

# Analysis of accessibility and mobility in Luanda

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## Abstract

The urban accessibility and mobility problems are global, with greater impact in the underdeveloped countries major cities, particularly in the African continent. This is due to traffic concentration and uncontrolled growth, caused by demographic pressure and a lack of a public transportation system.

Meeting Alves (2006), that portrays “urban mobility has a dislocation (...) ability” (author’s translation); the urban policies are to be in consideration with the purpose of organizing the city guarantying people’s circulation by transportation.

In terms of land extension, Luanda’s county is the second smallest of Angola, but in contrast the most populous. The high demographic growth has ruptured its urban planning structure, which facilitated the emergence o peripheral building.

Road flux counting and research with professional agents were carried out which allowed a better understanding of mobility’s qualification and characterization.

The distance between work/study/leisure and residence location, the massive use of public transportation; the frail rainwater draining systems; the roads capacity state, among others, are identified has being the main city’s issues. The solution passes by a city redesign and by separating the *candongueiros* (passenger vans used as public transportation) exclusive routes because it is a more collective transportation and is because its frequently used by the residents when commuting.

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Keywords: Accessibility, Mobility, Urban Policies, Public Transportation, Private Transportation.

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## 1. Introduction

Luanda's (capital city of Angola) accessibility and mobility study and analysis, aims to encourage innovative development strategies, capable of overcoming the main identifiable barriers in relation to the current land and transportation management policies. Luanda has a 24.657km<sup>2</sup> land extension with a population of 6.542.944, and is the primary economic and financial centre of Angola.

The subject area is an issue that deserves attention in spatial planning researches, particularly in Luanda's county. Luanda has a lack of public and collective transportation coverage but a massive use of private transportation; its disorganized growth is such that the access roads become an everyday life problem for those who, for diverse reasons, need to commute. Taking into account the uniqueness and coverage that characterizes Luanda, the solution may require a connection with other subject areas such as environment, traffic, transportation (Tele, 2014); with the intent of ensuring the safety and comfort of the local population. For a better understanding of the verified alterations about the subject area – and at the same time give this project a scientific rigour – several documents such as books, conference reports and dissertations about this same subject were consulted, in particular:

- The mobility and accessibility concepts that Alves (2006, own translation) explains, “the accessibility (convenience) is what we try to maximize when studying, planning or manage mobility”, so mobility is the capacity of an individual to move.
  - Manual do Planeamento de Acessibilidades Transportes – Transporte Público (Costa, 2008), with the objective of ensuring accessibility by public transportation, pursuing to secure mobility through easy access for people to reach the goods and services they require.
  - Manual Técnico de Acessibilidade e Mobilidade para Todos – A Cidade das (i) Mobilidades (Teles, 2014), the author foresees filling some absence of information, of systematized information, through studies of the evolution of the paradigms related with mobility conditions or their absence in the majority of cities.
  - Novos Princípios do Urbanismo (Ascher, 2008), the author aim is to add to the clarification of the main challenges that this new urbanism is facing and to the formulation of a few designing principles. At the same time, the author tries to characterize the transformation of the urban mobility system, vehicles and people's accessibility, inter-modality, and modal transference and mobility.
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## 2. Research Possibilities

- What is the extent and type of and periphery?
- What are the main causes found in the origins of these issues?
- What are the feasible interventions to solve?

### 3. Objective

To characterize the mobility and accessibility issue of Luanda's city and describe intervention solutions that aim to support the local administrative and management authorities when resolving the problems.

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### 4. Methodological Approach

A qualitative approach was used to find the investigation possibilities, because it is a research methodology that allows for direct observation of the study subject. In other words, it allows for a dynamic relationship between the real world and the individual. The data gathering was based in open question interviews to the institutions covered in the study - *Ministério dos Transportes, Ministério do Urbanismo e Habitação, Direção Nacional dos Transportes Rodoviários (DNTR), Instituto de Planeamento e Gestão Urbana de Luanda (IPGUL) através do Departamento da Mobilidade de Luanda, Empresas de Transportes Coletivos (público e privado), Associação de Taxistas de Luanda (ATL)*, and direct economic agents (drivers and collectors) – and through inquiries based on people's accessibility and mobility.

For the analysis of Luanda's mobility management, it was necessary to obtain data that allowed for the problem characterization. It was elaborated an inquire to interpret these questions: main commuting motives (work, home, school, appointments, leisure or other), point of origin and final destination, time spent looking for parking (when in private transportation), parking evaluation, city centre parking performance and quality and willingness to use a bicycle (in case of bikeway enforcement in the city).

