Case Study Paper

Planning Transit Oriented Development (TOD) in an African City Facing Rapid and Informal Urban Growth

The Case of the Urban Mobility Plan of Conakry, Guinea

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Abstract

Originally planned at the extremity of a peninsula, the capital of Guinea has faced a continuous demographic and spatial growth during the last decades, marked by insufficient actions in terms of planning regulations.

Surrounded by the Atlantic Ocean and vast areas of mangroves, Conakry forms a linear and narrow agglomeration of 40 kilometres long spreading on its peninsula. Its current population of 2.5 million inhabitants is projected to reach more than 5 million people by 2040, while its spatial growth has already reached its natural limits. Many of the informal settlements that characterize the urban structure of Conakry suffer from poor accessibility and from one of the lowest urban densities of street networks observed in Africa. Started in 2017, the Urban Mobility Plan of Conakry (EU funded program to national transport sector), has targeted the strategic and operational planning of a multimodal public transport network combined with a healthier and decentralized urban development model.

Marked by a constrained spatial growth and a unique but underused railway infrastructure originally built for mining transport, Conakry brings a rare opportunity of transit-oriented development application in a context of informal urbanization, associating BRT and railway, pedestrian accessibility and road safety with polycentric redevelopment.

The lack of urban governance and planning culture in Conakry makes many synergies between transport and land use invisible to the eyes of local decision-makers. Responding to the lack of urban development strategy and land use control, the Urban Mobility Plan of the Guinean capital came along with multiple short-term actions and decision-making tools with the aim of starting to implement the plan's orientations through smaller actions and initiatives integrated into larger strategies for the city. The article illustrates the methodology of the Urban Mobility Plan as an operational decision-making tool for Conakry and a strategic investment plan to associate economically viable infrastructure with people-oriented public spaces and accessibility for all.

Keywords

Transit-oriented development; Conakry; Polycentrism; Mass transit; African cities; Multimodal

1. Urban form, (im)mobility and impoverishment

1.1. Conakry, a spatially constrained urban growth for a booming urban population

Since the independence of Guinea, Conakry's urban population has been growing at an annual rate of 6%, with a population reaching 2.5 million in 2017, and its urban area has quintupled in size. The geography of the Guinean capital is marked by specific natural conditions: a narrow peninsula surrounded by the Atlantic Ocean at its extremity and by mangroves and wetlands, that are also the cradle of the halieutic resources of the country.

Urbanization of Conakry hasn't been coupled with economic growth or with coordinated urban policies able to address appropriate response to the demographic growth. Happening along a corridor of three to five kilometres wide, urban sprawl was led in only one direction, in the axis of the peninsula, eventually to be stopped by the Mount Kakoulima.

Figure 1 Drone view of the KM36 intersection, Dubreka

New settlements grew informally mostly along the three main roads connecting Kaloum, the historic centre and port of Conakry, with the rest of the country. Conakry (and its historic centre at the extremity) is not only a capital city but also a major port and logistic hub in Guinea and West Africa, benefiting from two specific railway lines built in the early 20th century to link Mamou, Kankan and the mining activities in Fria. These two railway lines naturally run along the urbanizing peninsula, bringing a critical potential infrastructure for public transport and accessibility to urban settlements. However, such railway has been mainly used for freight trains, at the exception of the recently operated Conakry Express, a passenger train running twice a day between Kaloum and Kagbelen, 34 kilometres away.

1.2. Constrained mobility, inefficient transport system and dramatic lack of accessibility

The importance of Conakry as a logistic hub with its Port and as a main market place in West Africa (market of Madina) attracted most of the efforts and attention in terms of planning and investment to freight traffic and logistic issues. While only three main radial trunks (Fidel Castro urban highway, Le Prince Road and Corniche Nord) are linking the city centre with the rest of the agglomeration, Conakry suffers from one of the lowest densities of urban roads among Africa cities. Primary roads are assuming multiple functions and roles, absorbing linear and informal market places, freight traffic coming from the Port and most of the motorized traffic and pedestrian flows, with almost no pedestrian space to walk on. This situation is amplified by the dramatic lack of secondary roads and paved streets giving accessibility to neighbourhoods, which diverts most of inter-neighbourhood traffic and flows to the primary roads.

