshop creating small and adaptive centers throughout the city that can accommodate transportation services



ther out with the brand new motorway that leads to Entebbe and the one that will soon go to Jinja. The metropolis is developing in the directions of these two small towns, which offer Kampala what it has long since cut itself off from: the blue horizon of Lake Victoria.

A LOOK BACK ON THE WORKSHOP

Kampala is one of the fastest growing cities in the world. The rapid urbanization it now faces presents partitioning challenges that reveal both considerable vulnerabilities as well as great potentials. It is a situation that requires an integrated and holistic approach.

The 2019 "Green and Innovative Kampala" workshop served as a comprehensive response, employing a collective, multidisciplinary and multi-sectoral approach that put emphasis on creating synergies with local stakeholders and

connectivity by enhancing mobility and continuity in the city's urban development. The workshop, which was a collaboration between the Kampala Capital City Authority and the French Development Agency, brought together a diverse cultural mix with 18 participants from 10 countries, key representatives from the government and civil society as well as citizens and local and international experts in a joint process of dialogue.

In the end, this workshop – the first ever held in East Africa – was able to produce innovative socio-economic urban planning proposals that will enable the Greater Kampala Metropolitan Area to effectively face climate change.

Porto-Novo: The motorcycle, a pillar of multimodal transportation

A look at the workshop

Luc Raimbault

Co-pilot of several workshops held in Porto Novo, engineer and urban planner



Located on the edge of a 35 km lagoon, the city of Porto-Novo, capital of Benin with 310,000 inhabitants, benefits from an exceptional natural setting yet also suffers from a lack of economic dynamism capable of ensuring its attractiveness. The 6

workshops, prepared as part of the decentralized cooperation between the City of Porto-Novo and the Communauté d'Agglomération de Cergy-Pontoise, responded to the challenges of planning, culture and ecology through a multidisciplinary approach to form the basis of an urban project shared by the inhabitants and the city's authorities.

Please consult Les Ateliers' website to discover all of the documentation related to the Porto-Novo workshops

Six student and professional workshops led in Porto-Novo, Benin

Territory of study

Porto-Novo, Benin

Pilots

Luc Raimbault, engineer-urban planner; Daniel Hounkpevi, project coordinator for Porto-Novo Green City; Delphine Baldé, architect-urban planner; Roméo Houssou, engineer;

Dates

2005-2017

Participants

Over 100 participants

Local Partner

City of Porto-Novo

Institutional Partners

Communauté d'Agglomération de Cergy-Pontoise, AFD, Grand Lyon, French Facility for Global Environment (FFEM)



THE GROWING IMPORTANCE OF THE MOTORCYCLE

Porto-Novo, the capital of Benin, benefits from a unique location that has played a determining role in the mobility solutions adopted by its inhabitants. Situated inland from the Atlantic coast, the city was built on the edge of the plateau overlooking the Ouémé River Valley. One of the most fertile areas in Africa, it is protected from the sea by a barrier coastline and lagoon. Only thirty kilometres away from Cotonou, it serves as a secondary urban antennae to the major port of Benin, with a constant exchange of people and goods, especially commuters, flowing between the two.

If the memory of the metric railroad from the colonial period, between Porto-Novo and the port of Cotonou, remains present due to its footprint in the urban fabric, the modern era has replaced it with two main modes of transportation: the minibus, which sometimes carries more than fifteen people, and the motorcycle. The first has been widely adopted across a continent where public transport, buses and trains are rare. Most recently, rising standards of living have made motorcycles the main means of individual transportation in major African cities, as evidenced by the swarms of two-wheeled vehicles at inter-sections. Few cities, however, like Porto-Novo, have given it such a central and versatile place in terms of its mobility.

MULTIPLICITY OF USES

Porto-Novo has pushed the range of possible uses for motorized two-wheelers to the extreme, compared to in the global North where they are limited to leisure activities, commuting and sometimes airport transportation.



Photo 1

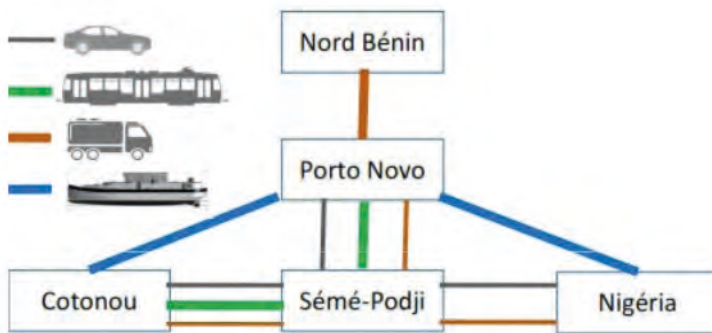


Photo 2



Photo 3

- > Family transport, sometimes with 2 parents and 3 children
- > School pick-up that can transport 6 school children at the same time (photo 1)
- > Taxicabs: the famous omnipresent *zemi-djans*, identifiable by their drivers and their blue helmets. No other form of cab can be hailed in the streets of Porto-Novo, to the great displeasure of tourists. The progress of digitalization should quickly fill this gap for visitors.
- > Transport of all types of goods with incredible volumes and loads. The most spectacular is the transport of empty petrol cans used for trade with Nigeria. Thirty-five (35) cans can be transported on a single motorcycle! (photo 2)
- > Petrol transport: the most original vehicle is the *moto-tank*, a typically Beninese concept used for petrol trade with Nigeria (photo 3). It is a scooter ingeniously transformed into a tricycle to create a tank of several hundred litres of gasoline on which the driver sits. These improbable machines, which are often operated only by people with motor disabilities, are veritable rolling bombs.