Apart from the applied inquiries in the centre (Mutamba), counting was applied for the analyses and quantification of the vehicle flow going to the city through the main arteries. The seven-member team had the supervision of Professor José Antunes Ferreira. The inquires were done in two separate days, May 29 and June 1<sup>st</sup> of 2015, with 419 validation which will represent the data analysis sample.

The inquiry methodology consists in an intersection research, by approaching people during their dislocation or activities, just like the ones inquired at Universidade Lusíada de Angola.

In the counting dada, the preferred method was through observation, which according to Richardson et al. (1995, citation from Júnior, 2000), is a fundamental traffic study process. The counting from June 5<sup>th</sup> 2015 was in five different points and had a duration of two hours (from 7h to 9h).

All data from counting and inquiry were dealt in a specific way, which allowed for an interpretation of the Accessibility and Mobility problem in the county and city of Luanda.

## 5. Transport Characterization

In Luanda's County, there are three forms of public transportation (railway, maritime, highway) responsible for the day-to-day transportation of commuters for work/ school/ leisure reasons.

By railway, Luanda's suburban train functions with a single line between the Luanda and Catete/Icolo and Bengo, with primary stops at Bungo's central station (city centre) and at Viana. There are 27 daily trains from Monday to Friday, for a 17.452 passengers/day, which corresponds to 0,3% of the County's population; it runs with no fix intervals, which means the waiting period can go from 20 minutes and 1 hour and 20 minutes.

The maritime transportation consists of four vessels (catamarans), two main routes (Kaposso-Luanda-Slavery Museum and Slavery Museum- Luanda's Harbour), and three main boarding stations. The operating carrier practices intervals of 30 minutes and 1 hour and 50 minutes between vessels and transports just about 7.202 passengers/day, which corresponds to 0,1% of the county's population.

Five companies provide highway transportation, a working fleet of 327 buses and 653.213 passengers/day, which corresponds to 10% of the county's population.

Highway transportation is the most used and together with the others means of public transportation make up for a daily average 677.867 of passengers, which corresponds to 10.4% of Luanda's population (with about 6.500.000 residents). This means that the supply is not meeting the demand of a growing population that mostly commutes by collective transportation.

The quality of public transportation can be seen in a different way, depending on the intended result (Costa, 2008). The public transportation was evaluated on that principle, in the city centre.

The quality reported varied according to personal experience and how the service is perceived. From the 419 inquired people, 42,5% consider the service terrible, 36,8% consider it reasonable, about 18% regard it has good, and the remaining 2,6% did not use the service.

The fragility of the County's public transportation supply encourages enforcement of collective and private parallel services to cover for the lack of supply and to secure the city's mobility need. From the services adapted to the County's current reality, it is to point out the *candongueiros* (usually from Toyota Hiace and easily identified by their blue and white and by the collectors shouts announcing the routes (Lopes, 2006: own translation)), light vehicle service, motorcycle service, custom taxi service and private transportation (*Transporte Individual* – TI). Generally, the use of TI is associated to social rising and isolation, for reasons that Costa (2008) points out: flexibility, permanent availability, privacy, convenience and comfort, which makes it a sort of natural household extension.

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## 6. Accessibility and Mobility Characterization

Identifying people's point of origin and intended destination allows for an understanding of the dynamics of mobility and for the analysis of accessibility conditions, not just by TI, but in particular by Public Transportation and non-motorized transportations (Seabra, Pinheiro,

Marcelino, Santos & Leitão, 2011). Image 1 presents the point of origin and destination of people commuting for several reasons.

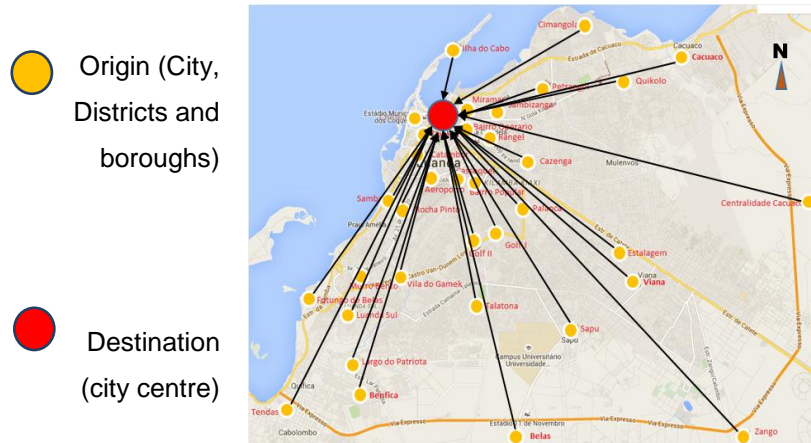


Image 1 – Identification of commuter’s origins and destination.  
 Source: Prepared by, according to surveys on mobility, 2015.

