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Urban Logistics and Mobility in the City of Yaoundé

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Abstract

The purpose of this communication is to demonstrate that the organization of good urban logistics in the city of Yaoundé can contribute to urban mobility if decentralized local authorities are involved with regard to the transfer of skills. Urban logistics is at the center of urban mobility of the flow of companies and people on time and at lower cost. Urban logistics makes it possible to optimize the flow of goods and people in urban centers, agglomerations, peripheries and even interurban flows, to produce and create income quickly and consequently, Cameroon draws economic growth, improving urban mobility and the well-being of the populations in the city of Yaoundé. This work is based on the field survey and the analysis of existing diachronic and synchronic sources on the city of Yaoundé and its peri-urban localities. The qualitative approach by observation is not left out for the analysis of the impact of this urban logistics on urban mobility. Empirical results show that urban logistics in the city of Yaoundé does not contribute enough to urban mobility due to poor urban policy by CTD actors and transport policies that are unsuitable for modern cities. In other words, infrastructure that is out of step with new cities or new towns. The originality of this research is twofold: Understanding the impact that urban logistics can have on population mobility and the link between demography and urban mobility in the city of Yaoundé.

Keywords: Urban Logistics, Urban Mobility, Flows.

Introduction

For more than two decades, the observation of urban logistics in the city of Yaoundé, as in the majority of large African metropolises, reveals a weakness in urban mobility which nowadays only accounts for less than 2% of daily trips. Urban logistics is the practice of traditional logistics methods for optimized management of the flow of goods and people in urban centers, agglomerations, peripheries and even interurban flows. This practice differs from traditional logistics fundamentally by its preponderance of interest in the establishment of logistics and transport infrastructures and the development of the urban transport network Onguene (2021).

The purpose of urban logistics is to facilitate urban mobility. It involves organizing incoming, internal, and outgoing flows in urban centers, towns, or agglomerations in the best possible time and cost conditions. Urban logistics in the city of Yaoundé is characterized by rapid urban expansion, escaping the planning rules of modern cities. In the 1980s, the city of Yaoundé occupied barely 16% of its municipal space. In 2022, we are at 97% occupancy. The strong pressure of the rural exodus it is experiencing coupled with poorly controlled urban planning by the State (Tchékoté et al., 2015) are at the origin of the current extension of the urban footprint, which already represented 52% in 2015 (INS, 2015). This urban sprawl gradually gives rise to increasingly saturated urban logistics, which leads to the need to diversify urban mobility tools. These issues, as Motcho and Saidou (2012) point out, are not sufficiently served by institutional transport 1 and are less viable in terms of transport infrastructure [1]. However, the extension of peri-urban areas makes the automobile sector one of the essential means of mobility (Dominique et al., 2007). Daily mobility is dominated by

small-capacity collective taxis, whose modal share is estimated at over 71% (CUY, 2020), and an increasingly dominant collective motorcycle taxi system at 25%. The small-capacity collective transport mode that dominates the transport scene in Yaoundé today emerged in the aftermath of the public transport crisis that led to the cessation of SOTUC1's activities in the mid-1990s. In fact, the operation of taxis and motorcycle taxis in Yaoundé is characterized by frequent and disorderly stops, which lead to significant negative externalities in urban logistics such as congestion, accidents and pollution, leading to high monetary costs to be borne by users (Mfoulou et al., 2013).

It is a mode of transport established by the State which invests in a public service and imposes service constraints, the costs of which, in general, cannot be borne by users [2].

This difficulty experienced by the State in responding effectively to the needs of population movement, has given rise, since 1975, to the development of an alternative transport, called "clandestine" by some scientists (Kengne, 1985 among others) or even described as "artisanal" by other researchers (Boubakour, 2008 among others). Thus, this work seeks to answer the following research question: can the urban logistics of the city of Yaoundé promote the urban mobility of populations? In other words, in a context of current globalization, does the urban logistics of the city of Yaoundé fit with the dynamics of the new city in Africa? The answer to this question is found in the structure of this paper. In particular, the Literature Review (2), The face of urban logistics and urban mobility in the city of Yaoundé (3), The urgency of an urban logistics dynamic in connection with a new city (4) and the conclusion (5).

Literature Review

We must go back to the work of Clark (1951), Alonso (1964), Muth (1969) and Mills (1972) to analyze the correlation that exists between urban logistics and urban mobility. These works, affiliated with those of Von Thünen (1783-1850), were interested in the occupation of space and showed the link between transport costs and the rent of cultivated land. They laid the foundations for taking space into account in microeconomic analysis .