The right transportation system is to be found for each connection



Open contributions

Herrie Schalekamp, [South Africa](#)

Peter Kasaija, [Uganda](#)

Virginie Boutueil, [France](#)

Hari Haran Chandra, [India](#)

Etienne Saint-Sernin, [France](#)

On the shores of
Lake Victoria, in
Kampala, Uganda

Public transport as a mediator in urban development and social inclusion?: Reflections on urbanisation, mobility and bus rapid transit in South Africa

Herrie Schalekamp

Research-led practitioner, Centre for Transport Studies, University of Cape Town

Cities the world over face a shared challenge: masses of people need to move, and often at the same time. In the African context, where widespread poverty mixes with rapid urbanisation, the volumes of moving people easily overwhelm existing infrastructure. The result is a daily confrontation between collective transport, trucks, cars, motorcycles, cyclists and people walking. Fleets of small buses, minibuses, passenger cars and motorcycles are prominent and aggressive competitors in this arena, but they are often also the core mass transport service provider that keeps many African cities from grinding to a halt.

Bus rapid transit (BRT) has entered into this everyday battleground, with public sector – and often donor agency – backing. Authorities often intend for BRT to absorb and replace especially bus and minibus operations, offer a car-competitive travel option, and connect economic hubs to expanding peripheries. BRT also promises an opportunity to reassert state control in the urban realm: where land-use management has failed, it is now a public transport system technology that might shape urban dynamics in Africa. Indeed, it might be argued that BRT in Africa is, in fact, a new mobility technology.

However, as with other forms of new mobility, such as digital, autonomous and electric technologies, understanding the specific contexts in which BRT is being inserted is crucial to unders-

tanding its prospects. Besides the physical environment, context also means societies' readiness to accept and afford new technologies, as well as the politics, vested interests and social inequalities that such technologies propose to disturb. To shed light on the complexity of introducing BRT as a mobility technology in a new context, let us look at the case of South Africa, which launched a multi-city BRT programme in 2006.

THE CONTEXT OF SOUTH AFRICAN CITIES

South Africa's cities, to a large extent, still reflect the country's apartheid past. Wealthier households uphold a standard of living similar to that of the global North, and are physically and digitally tied into the globalised world. Poor households, in contrast, often live in conditions seen in magazine images of the slums and squalor associated with extreme poverty.

What sets South Africa apart from many of its neighbours is not only the late end to official segregation, but, more positively, also a state-funded mass housing programme. In the first two decades of democracy (1994–2014) the state provided funding for 2.8 million residential units and a further 875,000 serviced plots of land. This has led to around 12.5 million people having a way out of living in a wooden, plastic or sheet metal shack. Many also gained a property title deed.

Residential development, however, remains problematic. At the wealthier end of the spectrum, walled free-standing housing estates on the urban periphery, sometimes complete with internal service and leisure facilities, predominate. Low-income housing often also follows a single-dwelling model. As cost is a driving factor, state-funded housing tracts are built where land is cheaper and in greater supply than in more centrally located positions. Alternatively, there is in-situ replacement of better-located shanty towns with the aforementioned single-dwelling developments.

In the low-income sector, the single-dwelling model, ironically, drives densification. Many free-standing houses are soon surrounded by five or more lean-to rooms, each of which might house a whole family. For the main householder this provides rental revenue – important when



MyCiTi bus and station in Cape Town's city centre

income opportunities are scarce and distant and unemployment is at a crisis level: 29% of the working age population is jobless, and a further 12% have given up on looking for work. The 'backyarders', as they are called, for their part gain access to electricity, water and some security of tenure, even if they typically need to go elsewhere for sanitation. Densification of wealthier parts of cities – most of it suburbia – is not nearly as dynamic.¹

Societal inequality impacts clearly on urban mobility choices. Wealthier city dwellers are heavily reliant on private cars, and the country has extensive road and urban freeway networks. Urban sprawl, an established vehicle manufacturing industry and a well-developed finance sector perpetuate such automobile reliance.

1 For more insight into South Africa's social and spatial challenges, see The Mandela Initiative's 2018 report, *Grappling with poverty and inequality*, available at <https://mandelainitiative.org.za/research/final-report.html>.

Even poorer households aspire to car ownership, but affordability prevents an actual shift to automobility – a third of the population lives on less than €50 per month. Walking excessive distances is common for the poorest, but urban sprawl means that collective motorised mobility remains essential even where there is extreme poverty.

Collective transport comprises heavy rail and conventional bus services, and a thriving minibus sector that captures two-thirds or more of urban public transport trips. Limited public bus service in most cities and large-scale mismanagement and underinvestment at the national urban rail agency have worked heavily in the favour of the minibus industry in the last two decades.

The minibus industry has its share of troubles. Ownership is fragmented, resulting in thousands of micro and small businesses in each city, with little state or central control. The resulting service oversupply incentivises drivers to compete aggressively with one another on the road. Vehicles maintenance is not a priority, and ultimately passengers suffer the safety consequences.



Small business, big players: a minibus supply, finance and refurbishment business

THE PROMISE OF BRT AS A SAVIOUR TECHNOLOGY

In 2006, South Africa was nominated to host the 2010 FIFA Soccer World Cup. National and city governments saw this as an opportunity to invest in urban public transport and attend to some of the service problems in the minibus sector. BRT was selected as the tool to do so, based on the perceived success of this public transport technology in Colombian and Brazilian cities. The national government earmarked South Africa's 12 largest cities and six other densely populated areas for BRT introduction, and the National Treasury created a new capital grant to support these local authorities to do so.