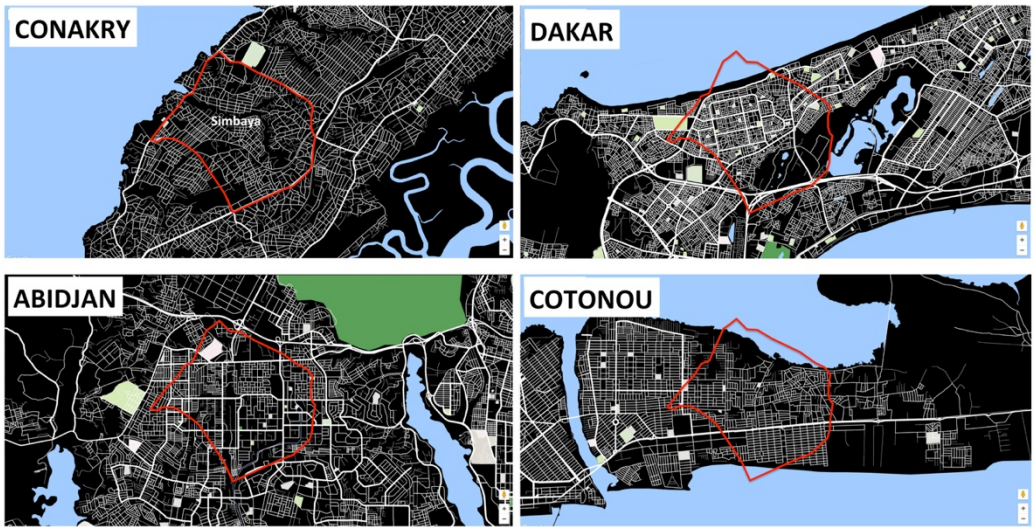

Figure 2 Compared densities of road and street networks in four West African cities

With a city centre located at the extremity of the peninsula and no decentralization policy, commuting trips have constantly increased over the years and have been concentrated on the very few main roads that were never designed for a city and for its people. Public transport, mostly consisting on minibuses called magbanas, shared taxis and taxi-motorcycles offer relatively low-cost services but with poor conditions of transport. Daily commuters face extreme conditions of road unsafety and congestion, most of them spending around 20% of their monthly income to reach their destination.

This lack of accessibility in human conditions leads to the increasing impoverishment of the urban populations and represent one of the main obstacles to a healthy urban development, as accessibility to opportunities for everyone is completely lacking. The urban form of Conakry reinforces this trend, as the fare of the journeys is based on the distance to destination. The more Conakry grows, the more its poverty increases.

2. Planning mobility for Conakry: Where to start?

2.1. The "transit master plan for Conakry", a traditional planning tool facing institutional and urban complexity

In 2017, the transit master plan of Conakry ("Plan de Déplacements Urbains" in French) was initiated and funded by the European Union and its support program to transport infrastructure, at the attention of the Ministries of Transport and of Public Works. In Guinea, urban mobility and transportation are organized and supervised by the national government. The governorate of Conakry still has little capacity to respond to the scale of urban growth's challenges faced by the city. However, the government initiated his Inter-ministerial Committee for Territorial Planning, reuniting 12 ministries. In this context, the transit master plan is at risk to be a technical study without effect. The institutional legitimacy of the plan became therefore an essential factor of success, an issue that led the team to create the Urban Mobility Working Group during the study, including all the stakeholders concerned by transportation in Conakry, and dedicated to become the working group that will implement the future urban transport authority.