For (Routhier, Toilier, Post-Print; 2011), freight transport is rarely taken into account in urban mobility modeling today. There are two main reasons for this. On the one hand, local authorities have long shown little interest in this essential function of the urban economy; there is no organizing authority for public freight transport, unlike for passenger mobility. On the other hand, the methodological issues for understanding the subject have only recently been partially resolved. (Touzi, 2021), believes that the sustainability of mobility systems and urban logistics is increasingly considered an essential condition for urban planning [3].

According to (Fathiya, 2019), urban logistics deals with the way of transporting goods by optimizing the various flows that circulate within the center of a city. This integrates into its functionality several environmental, economic and urbanization issues. However, commercial activities cannot be carried out without urban transport activity . Many relate to courier-type goods, without worrying about a particular area of activity, others on the contrary are targeted at a specific sector (Delaitre, Breuil, Molet; 2007). For (Bardin, Bonet, Chanut; 2010), in a global context of intensification of exchanges between regions, countries and continents, the logistics of large flows has benefited from technological and organizational innovations ensuring effectiveness and efficiency, combining cost control and optimization of service quality. While this dynamic operates effectively on a global scale, the same is not true on an urban scale, particularly in city centers [4-6].

The work of (Chanut, Paché; 2013) demonstrates that the societal urgency of sustainable development requires us to rethink urban logistics schemes in order to limit the harmful effects of delivering goods to the city center, while integrating recent developments in trade . To this end, the reflection is centered on the control of urban logistics as well as on the organization of urban transport considered as an effective means and an essential response for the proper functioning and influence of the city (Belkhiri, Madani; 2016). For (Dicko, 2021), like the large metropolises of sub-Saharan Africa, the analysis of supply and redistribution circuits in Bamako highlights a plurality of modes of transport used (motorized and non-motorized means) by different commercial actors to be able to carry out their activities [7].

Analyzing the peri-urbanization of the city of Yaoundé, it is characterized by rapid urban expansion, escaping the planning rules of modern cities. In the 1980s, the city of Yaoundé occupied barely 16% of its municipal space. The strong demographic pressure it is undergoing coupled with poorly controlled urban planning by the State (Tchékoté et al., 2015) are at the origin of the current extension of the urban footprint, which already represented 52% in 2015 (INS, 2015). These peripheries, as Motcho and Saidou (2012) point out, are not sufficiently served by institutional transport 5 and are less serviced in terms of transport infrastructure. (Chanut, Paché and Wagenhausen; 2012) demonstrates that issues related to urban logistics now occupy a central place in management research. Long confined to operational approaches, particularly in terms of optimal organization of goods transport in saturated cities, urban logistics is attracting the attention of researchers and practitioners based on original strategic models, emphasizing the importance of pooling resources between competing companies. According to (Morana, Gonzalez-Feliu; 2011) urban transport of goods by truck represents an important source of employment, it is also associated with problems related to congestion and respect for the environment [8].

Thus, (Gonzalez-Feliu, Ambrosini, Gardrat and Routhier2012) come to the conclusion that household shopping trips represent

[1]MfoulouOlugu Jean Patrick, Urban Community of Yaoundé

[2]The main objective of this study is to research the existing determinants in urban logistics in developed countries to improve the design of urban logistics in DJIBOUTI.

[3]Return to local urban commerce and growth of the commercial Internet. 5 It is a mode of transport established by the State, which invests in a public service and imposes service constraints, the costs of which, in general, cannot be borne by users. It is the operation on an individual scale of public transport vehicles whose ownership is atomized, that is to say, distributed among numerous owners. This operation can be integrated into more or less restrictive collective rules drawn up by professional or trade union organizations (Godard, 2008). The latter define the service routes, pay the taxes and set the costs unanimously with the administrative authorities.

more than half of the kilometers traveled in all goods transport flows in the city. These trips, often considered as part of personal travel, can be of interest in terms of goods transport, both for communities thinking about urban logistics and for commercial activities and large-scale distribution players in their commercial strategies and consumer delivery services. For (Morana, 2015), urban logistics today represents a major challenge in supply chain management. Population growth within cities is leading to an increase in the exchange of goods. In this regard, urban logistics must think and practice sustainability from today .