City governments planned for BRT to fill missing links in, or the absence of, mass rail services, over and above contractual event transport obligations to FIFA. Local authorities together with the National Department of Transport also saw the potential to consolidate conventional bus and minibus operations into new BRT operating entities; operating deficit subsidies that would previously have gone to trains and buses were to be reassigned to the new operations. System

planners furthermore hoped that modern and rapid public transport would attract car drivers, adding a new fare revenue stream.²

Today the country's BRT ambitions are largely unfulfilled. In 14 years, only two cities have been able to install BRT operations that can lay claim to being 'networks': Cape Town's MyCiTi system, with about 66,000 daily passengers, and Rea Vaya in Johannesburg with an estimated daily ridership of 55,000. George (a small city in the same province as Cape Town) together with the provincial government developed a new quality bus network – GoGeorge – instead of BRT. It accommodates around 14,000 daily passenger trips.

Amongst the other cities, some authorities have yet to move from planning to implementation, a few have embarked on construction or

2 See Van Ryneveld's 2018 report, *Urban transport analysis for the urbanisation review*. It is one of a number of informative reports on urban issues commissioned by the Cities Support Programme in the National Treasury, available at <https://csp.treasury.gov.za/>.

procurement but with no operations, while three have fledgling routes that are running (Ekurhuleni, Nelson Mandela Bay, Tshwane).

eThekweni, the municipality in which Durban is located, made some progress with Go!Durban BRT construction and in late 2018 launched a minibus service improvement scheme to prime such operators to form BRT companies. By mid-2019, it appeared the project had collapsed and the municipality had to return funds it had received from the national government due to lack of progress. The municipal mayor, a key project supporter, was also fired from her position in 2019 due to fraud allegations.

In Cape Town, by the end of 2018, the three key public figureheads of MyCiTi project for most of the 2010 decade left or were pushed out of their positions. They were the bureaucratic and political heads of the transport division as well as the city's mayor.

Besides the eThekweni and Cape Town examples, BRT projects in general have encountered some or other challenge affecting their viability and sustainability. This includes lack of local public transport planning expertise, poor financial management and uncooperative incumbent public transport operators.

Minibus owners and workers have not willingly participated in the BRT programme, with many of their minibus sector rights protected by law. The national grant funds have proved crucial to buying out minibus business to stimulate the industry's participation in BRT. Such buy-outs are, however, not sustainable in the long run.

BRT operational financial modelling before implementation also proved to be problematic. This is reflected in actual revenue: MyCiTi's fare income as a proportion of bus operating costs is just over 40%. In Rea Vaya's case, this figure is around 35%, with Tshwane in third place at about 10%. Since bus and rail subsidies have not been reallocated, municipalities have had to find money for BRT revenue shortfalls where previously they had few public transport funding duties.

The promise of BRT as a saviour technology has been oversold, it seems, but there have been positive impacts as well. A discourse around public transport reform, and the role of local government in it, has taken root. A key BRT cha-

racteristic – dedicated travel infrastructure – has demonstrated a way to boost public transport and bypass congestion. The country now has a cohort of planners, engineers and organisational specialists with on-the-job experience in public transport development. City dwellers fortunate to be near one of the scattered BRT services benefit from a new subsidised travel option.

The minibus industry has had a few wins too. It remains the dominant supplier of urban mass transport, helped along particularly by the rapid decline of rail services. Many minibus owners have benefitted financially from the buy-out deals to incorporate them in BRT. Limited law enforcement capacity also means that many of their minibuses are back on the road, competing with the new systems that were supposed to replace them. As awareness of the need for better urban public transport spreads, people in academia and the public and private sectors are looking into ways in which minibus services can be improved in situ rather than through wholesale replacement.

What, then, is the legacy that BRT might leave in relation to urban form, income divisions, and automobile-centricity in South Africa?

Its potential to affect how the country's cities grow is limited; BRT implementation has been too slow to respond meaningfully to urban expansion. As a tool to address socio-economic divides in urban South Africa, its limited geographic scale similarly means that it is unable to cut across the many poor/rich divides. The limited pace and extent of implementation means that travel time benefits compared to private cars only accrue where there is BRT services and in peak travel times. This is not enough to get people out of automobiles, let alone those who have enough money not to worry about the cost of car ownership and use.

Is BRT ultimately a form of new mobility? Hypothetically it might be, but in practice this has not been the experience in South Africa. It seems increasingly likely that new mobility possibilities will, rather, emerge in and around the hyper-competitive minibus sector that is so ubiquitous not only in South Africa, but indeed across the African continent.

Seeing mobility from the urban South

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Musana glances at the clock dials blinking sluggishly on the screen of his new Samsung smartphone. He realizes that he will not make it in time for work. He has just been forced to change from a matatu minibus to an Uber taxi to try and beat the traffic. Unfortunately, the Uber has also been caught up in a traffic jam. He quickly reaches out to his back pocket, draws out his old and battered leather wallet and picks out a brand new crisp bill which he hands to the driver. The driver duly takes the note. Before he even completes offering a word of thanks to his generous passenger, Musana is out and running towards a boda-boda motorcycle taxi stage. He quickly negotiates with one of several riders, jumps onto the back of the motorcycle and off they go, leaving a trail of dust in their wake as the rider maneuvers his passenger expertly through the traffic.

Without a doubt, the above fictional vignette is emblematic of the mobility experiences as encountered by the largest proportion of urbanites in African cities such as Kampala, Kigali, Nairobi, Lagos or Accra (Evans, O'Brien and Ch, 2018; Goodfellow and Titeca, 2012; Kumar, 2011; Tuffour and Appiagyei, 2014). These encounters depict the highly complex materiality of heterogeneity, interdependence, negotiation, value and risk trade-offs, conflict and multi-functionality that underpin mobility infrastructures in the global South. Such infrastructures are unequivocally the quintessential substrate upon which life and, by extension, livelihoods for the majority in Southern cities are made possible and productive. The different actors featured in this vignette, from Musana (the commuter), the Uber driver, the *boda-boda* operator to the *matatu* minibus operators are all important nodes that influence

the spatio-temporal modalities behind these “informal” mobility infrastructures. In this brief article, I draw from my experiences of Kampala, where I live and work, to identify several important features of its “informal” mobility infrastructures which, on deeper reflection, point to the existence of a very complex organism by way of how its constitutive elements are ordered and how they operate. Apart from offering a novel approach of seeing mobility infrastructures in cities such as Kampala, these reflections also challenge us to find alternative ways of engaging with them theoretically since they remain essential components of the urban mosaic in the global South.