The studies show that the distance people have to cover between origin and destination goes from 2,5km and 39,6km, and take 5 to 53 minutes by car (Google measurements and calculations). The reality of the projected time is contrary to the results obtained by the 419 inquiries of June 1<sup>st</sup> 2015, that stated an average time of 30minutes to 3 hours, depending on the distance and journey starting time. However, it is to point out that rush hours register a longer journey time due to traffic jams caused by road saturation, generalized traffic code violation, highway degradation, intense use of TI, high number of malfunctions, lack of docking stations for *candongueiros* and accident rates.

It is concluded that Luanda has the highest volume of dislocations with the city centre as a final destination with 65% out of 419 inquiries; Cacuaco has the lowest volume, with just 6,2%. Image 2 presents a percentage of the point origin of the residents that commute daily to the city centre.

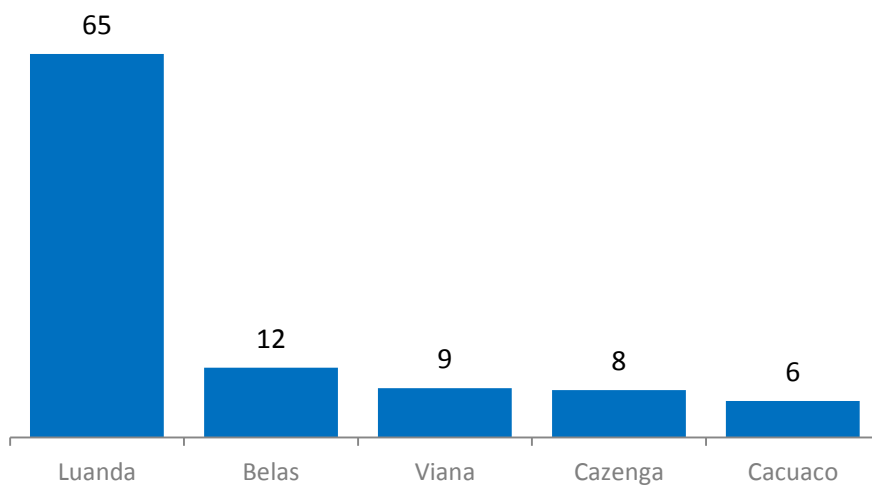


Image 2 – Total of dislocations, by point origin (%)  
 Source: Source: Prepared by, according to surveys on mobility, 2015.

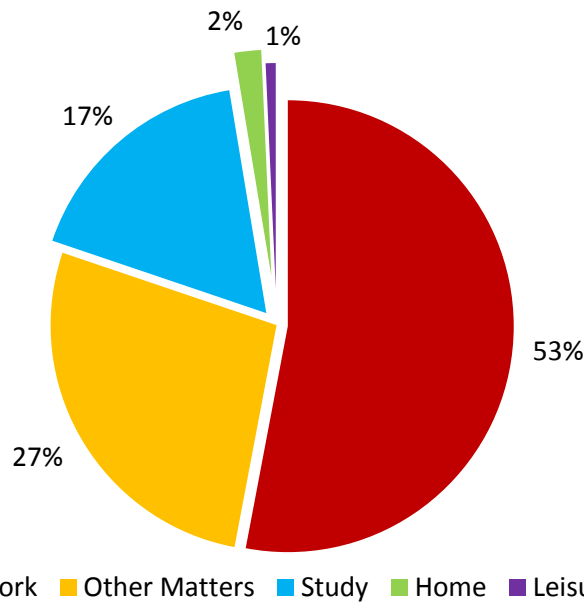


Image 3 – Total of Dislocations, by motive (%).

Source: Source: Prepared by, according to surveys on mobility, 2015.

As image 3 illustrate, 53% of the surveyed population commutes because of work, 17% are students, 2% are residents, 1% commute for leisure and 27% commute because of other matters.