These theoretical works question the urban factors likely to influence the choice and cost of mobility in a city like Yaoundé. In fact, the very strong urban growth in Yaoundé and the emergence of new peripheral districts offer a face of the city of Yaoundé and a mobility to analyze in the era of the dynamics of new cities [9].

Methodology

The overall scope of the study covers the entire territory of the seven municipalities constituting the city of Yaoundé as well as part of the territories of the municipalities of what is considered the metropolitan area: Lobo and Okola in the West, Obala and Soa in the North, Nkolafamba and Mfou in the East and South, then Mbankomo and Bikok (Mefou et-Akono department) in the South-West. The perimeter directly concerned covers a total area of approximately 700 km 2 of which 304 km 2 are within the administrative limits of the city of Yaoundé.

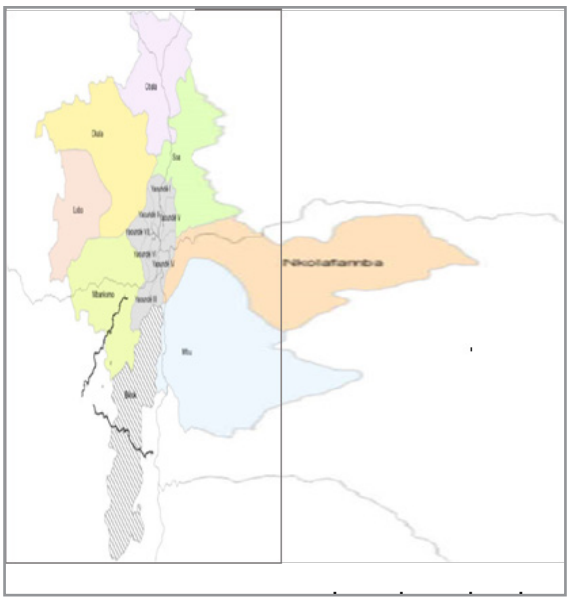

Figure 1 : The Yaoundé metropolitan area

Source : PMUS-CUY (2024)

As part of this study and with a view to synthesizing the phenomena of urban logistics and mobility in the city of Yaoundé, the research methodology used is analytical. The study is based on: field observations, documentary research, and interviews conducted not only with individuals and legal entities who manage the movement of people and goods in Yaoundé. Some information was collected from institutional actors in charge of transport in Cameroon. This is empirical data collected in January 2022 and secondary data. The primary data is the result of interviews with 11 passenger and goods transport companies in the city of Yaoundé; 50 randomly selected loaders or owners of goods, passengers (students, workers, parents) who have to move every day, about fifteen warehouses and road transport platforms boarding sites; 17 commercial and industrial companies, and finally with officials of the Ministry of Transport in charge of urban transport [10].

The methodological tool (questionnaire) intended for the respondents seeks to understand the correlation that exists between urban logistics and urban mobility. This makes it possible to situate the issue in which urban mobility takes place according to urban logistics, as well as its economic context. This instrument makes it possible to analyze what guides the choice of each actor in their urban movements. These exchanges contributed to the observations and cartographic data to update the database. Secondary data come from the literature review, data from the sites of the Ministry of Transport and the Urban Community of Yaoundé. The collected data were processed using Excel and image processing software to produce maps illustrating this research [11-13].

Results

Urban logistics and demographic dynamics in Yaoundé

According to the PMUS-CUY (2019), demographic forecasts were calculated with a growth rate of 3.1% for the 2025 and 2035 horizons. Population growth is the main driver of the expansion of the urbanized area of Yaoundé. It is assumed that the urbanized area will continue to develop, probably at a rate similar to that of today, and therefore that the density in the expansion areas will remain around what is observed in 2018 as explained above: 150 inhabitants/ha on average, not including large equipment zones; which, taking this into account in addition to the non-constructible areas (high reliefs and lowlands), would have

It proposes a Maturity Model that allows us to understand the progression of urban logistics, in its macroeconomic sense. Because the means of delivery must be sustainable (economic, ecological and social/societal). It is an overview of the possibilities through (the slowness logistics approach), the carrier pigeon (delivery by air) and teleportation (quantum transmission of information).

[5]Considering, depending on the municipality, 20% or 30% of areas not occupied by housing.

a gross density rather in the order of 100-120 inhabitants/ha . The table below gives the site capacity figures, compared to the expected populations in 2025 and 2035.