THE COMPLEX GEOGRAPHIES OF URBAN MOBILITY IN THE GLOBAL SOUTH

With the urbanization and environmental change nexus dominating the global development discourse, issues such as mobility have come under increased scrutiny. In many cities of the global South, mobility is largely dependent on “informal” infrastructures. However, such infrastructures have often been labeled as “messy” or the antithesis of “modernity” when seen through the lens of the global North. Such categorizations are strongly rooted in the perceptions that these infrastructures are “inefficient, low quality, harbingers of crime and urban disorder”. Most research on these infrastructures and other accounts has been largely deconstructive, giving more emphasis to their deficiencies while obscuring their inherently complex geographies. As such, we have been presented with only a partial understanding of the character of urban mobility unfolding in Southern cities. From a critical perspective though, informal mobility infrastructures in Southern cities are not just mere by-products of the spatial (re)production processes therein. On the contrary, they are constituent elements that are heavily implicated in the way urban space itself is configured, negotiated, contested and experienced by multiple actors, how socio-technological innovation unfolds and economic opportunities are harnessed especially by the urban poor. They make cities work for the majority who live in them by meeting mobility needs especially where deeply politicized,

dysfunctional and resource-constrained city governments cannot deliver the more “desirable and modern” centralized mobility infrastructure.

HETEROGENEOUS AND INTERDEPENDENT MOBILITY OPTIONS CHARACTERIZED BY MULTI-ACTOR INTERACTIONS

In many Southern cities, multiple actors operate in a sector that entails an eclectic and diverse mix of mobility options. As presented earlier, cities such as Kampala in the global South are heavily dependent on such a heterogeneous range of options to meet the daily mobility needs of their residents. The absence of a public transport system implies that more than 60 percent of the city’s population are reliant on these options to access work, public services (education, healthcare, etc.) and meet other daily needs. The character of the city’s mobility infrastructure bears striking semblance to other similar-sized regional cities in the region such as Dar es Salaam, Kigali and Nairobi. Urban commuters can choose from a variety of options which include the boda-boda motorcycle taxis, the 14-seater minibus taxis (commonly known as matatus), 30 to 40-seater medium- and larger-sized buses, and walking.

Over the years, the matatu minibuses have gradually become the dominant mode of transport upon which intra-urban mobility in cities such as Kampala is so highly dependent. The larger buses are mostly deployed for longer inter-urban trips. On the other hand, the ubiquitous boda-boda motorcycle taxis exemplify local entrepreneurship, innovation and ingenuity to respond to rising demand for more efficient and affordable urban mobility options aside from the above. The boda-boda taxis rank highest in terms of spatial penetration, with over 150,000 currently estimated to be operating in Kampala alone. The entry of formalized private transport service firms such as SafeBoda, Bolt (formerly Taxify) and Uber, which are employing smartphone applications, has added another layer of complexity to this particular mode. Although walking is often overlooked, it accounts for more than 50 percent of the daily work-related trips

made in Kampala. However, there is a dearth of information on their exact patterns and other dynamics. All these infrastructures operate on the city’s vast road network which is mostly a hybrid of “organic”, unregulated development that has proliferated over the last 30 years along the periphery and a colonially-planned central core.

The above mix of mobility options enrolls multiple actors interacting across various scales (micro to macro) through intricate informal-formal working arrangements which are predicated on mutual collaboration and cooperation towards meeting both converging and divergent interests. These include visible and invisible actors, ranging from the transport users/passengers, taxi drivers, conductors, taxi stage managers, taxi stage brokers/touts, motorcycle operators, taxi drivers’ and operators’ associations, private formal transport service firm and vehicle parts entrepreneurs to public bodies such as the city government and the traffic police, among other more peripheral sector actors. In mediating urban mobility, the city’s mobility infrastructures are acting as conjunction points for the above sets of actors. These different actors intersect through constantly shifting interactions, producing a social composite of interlinked human networks conceptualized by Simone (2004) as “people as infrastructure”. The uneven contours of urban mobility in Southern cities are very much a consequence of these complex human-environment interactions unfolding at various scales. Contrary to previous perceptions of such infrastructures as “messy”, they have evolved into fairly cohesive configurations of highly interconnected, semi-autonomous, differentiated and inter/codependent elements. They are also imbued by multi-functionality and cross-synergies while concurrently presenting immense urban socio-economic planning and management challenges.

OPPORTUNITIES AND RISKS

Without a doubt, the mobility infrastructures in cities such as Kampala are playing a crucial role in enabling greater urban mobility. In fulfilling this function, they present a wide range of socio-economic and environmental opportunities. These



include opportunities for employment through various forward and backward sector linkages. They are also sites for innovation and experimentation with sustainable technologies such as the Zembo electric motorcycles and smartphone applications. Seen this way, they present immense opportunities for harnessing and promoting local creative thinking and problem-solving ingenuity. Needless to say, the sector also presents a potentially lucrative, non-traditional source of revenue for the city government. Nonetheless, these infrastructures also come with serious public health and environmental risks in form of accidents, pollution and other challenges such as violence and crime, issues which have traditionally tended to overshadow their critical role as enablers of urban mobility.