In order to respond to urgent mobility issues and to anticipate the future demand and challenges, the plan has been conceived as a holistic mobility plan, targeting priorities according to feasibility with timeframes (2020 to 2040) and to scales and levels of interventions (metropolitan area, district, neighbourhood, street).

One major challenge was to elaborate actions with synergies and mutual benefits between pedestrians, mass transit and other public transport services, transporters syndicates, freight traffic and logistics stakeholders (rail & road). One of the approaches to face this complex patchwork of street/road users and transport stakeholders was to create a decision-making tool that everyone could understand. The mobility plan was therefore translated into an investment plan divided in 5-years periods, including traffic and safety measures at all scales and accompanied by design guidelines. The metropolitan scale of the vision of Conakry for 2040 has been illustrated by a physical model of 5 meters long expressing and synthetizing all the proposed actions for each mobility mode and at each spatial level.

Figure 3 Urban Mobility Plan of Conakry: Five-Year Investment Plan, period 2

2.2. Identifying the major obstacles to mobility and liveability

Eight major obstacles to a sustainable and healthy mobility of populations have been identified in Conakry. These obstacles are to be observed in the perspectives of the

demographic growth of Conakry, constrained geographically by almost no possible spatial growth. While the population of the agglomeration, including Coyah and Dubreka, will exceed 2.8 million in 2020 with an average density of 16,000 inhabitants/sq.km, these numbers are projected to be doubled by 2040. Such population growth also means a young urban population, with more than the half of it under 20 years old. The question of urban densification is more critical in Conakry than in other African cities because of its geographical specificities. Coyah, Dubreka and Kouria might absorb partly this demographic growth, but the major environmental risk is in the gradual urbanisation of the wetlands and mangroves, home to a rich but fragile ecosystem, and also an essential economic (halieutic) resource for the local population.

In this context, the most important obstacles to mobility and to viable city have been addressed:

- Conakry has only one economic and administrative urban centre (Kaloum), and its main market (Madina) is also located at the extremity of the peninsula;
- The density of roads and paved streets is dramatically low and leads all the traffic flows to the main trunk roads;
- Road safety issues are growing proportionally with the rapid urban population growth;
- Informal public transport is inefficient and becomes a source of congestion and unsafety itself;
- Existing road networks cannot allow the implementation of an appropriate public transport system with financial viability;
- The railway infrastructure running through the city is underused for both passengers traffic and freight traffic;
- Urban population density is constantly increasing in settlements that were never conceived to absorb such demographic pressure;
- The urban agglomeration is growing in only one direction, further away from the city centre, increasing the lack of accessibility and the cost of transportation for (sub)urban population.

2.3. Nine key measures to unlock Conakry's urban populations

The complex relation between the lack of planning, hyper-concentration of key economic functions, road safety issues, lack of accessibility to opportunities and impoverishment of local populations required to think beyond transportation and mobility and to anticipate appropriate land use policies. Nine key measures were identified as starting points to develop short to long-term strategies in each sector with a holistic approach:

- **Implement immediate actions** considering current physical conditions and institutional capacity, such as **low-cost interventions** on street rehabilitation in Kaloum, road safety measures, pedestrian space protection and parking management;
- Develop a **multimodal mass transit network** (heavy rail transit + bus rapid transit) using and improving existing infrastructure, adapted to a linear agglomeration of 45 kilometres long;
- **Hierarchise the street networks** of Conakry and address **design guidelines** for each type of axis, including road safety measures, pedestrian accessibility, speed limitations and parking management;
- Create or reconnect **networks of streets and secondary roads**, using existing and unpaved paths;
- Elaborate **holistic traffic plans** for each neighbourhood;
- Elaborate a multi-scale **Pedestrian Master Plan**, introducing the concepts of pedestrian corridors and multifunctional public spaces;
- Shift the majority of **road freight traffic to the railway**, and develop accordingly the **dry port** of Kagbelen, to be combined with the construction of a major market area and urban logistic hub along the railway;
- Plan a **polycentric city relying on TOD**, by decentralizing economic, administrative and logistic functions in 3 metropolitan subcentres and 9 mixed-used hubs and districts;
- Create a **metropolitan transport authority** that will be able to lead a mass transit network project and integrate land use and urban transport policies to achieve transit-oriented development (TOD).