Table 1: Comparison of site capacity with expected population in 2025 and 2035

Area (Km 2) Population (inhab.)			in 2025 in 2035	
Yaoundé 1	54.64 419 347 494 064		670 456	
Yaoundé 2	22.56 389 574 385 429		523 035	
Yaoundé 3	68,34 887 369 479 565		650 780	
Yaoundé 4	58.67 803 401 932 713 1 265 711 Yaoundé 5		26.52 357 454	426249 578 429
Yaoundé 6	28.35	489 746 568 876	771 977	
Yaoundé 7	44.92 259 119	178473	242 191	
Total	3 04.00	3 606 009 3 465 369 4 702 579		

Source : PMUS-CUY (2024)

It therefore appears that the sites of Yaoundé 1, Yaoundé 5 and Yaoundé 6 would be saturated by 2025. In 2035, there would still be a little margin in Yaoundé 3 (in the South-West part of the city) and much less in Yaoundé 7. The surpluses from each of these areas would therefore supply the surrounding municipalities. Recent developments and trends noted on the ground indicate urban growth following three preferred directions: North / North-East (RN1 and Soa road), East (RN10 and Mfou road), South (Nsimalen road) and South-West (in the extension of Simbok with the new Kribi road and to a certain extent the RN3). This is generally a ridge urbanization that initially follows the main exits from the city (RN1, RN2, RN10, RN3 and the Soa and Mfou roads) which gradually thicken. To the West, development is blocked by the high reliefs which offer little more than a few pockets in Oyomabang, Nkolbisson and Leboudi which gradually become denser but with limited site capacity. Observation of the series of satellite photos shows a very strong push in the East, the result of spontaneous (non-voluntary) growth which exceeded the forecasts of the PDU (2010) which indicated a blockage at the level of the Anga'a and Foulou rivers, and on the other hand a stronger progression in the South-West (Afanoyoa). In the current context, nothing seems to be able to stop these trends, with a frantic consumption of space. The North and the South-West/South/East crescent will probably continue to accommodate the bulk of urban growth. All these areas are mainly allocated to housing, even if there is a strong trend towards the spontaneous creation of an industrial zone along the RN3 towards Mbankomo. Similarly, no secondary centre seems to be emerging, apart from Mfou, Nkolafamba and Soa which will probably be absorbed in the long term. It is also necessary to note the recent availability of significant State land reserves in the North (Olembé in the continuity of the SIC housing and the future stadium), which offer the possibility of developing a secondary centre and above all of controlling the occupation of the site in this part of the city, similar to what was done 30 years ago in the South-West [14].

Polarization of Activities and Jobs in Downtown Yaoundé

Generally speaking, the city of Yaoundé accounts for 28% of the country's businesses , with strong growth over the last few decades, which has led to a significant territorial rebalancing across the country, with the net decline of Douala, which now only hosts 35% of businesses . Activities and jobs are dominated by the tertiary sector (4 out of 5 jobs) and, to a lesser extent, by the secondary sector. The formal tertiary sector, mainly made up of the Administration but also the private sector (banks, insurance companies, etc.), is mainly located in the city center, generally on the administrative and commercial plateaus (up to the City Hall or even Nlongkak). The Administration is mainly located on the Administrative Plateau, with an annex in progress in the North of the city (Etoudi) near the Presidential Palace [15].

The tertiary sector is, however, dominated by the informal sector (39% of the city's total jobs) which is found throughout the city, with a predominant place for commerce in terms of employment (28% of the workforce). There are two markets of metropolitan dimension: (i) the Messa-Mokolo market (food and manufactured products) located in the center-west of the city on the radial road leading to the old Douala road; (ii) the central market (manufactured products) located in the heart of the city on the Commercial Plateau. Three other significant commercial centers from the point of view of transport and traffic should be noted: Mfoundi market (city center), Etoudi market (North) and Mvog-Mbi market (central zone, south direction).

The secondary sector is also present with a main industrial hub in the South/Southwest (Mvan-Ahala, including MAGZI 12 zone). There are also some pockets of activity in the North, West as well as in the central part and along the exit to Mbankomo.