FROM SURVIVAL TO DISRUPTIVE INFRASTRUCTURES

Looking critically at the growth trajectory of Kampala's mobility infrastructures over the past 30 years, they have ostensibly evolved into what can be conceptualized as survival, emergent and disruptive infrastructures. Clearly, these infrastructures started out largely as one of many survival strategies by poor urban dwellers in response to the devastating impacts of externally imposed neoliberal economic restructuring during the late 1980s and early 1990s. The absence of viable, affordable and reliable mobility options after the resulting socio-economic convulsions opened up extensive service deficits which were, in turn, exploited as opportunities by different actors to provide alternative solutions. Informal mobility options such as the boda-boda and matatu taxis rapidly penetrated the urban transport sector, facilitated by largely

ad hoc informal, self-organizing processes. Needless to say, they operated in a "grey area" along the margins of illegality as stand-alone or competing entities. Typically, these infrastructures exhibited a provisional, organic and incoherent form. Nevertheless, they made life possible for many city residents seeking better opportunities to enhance their livelihoods, while concurrently playing the role of "spatial anchors" for the marginalized to stake their claim and right to the city.

After operating mostly as instruments of "survival" for a long time, Kampala's informal mobility infrastructures appear to have transitioned into a more integrated, self-organized composite. After operating for more than three decades, they have evolved into what Goldstein and McKelvey (1999) refer to as "[...] novel and coherent structures, patterns, and properties during the process of self-organization in complex systems". The boda-boda motorcycle and matatu taxis are exemplars of the novelty of local ingenuity and innovation. Together, the collective of informal mobility infrastructures has been transformed into a self-integrated and highly complex organism, where the symbiotic interactions between different modes (boda-boda, matatu, larger buses and others) have created a higher-level, more dynamic and synchronized unit. From a social, economic, environmental and planning perspective, the impact of these infrastructures has been nothing short of disruptive. They have inadvertently challenged the notion that only large, state monopolies or state-sanctioned private entities can provide mobility services. Inadvertently, they are forcing a rethink of traditional urban transport governance and management approaches. By enabling the deployment of new socio-technological infrastructures such as

ride-hailing apps and mobile money to support service provision, these informal mobility infrastructures are also presenting new, unforeseen challenges. Along with the need to meet the ever-changing needs of a highly mobile urban population, these infrastructures are very unpredictable, presenting various social, economic, political and environmental risks that we might not be able to fully comprehend today.

CONCLUSION

Placing the short vignette from the introduction within context, it becomes evident that underneath and beyond the mundane routines around the boda-boda and matatu taxis or newer innovations like Uber, informal mobility infrastructures are highly multifaceted and dynamic socio-technological phenomena upon which daily life is ordered and experienced in Southern cities such as Kampala. The combination of such a diverse range of infrastructures is creating a highly complex mosaic of socio-materialities, which demand to be approached as the “norm” of how such cities work rather than being approached through the lens of Northern “modernity” or “how they fail” as has been alternatively portrayed. To better understand such unfolding complexity, we need alternative, radical, creative, flexible and innovative ways to generate more nuanced insights into mobility in Southern cities, in concert with the already growing body of work by a burgeoning group of Southern scholars and practitioners. With such alternative ways of “seeing” into how these infrastructures shape urban mobility and, ultimately, impact how urbanites access opportunities to improve their livelihoods, these infrastructures can potentially open up additional interesting questions – practical and theoretical – about the form of mobility emerging in Southern cities. It is hoped that these new questions will trigger new thinking and deeper reflection to inject the much-needed impetus for widening theoretical and conceptual engagement with Southern cities altogether.

Urban mobility under influence: Trends and prospects for the digitization of mobility services in Africa

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The spread of mobile information and communication technologies (ICTs) in general and smartphones in particular is a global phenomenon that could see many developing countries leapfrogging to the type of technology and level of penetration observed in developed countries within just a few decades. Yet, the question of whether this process will yield similar outcomes in developing and developed countries in terms of the transformation of mobility behaviors, services and policy-making remains open for discussion. Besides, special precautions should be taken to refine the understanding of urban mobility systems in developing countries, and to acknowledge the diversity of local situations in terms of demographics, urban form, but also political stability, economic dynamism, regulatory capacity, ICT diffusion, etc.

As of 2020, one in six human beings live in Africa (1.3 billion people, up from 273 million in 1960) and 43% of them live in cities (18% in 1960). Africa is undergoing rapid change, not only in terms of demography and urban development, but also in the adoption and use of ICTs. The mobile penetration rate reached 68% of the population in North Africa and 44% in sub-Saharan Africa in 2018, up from respectively 48% and 36% only five years earlier. Digital technologies are accelerating change in a broad range of social practices and services, especially in fi-

nance, commerce, social networks and health, and progressively in education, agriculture and mobility. In the past decade, the continent has seen the emergence of indigenous digital platforms, some of which have emerged as leaders on the continent, such as Jumia (Nigeria) for e-commerce. The speed and scale of demographic and urban change on the African continent, coupled with the economic and social transformations brought about by the rapid development of information and communication technologies (ICTs), are echoed in the changes taking place in the mobility systems of African cities.