3. The urban form challenge and the TOD approach of accessibility for all

3.1. A multimodal mass transit system using the existing infrastructure

To decentralise Kaloum and Madina's functions and achieve a polycentric city with more spatial equality in accessibility along 45 kilometres of urban settlements, three major metropolitan subcentres were proposed. Koloma would absorb government and ministries offices and administrations, as planned earlier by the national government. Sonfonia would become an urban free trade zone. Kagbelen would see its dry port developed further with enhanced railway infrastructure and logistic facilities, associated to a new primary market district able to gradually deconcentrate the activities in Madina. Every new subcentre operation is associated to affordable housing programs.

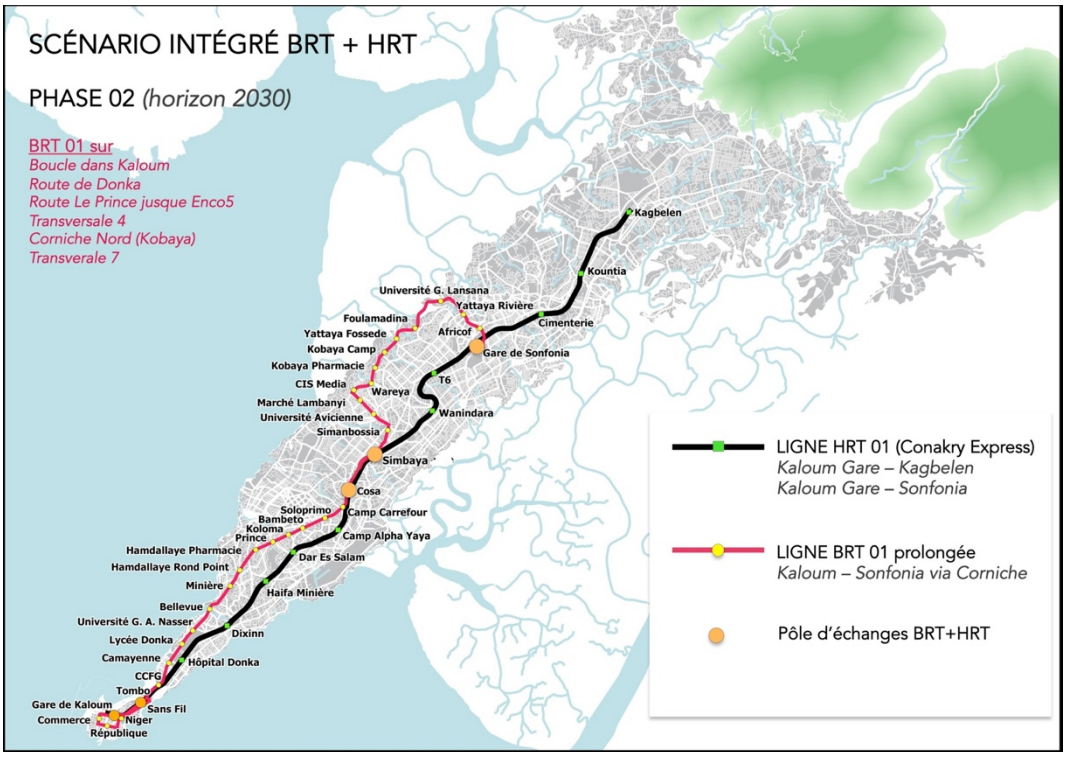

Figure 4 Projected Mass Transit Network (BRT+HRT), Horizon 2030

To make such urban decentralization feasible along one corridor, a multimodal mass transit network has been planned, combining Heavy Rail Transit (HRT) and Bus Rapid Transit (BRT) lines. The mass transit system has been planned and designed to serve most of densely populated areas, markets and potential new developments along the railway infrastructure.