### 6.1. Transportation choice for commuting

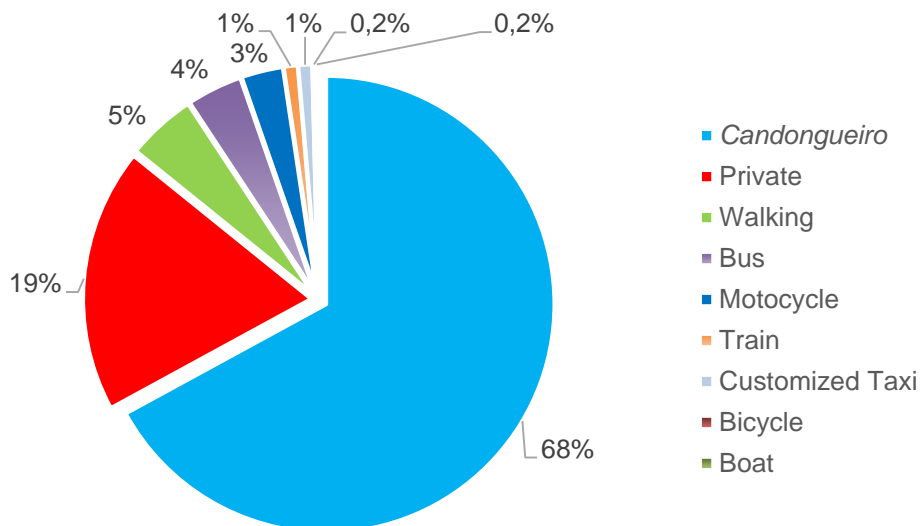


Image 4 – Total of dislocations, by type of transportation (%).

Source: Prepared by, according to surveys on mobility, 2015.

The study about dislocation shows that the *candongueiro* is the preferred transportation by the inquired population when commuting to the city centre for work, school, shopping, leisure and other matters, representing 68% of dislocations. The costumed taxi is the least used, with just

1%. Image 4 presents the volume of dislocations according to the different types of transportation.

A report published by the Public Opinion Research Company – EPOP & Mercado on August 2014, by means of telephone survey (with the participation of 400 residents of Luanda), reveals that 97% of the inquired used the *candongueiros* as public transportation. The supply during calmer hours, and the demand on rush hours for Luanda’s *candongueiros* services, is observable in the images 5 and 6, bellow.



Images 5 and 6 – Supply at S. Paulo’s quarter (left) and demand at Rocha’s quarter (right).

Source: Prepared by, 2015.

## 6.2. Road network demand

To quantify the demand’s volume of the road network, a vehicle counting data survey was done at five strategic points of the roads, where the 2007 counting was made. The results from the 2015 survey exemplify the daily volume of vehicles that entre the city’s centre with a counted 16.290 vehicles in two hours, at those five strategic points.

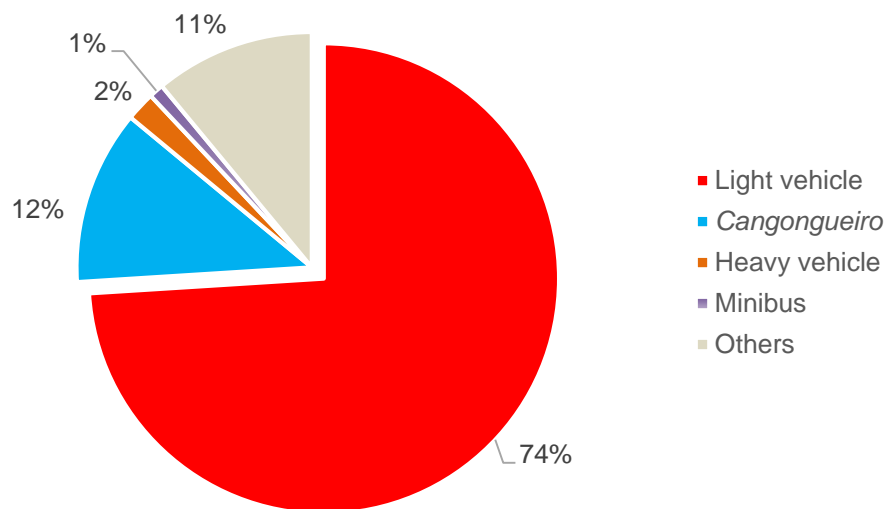


Image 7 – Total of entries, by type of transportation (%).

Source: Prepared by, according to vehicle counting, 2015.