THE DIGITAL TRANSFORMATION OF PARATRANSIT SERVICES

For several decades now, paratransit services (including taxis, motorcycle taxis, shared taxis, minibus taxis and on-demand transport services) have been on the rise in most African cities. They now often make a majority share of daily mobility. They have gradually become entrenched in the urban landscapes and local cultures and have given rise to new transport locations – including bus stations, end of line “garages”, intermediate stops and car washes – and new social practices, such as joyriding onboard matatu minibuses in Nairobi. They have taken on a variety of shapes: from motorcycle taxis (*boda-boda* in Nairobi, Kampala or Dar es Salaam; *jakarta* in Dakar; *okada* in Lagos or Accra; *zemidjan* in Cotonou or Lomé) to mini- or midibuses (*car rapide* / *ndiaga ndiaye* / AFTU in Dakar; *combi* / minibus-taxi in Cape Town; *dala-dala* in Dar es Salaam; *danfo* in Lagos; *duruni* / *sotrama* in Bamako; *faba-faba* in Niamey; *gbaka* in Abidjan; *matatu* in Nairobi or Kampala; *tro-tro* in Accra; *wuyeyet* in Addis Ababa), and include three-wheeler taxis (*bajaj* in Addis Ababa; *saloni* in Abidjan) or private cars used as taxis or shared taxis (*amapelha* in Cape Town; *clando* in Dakar; “red head” taxi in Niamey; *wôrô-wôrô* in Abidjan). Although they are criticized for their part in the decline of public transit services, in worsening traffic congestion, in poor safety conditions – on the road and onboard vehicles – and in occasional violence, paratransit services are increasingly acknowledged for their role as “gap fillers”, providing service to areas and populations that would otherwise be

deprived. They offer both time flexibility (departures without fixed schedules, variable peak and off-peak frequencies) and spatial flexibility (no fixed routes or no fixed stops along routes, variable peak and off-peak routes, ability to serve peripheral areas and informal settlements). Besides, paratransit services are a major employment sector in many African cities (providing jobs and revenues for drivers, driver mates, repair/maintenance technicians, owners, etc.) and one of the main employment sectors for African youth.

The experience of the past decade suggests that African cities provide fertile ground for the digital transformation of mobility in general and paratransit services in particular. Illustrations of how ICTs are transforming paratransit operations include the use of mobile payment in ride-hailing services in Kenya, the introduction of digital meters for motorcycle taxis in Kigali, or yet the provision of Wi-Fi internet connection onboard minibuses in Nairobi or Abidjan. The digitization of informal or semi-formal transport networks by minibus is another example, as illustrated by initiatives to map paratransit services in Nairobi (project Digital Matatus), Dhaka (project Share My Bus Dhaka), Accra (project Accra Mobility), Kampala or Maputo (project Mapa dos Chapas). Such paratransit maps have paved the way for the development of the first route planning tools to include paratransit services, e.g. in Kampala, Nairobi, etc. Mobile ICTs also offer opportunities to improve the quality of service perceived by paratransit users through real-time information, especially regarding safety and reliability. ICT-based crowdsourcing has been used in Nairobi to provide real-time information to paratransit users on traffic conditions and road accidents. A partnership with the National Transport Safety Agency (NTSA) and the Nairobi City Council has even enabled the crowdsourcing platform to report reckless driving behavior of matatu drivers in real time. Another crowdsourcing smartphone application has developed in Dakar for real-time information on the location of transit buses.

THE GROWING ROLE OF ON-DEMAND SERVICES

On top of modernizing and optimizing traditional paratransit services, mobile ICTs have also triggered the development of new on-demand services provided by digital mobility platforms – international or native to the African continent. International platforms were the first to develop digital on-demand services in African cities (starting with Uber in 2014 in Johannesburg). By mid-2017, Uber was operating services in 16 African cities, including 13 in sub-Saharan Africa. As of 2020, Uber operates services in 25 African cities, including 16 in sub-Saharan Africa (Abidjan, Abuja, Accra, Cape Town, Dar es Salaam, Durban, East London, Gulu, Johannesburg, Kampala, Kumasi, Lagos, Mombasa, Nairobi, Port Elizabeth, Pretoria). Recent observations show a proliferation of digital platforms in African cities. As of May 2019, 47 digital mobility platforms with more than 10,000 downloads on Google Play were present on the African continent (8 international platforms, 39 local platforms). Among the 12 platforms with more than 100,000 downloads, 5 were international platforms (Bolt from Estonia, Careem from the United Arab Emirates, Heetch from France, Uber from the United States and Yango from Russia) and 7 were local platforms (GoZem from Togo, Little Cab from Kenya, Oga Taxi from Nigeria, SafeBoda from Uganda, Swvl from Egypt, tem:tem and Yassir from Algeria). International platforms tend to anchor their development in large metropolises with relative economic and political stability. Local platforms tend to launch services in one or several cities in their home country before extending to neighboring countries (e.g. Oga Taxi, Swvl). The proliferation of digital platforms may entail risks, both for the players in the sector (risk of bankruptcy, hostile takeover), for the individuals involved in the production of these services (risk of downward pressure on drivers' incomes), for customers (risk of fierce competition to the detriment of reliability or safety), and for other players in the transport sector (risk of unfair competition with regulated taxi and public transport services). The arrival of these platforms in the urban mobility landscape in Africa is still a recent phenomenon. These platforms reinforce the supply of paratransit services,

but the nature of their interactions with more traditional modes of transport is unclear yet. Further analysis of demand will be needed to assess whether such platforms will come as a complement to traditional paratransit services (e.g. for more affluent customers), as direct competition, or yet as a substitute in the long term.

Adaptation to local contexts will have a major impact on the effective potential of ICTs to transform urban mobility systems in African cities. One example of adaptation to local context has been the development of USSD- and SMS-based services (for mobility-related information, booking, payment, etc.) instead of, or in addition to, mobile Internet and apps. Whether such low-tech (or low-cost technology) solutions are just a transitory palliative for lack of a better solution, or whether they provide significant advantages that are bound to endure and could be exploited in other contexts, remains to be assessed. In any case, low-cost technology solutions may offer major prospects for improving the level of service of transit and paratransit services for many in cities where cost (of devices, data, etc.) is still a sensitive issue.