Travel generation hubs scattered across the metropolitan area

There are several main points of origin/destination of motorized and pedestrian traffic:

1. **The Administrative Plateau in the heart of the central zone; The industrial zone in the South (Mvan-Ahala); The interurban passenger road terminals:**

- A Western hub consisting of the Western bus station (Messa) supplemented by annexes in the Mokolo and Carrière districts and which serve the West and North-West directions (Old Douala road, Okola etc.) but also the West (Ba-

[6]Cameroon Real Estate Company, public housing operator.
[7]General Business Census (RGE 2009), INS.
[8]But 2 out of 3 large companies have their headquarters in Douala.
[9]Employment data comes from the 2nd Employment and Sector Survey
Informal in Cameroon (EESI) 2), Summary Report, April 2011 12 Mission for the Development and Management of Industrial Zones.

foussam, Bamenda via the RN1/RN4);
- A North pole made up of the Etoudi bus station and the private stations of Tongolo and Manguiers (Sorciers crossroads), which serve the East and North of the country (via the RN10) as well as the West of the country (RN1/RN4) and the North of the region (Obala, Monatélé, Bafia etc.); the East bus station (Mimboman) which serves the East (RN10) and the West of the country (RN1/RN4);
- The South pole (Mvan), by far the most important, consisting of a group of private stations for the South directions through the RN2 (Sangmelima, Mbalmayo) and Littoral (Douala, Kribi etc.) through the RN3;
- Minor hubs at various points in the city, dedicated to intra-urban transport or generally within the metropolitan area: Oyomabang, Nkomo, Av. Mgr Vogt (Camairco offices), Ngousso, behind the General Treasury;

2. Air or rail transport terminals
- Nsimalen International Airport in the south of the metropolitan area (RN9);
- Mvolyé railway station in the Southwest industrial zone;
- The Passenger station and the Goods station located in the central part;

3. Commercial areas
- The central market center / Mfoundi market in the central part of the city;
- The Messa/Mokolo market, in the center west;
- The Etoudi market in the North and the Mvog-Mbi market in the 1st ring towards the South;

4. Large equipment
- The Omnisport Ahmadou Ahidjo stadium in the Northeast;
- The General Hospital / Gyneco-Obstetric Hospital pole in the Northeast;
- Central Hospital West direction within the central part;
- The University of Yaoundé II - Soa in the North-East of the metropolitan area;
- The center made up of the University of Yaoundé I, the Lycée Général Leclerc and the University Hospital Center in the 1st ring road towards the South-West of the city • the Olembé stadium in the North;

5. Dormitory towns in the metropolitan area
- The town of Mfou in the South-East;
- The city of Soa in the northeast;
- The localities of Mbankomo and Obala respectively to the North and West.

Apart from a concentration of administrations in the centre of Yaoundé, it appears that the main traffic generating centres are spread across the entire territory. Note that each district has educational and medical facilities as well as local markets which do not facilitate urban mobility.

The state of the road network in the city of Yaoundé

In the city of Yaoundé, the road network can be broadly characterized by the following elements:
- Paved infrastructure limited to 300 km across the entire CUY, out of the 4,762 km of roads. Many neighborhoods are only served by dirt roads;
- National and municipal axes heading towards the center (mainly radial structure) , with two or even three traffic lanes in each direction (N1, N10, old Douala road / N3, Ewondo street).
- A secondary network linking the main road network in certain areas of the city, located mainly in the south.
- A service network in certain areas of the city which is very often not paved [16].

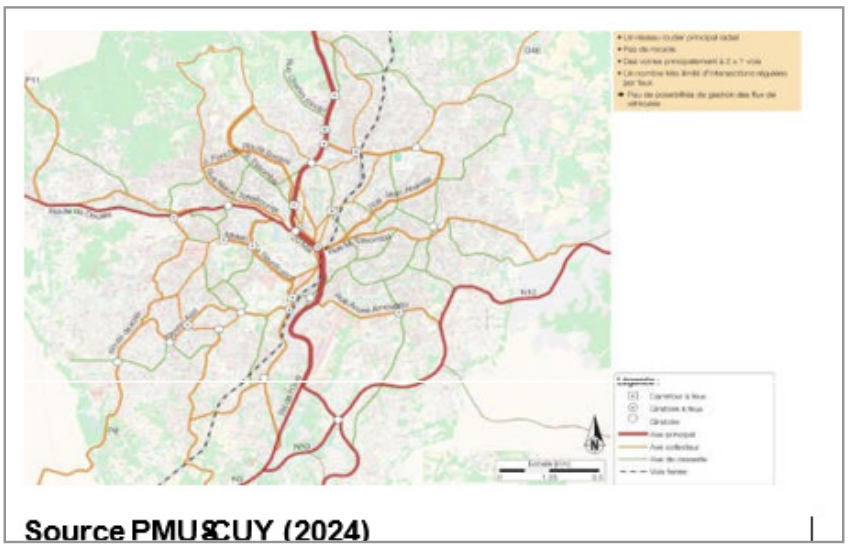

Figure 2: Hierarchy of the Yaoundé Road Network and Principle of Intersection Management