By 2030, the enhanced Conakry Express service (Heavy Rail Transit) is planned to operate with 30 round trips a day between Kaloum and Kagbelen and serve 15 stations along the 34 kilometres of the CBK line. Its fleet of 15 trains (with a capacity of 2400 passengers/train) is planned to ride on a rehabilitated and reinforced infrastructure with two to three railway tracks, combining local and express services with no fare zones in order to respond to the linear urban form and its accessibility issues.

Since the mass transit system responds to a demand oriented to longer distance urban trips, the existing minibuses and shared taxis shift to shorter distance trips with lower fares, and find their spatial and economic synergy with the BRT and the HRT.

The first phases of implementation of the Bus Rapid Transit (BRT) network connect the boulevards of central Kaloum with the district of Ratoma along the Route de Donka, the Route Le Prince and the Corniche Nord along the Northern seafront to reach then the future multimodal hub of Sonfonya railway station. With its 35 kilometres of central bus lanes and 33 closed BRT stations protected from the traffic, the network is planned to operate 450 trips a day with a capacity of 205 passengers per bus and a fleet of 96 biarticulated buses.

Together, the total capacity of the multimodal mass transit system covers 235,000 trips per day and per direction, which represent an annual gain of 1 million ton of CO2 emissions for the mobility in Conakry by 2030. During peak hours, the system will be able to carry 21,500 passengers per hour and per direction.

Within mechanized daily trips, the modal share of public transport is projected to reach 41%, to be compared with the 17% observed by the surveys in 2018.

In 2030, more than 800,000 people will live in a 10 minutes walking distance from the 15 train stations and 33 BRT stations.

Figure 5 Conakry Polycentric Development Plan

3.2. How a mass transit system can improve urban liveability and road safety?

A synergy of 2 different mass transit services has been elaborated to solve various issues of accessibility within the neighbourhoods and slums. The advantage of the railway system (HRT) is that its infrastructure covers dense areas that are isolated from the primary roads. When the HRT network will have been extended to the second existing infrastructure of Conakry (Fria line), it will unlock a dozen of urban and suburban settlements that have suffered from isolation. Nine hundred hectares of lands have also been identified around train stations to develop affordable housing programs, markets, logistic hubs and key metropolitan functions.

Investing in railway infrastructure reinforcement with 2 to 3 railway tracks along the CBK line also means many benefits for the freight traffic since the capacity of the network will be able to absorb both passengers and freight trains. This configuration allows a better financial feasibility and sustainability of the system, as long as the institutional framework's evolution allows such infrastructure to be shared by different operators.

The financial feasibility of the reinforcement of the railway has to be viewed in a wider way if we consider this infrastructure as the future spine of the city. The plan identified it as a major asset that could include 6 meters wide pedestrian and cyclable corridors running along the 57 kilometres of urban railway lines (CBK and Fria lines).

Figure 6 Design guidelines : projected section of the Boulevard Diallo, Kaloum

Developing a BRT network brings a different attention to urban liveability improvement. In the case of Conakry, most of BRT lines have been planned on existing primary roads, currently suffering from congestion and unsafety. The integration of a BRT trunk on a primary road brings the opportunity to create a new urban boulevard associating public spaces, road safety, BRT stations and tree coverage together in the neighbourhoods that have suffered the most of social unrest and traffic accidents, such as Bambeto along the Route Le Prince. In 2018, five important road viaducts projects crossing major road intersections have been planned and funded to increase the capacity of the Route Le Prince to absorb motorized traffic demand.

One of the priorities of the Mobility Plan was to find an agreement on the immediate reconsideration of these planned works and the integration of BRT stations on each flyover.