The counting results show a higher percentage of private vehicles, and minibuses the lowest percentage, 74% against 1%. Image 7 presents the counting’s result, by type of transportation.

## 7. Conclusion

The mismatch between urban principles and the transportation system - due to Luanda's disorganized growth – are pointed out as the city's mobility and accessibility main constraint. Just like the residence location relative to the main traffic generator hubs, current road condition and capacity (supply and demand), traffic disarray caused by the *candongueiros* and by the excessive use of private transportation, rainwater and lack of a basic draining system, and the current sidewalks' condition.

Generally, although informal and disorderly, the services provided by the *candongueiros* is the only one that covers the County's whole land extension, and takes on the role of main collective transportation, and is used in the population's daily dislocations, registering a 38% demand. The TI follows, with a 34% out of the total of counted passengers of which, during the study, 70.794 were commuting in the city in several transportation ways.

Taking into account the *candongueiros* coverage in the city, the adoption of transportation policies - such as the ones of Lisbon that enforced public transportation only lanes (the BUS lanes) in the city's main arteries – is justifiable. The enforcement of this policy, although with an inefficient time schedule, helps with the traffic outflow of the collective transportation, particularly the buses of *Carris* and the taxis.

The enforcement of identical policies in Luanda – which needs urgent solutions for its' chaotic traffic jams – should occur in Luanda's main access roads (structuring roads), with enough lanes and spacing in the roadways with 3 metres width and to the right, because of the transportation's stops (600 to 800 metre distance between stops). The solution may be separating, whenever possible, the *candongueiros*' traffic from the rest, so that this policy can contribute for a progressive traffic flow increase and to diminish the journey's time. Image 8 shows the design of the *candongueiros*' lane enforcement proposal, at Deolinda Rodrigues' Avenue.

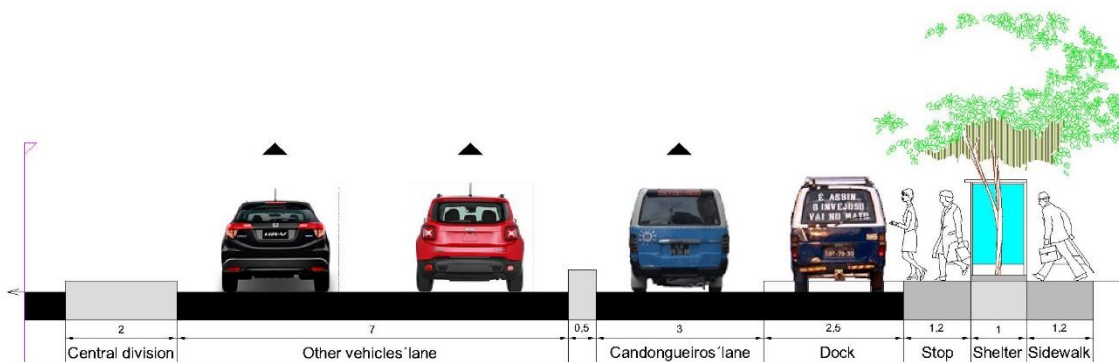


Image 8 – Cross section, city centre direction – Viana, Deolinda Rodrigues' Avenue.

Source: Prepared by, 2015.

Facing the drivers' behaviour, lane separation could be done through physical central divisions in the road, with interruptions at transition zones, and people's circulation. The transition should only be from left to right, to safeguard vehicle circulation. It is not to be permitted for the *candongueiros* to use the normal lanes. Compliance of this policy is to be ensured through the



road design (physical division) and traffic signalization (horizontal and vertical) prohibiting the transition for the *candongueiros*.

For the future development of the city, some urban policy readjustment may be required, promoting a compact city where work/school/leisure commuting is possible by foot or bicycle, avoiding the use of vehicles and averting the negative effects caused by massive private transportation use. On the hand - apart from the foreseen introduction of other public transportation methods (BRT and surface subway) that the sector promises to enforce with the intent of mobility improvement -, it is necessary for the competent entities to create policies that reorganize the transportation by *candongueiros*. These policies pass by making partnerships, between the service providers (drivers and collectors), providing qualification, and ensuring respect for the customer and for the traffic code. Likewise, urban circuits for the *candongueiros* should be defined; referring the peripheries as possible concession areas, with stop stations at higher people's concentration zones (informal markets that make the periphery), where a modal transference can occur, limiting the *candongueiros'* entry in the city centre, which is to be reserved for public transportation.

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