There are currently only a limited number of options for bypassing the city center. Most journeys must therefore pass through/near the city center, at the Carrefour de la Poste and the Carrefour Warda. These two intersections are almost obligatory crossing points for a large number of users. Furthermore, a large number of neighborhoods are only served by external roads and no internal roads have been developed, due to a lack of space between the various buildings or available funds for road construction. These pockets, where no paved roads are provided, can extend over several square kilometers and can pose significant obstacles

[10]*See Chapter 1.1.4.*
[11]*Kumar & Barrett [2008].*

to the overall service of the territory and the network coverage.

It should also be noted that a large number of intersections located on the main network are not clearly managed and that no "physical" hierarchy of the road network is in place. The number of traffic light intersections, which can help direct and promote traffic flows, is very limited, namely around fifteen across the entire territory. No policy for managing these hotspots is in place. And when problems are encountered, it is the police who come to manage these points, instead of adapting the general operation / phasing of these (Warda intersection for example). However, when the layout is consistent with the intended operation of the intersection (Nlongkak intersection, near the STECY depot), traffic flows correctly.

At the same time, the maintenance of the various roads, particularly those at secondary or lower levels, is very limited. Large potholes are regularly encountered, resulting in significant capacity losses in sections (instead of having a vehicle every 2-3 seconds, the time between two vehicles can reach 10 seconds, resulting in a loss of nearly 80% of the theoretical capacity of the road and/or loss of a traffic lane).

It should be noted that the limited number of railway crossings can also pose some problems because they concentrate a large number of flows, often on reduced axes at these singular points. Finally, the available network is also occupied for various uses, penalizing traffic flow:

- Taxis on one or two traffic lanes, particularly for picking up or dropping off passengers. They stop on the roadway and thus limit the number of traffic lanes for other users;
- Pedestrians, who, due to a lack of suitable facilities (cluttered sidewalks, lack of pavements, parking, etc.), walk directly on the road;
- Bus maneuvers on the road at bus stations.

Institutional Public Transport in the City of Yaoundé

These lines are also constantly evolving and adapting because between February 2018 and May 2018, the length of these nine lines increased from approximately 150 km to more than 210 km, in particular to pick up passengers in potentially interesting sectors. The objective remains to have 18 lines, over a length of more than 260 km in the short term. The network is evolving and "seeking" to optimize service, hence many adaptations to be expected in the short term, with the experience acquired over time. The fleet is currently composed of around fifty buses, with a capacity of 30 to 70 seats depending on the model, which makes it possible to offer three to five buses per line on average, which remains much lower than what was mentioned in the PDU (passage every 5 minutes). Currently, no arrangements are in place to promote this mode of transport. Buses travel on the same roadway as other vehicles and are therefore penalized by congestion. Commercial speeds are relatively slow, especially during peak periods, and the theoretical timetables/frequencies displayed cannot be maintained. The fare for travel is set at 200 CFA, but can be reduced to 180 CFA if 5 tickets are purchased. To make a trip, users must present their ticket to the bus driver, which greatly limits the risk of fraud.

The face of Artisanal Transport in the City of Yaoundé

Minibuses are often seen as the archetypal mode of artisanal transport in Sub-Saharan Africa. The most common analyses explain that minibuses initially emerged as a solution to the lack of supply resulting from the gradual withdrawal of institutional buses . Today, the development of the minibus sector on the African continent has been disrupted by the arrival of new modes (such as motorcycle taxis and shared taxis).

Figure 3: STECY Network Map (STECY source)

Nevertheless, minibuses retain significant modal shares in several African cities; they are a valid alternative adapted to the continent's urban mobility needs. The place of minibuses within Yaoundé's public transport system differs substantially from similar examples in the region. Indeed, in Yaoundé, minibuses are limited to operating so-called 'peri-urban' services, i.e., on the outskirts of the city and on interurban routes. This distinction is particularly important: interurban services, because vehicles fill up at the departure station and the routes have few intermediate stops, are theoretically more profitable than intra-urban services. Minibuses operate on relatively well-defined routes, departing from loading points that are sometimes relatively informal and certainly unplanned stations – located on urban landmarks in peripheral neighborhoods. Eight minibus routes, mainly for peri-urban use, are currently in operation. The one with the most supply (and therefore demand) connects the center of Yaoundé to Soa. These lines serve the main neighborhoods of Yaoundé but do not serve the main bus stations.