3.3. Articulate mass transit, urban logistics and TOD

Along the study of the transit master plan of Conakry, it became evident that the logistic activities of Conakry and its Port as well as his market of Madina - one of the largest markets of West Africa - were at the heart of Conakry's transport infrastructure and mobility. Markets in Conakry are the main centres of economic vitality and traditionally spread along major roads, 'where the demand can be met'. This concentrated economic vitality is also source of traffic congestion and road safety issues, as roads have to absorb a vast diversity of pedestrian and motorized traffic flows.

The orientation of the Mobility Plan is to implement logistic hubs for consumer goods along the railway infrastructure, so new markets can be gradually located in safer areas away from the main roads and closer to the new distribution centres. Shifting urban logistics from road to rail represents a major potential transformation for road safety conditions for everyone, but it's also a tool of decentralization of the economic activities in the case of Conakry.

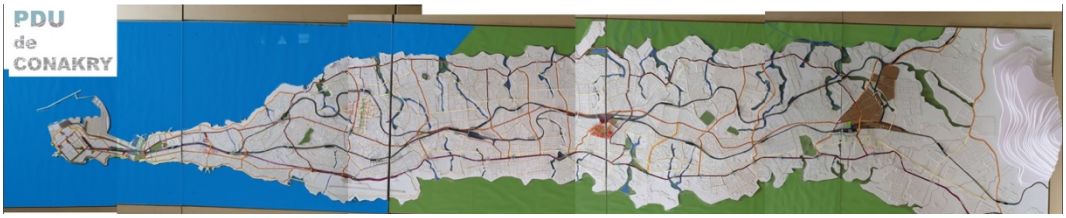

Figure 7 Physical model of Conakry 2040 (1/10,000)

One of the main conditions of the modal shift from road (trucks from the Port to destination such as markets) to rail (freight trains) is to develop the dry port of Kagbelen 35 kilometers away as an important logistic hub, not only for Conakry but also for Guinea. If most of the freight is transferred from the maritime port to the dry port by rail, it pushes away the trucks away from the city. The only way to make it work in terms of urban logistics is to associate the dry port development with a new commercial hub and market area which will benefit from the logistic hub of Kagbelen and its train station. Since Conakry is a "market city" (ville-marché), the combination of a national logistic platform, a commercial district, a major train station, multimodal hub and a new market could lever the polycentric potential of the city and move gradually the centre of gravity of the agglomeration in the centre of the peninsula.

Figure 8 Urban logistics and markets relocation

The strategic plan of Kagbelen area, included in the Mobility Plan, proposes a railway connection to Dubreka, connecting with the Fria railway line to be rehabilitated into a standard gauge track. The outer districts of Dubreka and Coyah wouldn't be suburban anymore but the surroundings of a major and accessible metropolitan subcentre. Sonfonia would benefit itself from its high level of connectivity with Kagbelen and emerge as another subcentre for Conakry.

Planning a polycentric Conakry relying on mass transit and TOD is currently a complex challenge because economic drivers to achieve such result are currently weak. It requires to develop creative synergies between the main economic urban sectors (commerce, logistics), shared infrastructure with financial viability and multimodal use (railway and pedestrian corridors) and TOD with local characteristics and specific needs (markets, affordable housing projects, mixed-used development). In the case of Conakry, the elaboration of the Mobility Plan illustrates how much logistics has conditioned and constrained the development of the Guinea capital and how it can be rather used to lever the financialization of a healthier urban mobility and transport infrastructure with associated benefits for pedestrians, bicycles and accessible neighbourhoods for all.

If investment strategies in economically viable transport infrastructure integrate better the social realities and local economic characteristics of African cities, an appropriate urbanism could start to emerge and open the gates to singular forms of polycentrism relying on micro urban economy, rather than on imported models of commercial urban development.

4. References

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