The question remains as to whether ICTs will help African cities build mobility trajectories that are more in line with the environmental as well as social objectives of sustainable development. Further research would be needed into the overall equity and accessibility impacts of such technologies, especially as regards the special nature, forms and impacts of the "digital divide" on access to mobility services in African cities. More research would also be needed into the potential direct and indirect contributions of ICT-enabled mobility solutions to sustainable mobility transitions. It has been suggested that ICT-based solutions could play a major role in modernizing paratransit services and maintaining their presence as an integral part of urban mobility systems, alongside transit services, in the decades to come. Whether this opportunity will materialize and open up alternative mobility pathways for African and other developing world cities, by combating the rapid growth in private car ownership, remains an open question.



In Kampala's Central Business District, 2019



Campaign for the mobile technology company Africell, Kampala - Uganda, 2019

Can African cities transition to sustainable modes?

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In a continent that has 54 countries, 30 million sq km of land mass and about 1.3 billion today (with about 500 million of them in cities), this would not be a challenge if the demographic bomb were not ticking away as it is now. Besides Africa can take consolation – for now – from India hosting the same population today with just 10 percent of Africa's landmass at 3.3 million sq km.

Megacities with a population of over 10 million are sprouting across Africa. There are already 7 megacities in the continent, careening at 20 million and over. Luanda in Angola, Dar es Salaam in Tanzania and Johannesburg in South Africa will host 10 million by 2030. Abidjan in Côte d'Ivoire and Nairobi in Kenya will surpass 10 million by 2040. And by 2050, Ouagadougou in Burkina Faso, Addis Ababa in Ethiopia, Bamako in Mali, Dakar in Senegal and Ibadan and Kano in Nigeria will join the double-digit ranks. Kampala is threatening to reach the 10 million mark in the 2020s, from its current 4 million. The number of people living in urban areas in Africa will double to more than 1 billion by 2040 by every studied estimate.

What is redeeming is that poverty and the conspicuous lack of a middle class has kept consumption low. For a continent with 1 billion inhabitants, it only occupies 1% of global new car sales. What are solutions that will make the transition to a sustainable built environment possible? What is the role of the government and of urban local bodies?

Energy is at the heart of all things whether it

is water, waste management, mobility, lighting or cooling. Transportation will see a revolution that will be market-led and is a key issue for low-carbon cities. Can city infrastructure walk the same market-led and technology-driven trail for people to have easy access to solutions for clean water and energy?

The workshops of Les Ateliers, in Kampala and other African cities, highlight that the awareness and the understanding of the sustainable challenge is well established. These cities need an effective sizing of the challenge with a demonstration of sustainable, available and transformative technologies and solutions for reducing or optimising demand from centralised sources for energy and water that they and their people can adopt without intervention from the government.

CONTEXT AND KEY LINK

Unpredictable global temperatures and weather patterns suggest we are living through a time of momentous and tumultuous environmental change. Compounding these climate change-induced disasters is the exponential demand for water and energy in cities, in agriculture and industry. The various regions of this vast continent are besieged with unprecedented rains that render millions of citizens homeless. At the other extreme in these regions is water shortages due to lack of rain compounded by the gradual drying-up of a city's underground water sources. The need for developing and implementing integrated, holistic programmes for optimising the use of water and energy at scale is thus imperative and urgent.

The link and interdependence between water and energy is the key. Getting on top of this will allow communities and neighbourhoods in Kampala or other such cities in the continent to beat the challenge with localised solutions for kitchen energy, local street lighting and home lighting with solar rooftop solutions that last 20 years and come at costs that are recovered in less than 4 years at current power tariffs, turning waste water into health-grade drinking water [India and China are doing it on a large scale and Africa can learn without the cost of innovating], localising city garbage disposal with Waste-to-Energy plants...

there are many solutions that industry and entrepreneurs can be groomed into taking up. The governments' acceptance is needed to agree to drop centralised public spending and let people shape their everyday lives with technology and market-led strategies and interventions.

The challenge appears to be daunting to make such a transition to a green and clean lifestyle for citizens of these large African cities, but a modest start with these questions being raised and resolved will help:

What are water and energy footprints in industry, in transportation, in urban buildings and on farms?

How can we reduce water and energy usage while advancing resilience? What are the key transformative technologies that advance optimal use and management of water and energy? How can one harness the potential of public-private partnerships and consortiums to develop, test, validate and demonstrate water-energy solutions involving communities?

In African cities, where the doubling of population is occurring in nearly every one of the first 100 cities in these 54 nations, the need for energy – domestic, commercial and industrial – as global investors eye with interest the GDP surge at 4–6 per cent, will sharply rise. Even if hydroelectricity is currently overproduced in Eastern Africa countries, will some other countries turn for hydel and nuclear and coal-based thermal power solutions that will aggravate climate change challenges? Solar potential is still seeing just the tip of the iceberg, with technology that has already dropped prices by 90 per cent in the decade of the 2010s.

A COMBINATION OF MULTI-STAKEHOLDERS' WORK AND SYNERGIES

Energy efficiency is a priority issue of every African city. For every 5 megawatts of power production, just one 'negawatt' of savings is needed. This means distribution-side reforms in the power sector, and energy efficiency measures for all commercial buildings, hotels, and residential apartments have to become everybody's business. Green ratings for buildings and for products have to be initiated across Africa in the urban sector with guidelines for lighting

and pump efficiency, central air-conditioning, rooftop water harvesting, waste water treatment, rooftop solar systems versus off-grid solar farms which are capital-intensive, transformer efficiencies with power quality monitoring devices that track power factor, and harmonic distortions. It is a combination of work and synergies by the water and power utilities, and by end-users. Urban local bodies like the Kampala Capital City Authority have to bring in mandates where necessary, while outreach campaigns must mobilise voluntary compliance in individual and self-interest.

To begin with, a chosen city has to launch a water-energy programme that city authorities take up to implement and demonstrate transformative solutions with market-driven consortia which optimise energy and water use while advancing water and energy security, in select water-stressed and energy-impaired regions of the country.