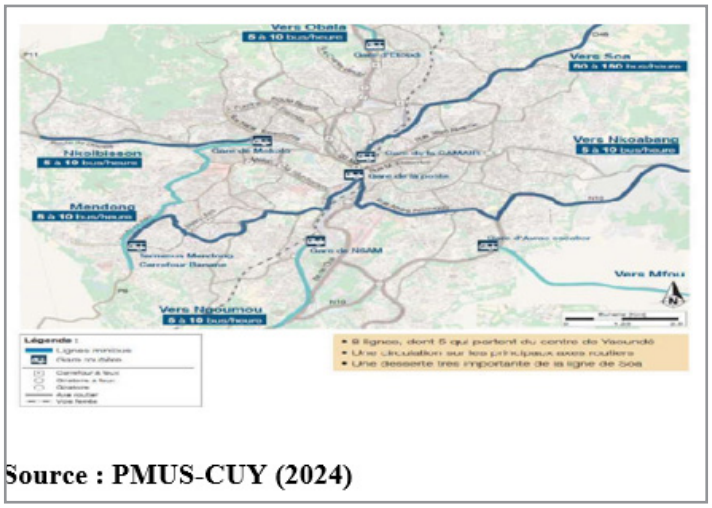

Figure 4: Current Minibus Network

Shared taxis, in their simplest definition, are vehicles that offer public transport services either (i) on a well-defined route as is the case in South America, or (ii) between two loading points following moderately defined routes as is often the case in Sub-Saharan Africa. In general, in most cases, they are easily distinguished from conventional taxis or metered taxis, which only offer trips at the request of the user. This is not the case in Yaoundé where metered taxis and shared taxis form a single group that can switch between the two forms of service without major restrictions. The forms of operation are:

- Pick-up refers to shared taxi services between two urban points or landmarks. Without any established routes or territorially-based anchor points, pick-up taxis operate throughout the city. The driver can pick up and drop off passengers at will, depending on the route defined for the passengers on board the vehicle. In 2010, the rate for this type of service was 200 FCFA per trip per user. This rate has now increased to 250 FCFA.
- The vehicle rental service is hourly. The driver follows the user's instructions, who then sets the routes according to their needs. In 2010, the hourly rate for this type of service was 2,000 FCFA. Today, the hourly rate is 3,000 FCFA.
- The depot is a service comparable to that of traditional taxis. It is therefore on-demand transport with a price that is negotiated based on the distance traveled. The vehicle is 'rented' by a single user (or a group of passengers sharing an origin and destination). The price, in 2010, could vary between 1,000 FCFA and 1,500 FCFA. Currently, although negotiated, it fluctuates between 1,500 and 2,000 FCFA.

Motorcycle taxis are often called the "zero degree" of mobility because, in theory, they are a mode that allows only one passenger to ride, although this rule is not always respected (Diaz Olvera et al 2007). They are particularly suited to urban conditions in Africa: lack of institutional transport services, poor road infrastructure in the peripheries and poorly planned neighborhoods that prevent other modes of transport from accessing them.

The Myth of Parking in the City of Yaoundé

Parking is a key element of modal choice. In addition to company and ministry parking lots, various areas of Yaoundé have organized and marked parking spaces on the road, including:

- In the city center of Yaoundé, in the administrative and commercial sector;
- Along certain axes, notably along the N2, near the intersection between Elig-Effa Street and 3.391 Street, as well as on small, occasional sections located near small centralized areas. But these regulations are put in place on a case-by-case basis, more to try to avoid parking anywhere, than to "manage" the parking.

In the city center, the distribution of the status of the approximately 3,700 spaces is as follows: 1,250 reserved or private spaces, including 340 directly on the street; 1,650 paid spaces, including 650 off-street. The rate is set at 100 CFA francs per hour, and a guard is responsible for collecting the money and monitoring around fifty spaces. These spaces are mainly located near the shops on Kennedy Street, the central market, and Independence Square.