One of the cities, Kampala or any other that Les Ateliers has studied extensively, should serve as a model with possibilities of scale and replication proven over the first series of installations. Central to such a programme would be the creation of institutional alliances or consortia between the cities' enterprises, community, university / academia, R&D centres, civil society, financial institutions and governments to partner, design, develop and commercialise Water-Energy technologies and solutions, build human and institutional capacity and inform government policy. It should lead to design, development and implementation of pilot demonstration projects in the nexus of water with energy and food. This is the way to transition cities to SBE practices and reach SDG.

Energy for water and Water for energy – both tightly interconnected through the water-energy nexus – have been relatively under-explored. In particular, the end-use segments (where energy is used for various water-related purposes within industrial facilities, in agriculture and in buildings) have been identified to have among the highest energy and carbon-emission intensity in many regions of the developing world and thus present attractive options to advance energy and water end-use efficiency.

Enable e-mobility adoption by decoupling usage and investment

Etienne Saint-Sernin

Energy engineer, Co-Founder of Zembo

Millions of motorcycle taxi drivers are active in sub-Saharan Africa. This is a revenue-generating activity for young people and their families and an affordable transport solution for low-income people, adapted to African roads and often the single available solution. The problem is that the driver spends a lot of money in renting his vehicle and buying fuel, putting a strain on his revenues. In addition, this activity causes high environmental pollution, both local and global.

While renewable energies are profitable and offer lower total cost of ownership (TCO) for users, they necessitate higher investment. That's why financing solutions have been built: energy-as-a-service models split investment and usage, both on the large (power plant) and small scale (PayGo SHS¹).

In the transport sector, electric mobility is part of the climate change response. As renewable energies require higher investment from the user (mostly the battery cost) while enabling cheaper operational costs and TCO (already true vs. fuel), a third party should invest in batteries and invent battery-as-a-service models. This would reduce both investment and risk for the user by transferring the supply and maintenance of batteries to a specialized entity able to assess the battery quality and optimize its cost, lifetime, second life and recycling.

This is especially required in developing countries where users' investment capacity is usually low, limiting the adoption of climate-compatible and cheaper solutions. Its impact can even be

enhanced with battery-swap services, solving additional issues for the user (no waiting time) and the infrastructure (lower power and storage capacity).

New operators are coming-up as solar-recharged electric motorcycle taxis are becoming more widespread in Africa and provide two complementary activities:

- › The leasing (rent-to-own) of electric motorcycles to taxi drivers, enabling drivers to become owners;
- › The supplying of fully charged batteries through a network of swapping stations – drivers do not take the risk of purchasing a battery and always have a place to swap their depleted battery for a fully charged one within a minute.

The advantages of our electric solution are the following:

- › Improvement of drivers' revenues (both the motorcycle and the energy per km are cheaper per day)
- › Environmentally clean solution (lowering CO₂ particle emissions and noise)

After a successful pilot in Uganda, Zembo launched its commercial stage and operates charging stations in Kampala with the objective to reach 2,000 vehicles in 2020.



Zembo's electric motorcycle taxis and one of the Kampala's solar recharge stations

1 Pay-As-You-Go Solar Home System for domestic usage

les ateliers

maîtrise d'œuvre urbaine

Les Ateliers is a non-profit association created in 1982. Initially aimed at students and young professionals, it is today an international network of both new and experienced professionals, academics and decision-makers tied to the field of urban development. Since 2005, the association has been organizing workshops focused on the practice of urban planning and envisaged as spaces for collective design and creativity. In France and elsewhere, these workshops provide project managers with an international perspective and illustrated proposals for their territorial strategies and urban development projects. By bringing together different professions and cultures, they also serve as an opportunity to challenge traditional notions of learning and exchange at the highest levels.

LES ATELIERS IN AFRICA

2020 SAN PEDRO, CÔTE D'IVOIRE

De la cité portuaire à la métropole côtière

2019 KAMPALA, OUGANDA

Green and Innovative Kampala

2018 OUAGADOUGOU, BURKINA FASO

Ouagadougou 2050, Vivre le quotidien à l'échelle du Grand territoire

2018 OUARZAZATE, MAROC

Le grand Ouarzazate, une ville oasienne du XXI^e siècle

2018 BANGUI, REPUBLIQUE CENTRAFRICAINE

De l'urbanité des Kodoros à la dynamique du grand territoire

2017 PORTO-NOVO, BÉNIN

Révéler les défis de Porto-Novo, Capitale Africaine du XXI^e siècle

2016 DOUALA, CAMEROUN

Douala ô Mulema : Entre infrastructure et stratégie métropolitaine, quelle place pour le projet urbain ?

2014 NOUAKCHOTT, MAURITANIE

Nouakchott, l'avenir pour défi : Adaptation et mutation d'une ville vulnérable

2014 BAMAKO, MALI

Atelier de stratégie opérationnelle sur la vision Bamako 2030

2013 DOUALA, CAMEROUN

Douala, «ville assemblée»

2012 THIÈS, SÉNÉGAL

Thiès, ville carrefour

2012 PORTO-NOVO, BÉNIN

Ecosystème et développement urbain

2011 BAMAKO, MALI

Les nouvelles centralités de la métropole de Bamako

2011 PORTO-NOVO, BÉNIN

Stratégie et projets d'aménagement pour le Centre-Ville Ouest de Porto-Novo

2010 SAINT-LOUIS, SENEGAL

Saint-Louis 2030, nouvelle métropole africaine

2010 PORTO-NOVO, BÉNIN

Un nouveau quartier en bordure de lagune

2009 PORTO-NOVO, BÉNIN

L'aménagement des berges de la lagune

2006 CASABLANCA, MAROC

Le grand projet urbain de Casablanca

2005 PORTO-NOVO, BÉNIN

Identité et développement d'une capitale africaine du 21^e siècle