Pedestrian Mobility

Walking is the second most used mode of transport in Yaoundé. Despite its popularity, it is not facilitated or even obstructed by the various urban developments that follow one another. Pedestrian mobility can take different forms and temporalities: as a mode of transport in its own right or as a means of connecting one mode of transport to another. All these forms of practices as well as the different users are essential elements of pedestrian mobility but which lead to disparities: a heterogeneity of the urban fabric which restricts movement, spaces designed for one type of user, an oversize of car lanes. Added to these development problems is a lack of regulation of the use of public roads. Pedestrians then find themselves forced to move on the roads and generally outside the spaces dedicated to them.

The strong urban and demographic growth experienced by the metropolitan area in recent decades has impacted mobility by lengthening journeys and the number of journeys. Coupled with the rise of motorized vehicles, urban planning has been designed partly around them. Pedestrian infrastructure is thought of in a second phase and often left to the individual initiative of each building owner with a right of way on a street. The lack of separation of modes combined with the oversize of some road axes has created a deregulation of traffic on certain axes. Pedestrian infrastructure is undersized compared to certain road spaces

which lose functionality.

The Urgency of a Dynamic of Urban Logistics by Ctd in Link with A New City

The challenge of the new city for future districts

Public authorities must avoid rebuilding a new city from an old one. The new city is conceived years in advance. The urban policy based on the current urbanization plan of the city of Yaoundé is obsolete and unsuitable. For example, the current city does not comply with any traffic flow relief plan; it is congested with housing that has no bypass roads, no modern infrastructure, and no synchronized cadastral map. This old city must be left as it is and an urbanization policy implemented for the next emerging neighborhoods, in line with the determinants of a new one.

The challenge of transport logistics in line with new cities

Transport logistics is broken down into three main activities: determining transport networks, transport planning and vehicle fleet management. For a dynamic transport network , it is necessary to break with the construction of transport infrastructure such as the Nsimalen-Palais de l'unité highway which still congests the city of Yaoundé at the second Mvan interchange. Making the construction work of this highway difficult in the urban area with the road congestion it creates for the movement of flows from this nodal point along the city center of Yaoundé to reach the fixed point. This dynamic transport network will optimize the urban logistics chain on the basis of overall cost, deadlines and quality of service, the best offer. Also, the consequence will be felt on: the mode of transport of products (maritime, air, rail; road or multimodal); transport risks (limiting the number of breaks in loads, use of intermodal transport units); the availability of logistical resources (handling equipment, storage area) on either side of each transport point; the selection of the least expensive network and the one best suited to the goods to be transported.

Transport planning in the city of Yaoundé requires a model in line with urban flows. Once the various nodes (successive points) of the transport network are determined, the actual transport operation must be planned. Transport planning plays an important role in the management of delivery rounds; inter-factory or inter-store transport; and is widely deployed at the level of grouping/ungrouping platforms. The transport planning activity of the city of Yaoundé consists of predicting and fixing in time, quantities, dates and places of transport of goods. This allows for the necessary adjustments and balancing to be made in advance, taking into account the actual transport capacity available and the vehicle occupancy rate. For the management of the vehicle fleet in the city of Yaoundé, although it sometimes integrates transport planning, vehicle fleet management is an activity essentially based on the administrative and technical management of transport vehicles. It therefore brings together all the activities whose aim is to monitor the use of vehicles and guarantee their availability for possible transport needs (implementation of technical checks, updating of on-board documents, monitoring of drivers, management of fuel stocks and spare parts).

The challenge of support logistics in line with urban logistics

Support logistics in the city of Yaoundé consists of the implementation of a certain number of non-technical activities, indirectly linked to the production of goods and services, but therefore the necessity is justified by their disposition to facilitate this production. We are therefore witnessing a set of activities that will be managed by the general services of companies: management of logistics activities under subcontracting contracts; real estate management (rental/maintenance of buildings, villas, company premises); management of mail and telecommunications services. The purpose of urban logistics in the city of Yaoundé is to facilitate urban mobility. It is a question of organizing incoming flows, internal flows and outgoing flows in the city of Yaoundé, and its agglomerations, in the best conditions of time and cost. Public authorities must therefore prioritize centers of interest such as:

- Implementation of logistics infrastructure (warehouses and distribution platforms, shopping or consumer centers, markets, etc. in short, any infrastructure that requires a massive influx of people or goods);
- Implementation of transport infrastructure (bus and railway stations, ports, airports, parking lots, road landscaping installations, road weighing facilities, petrol stations, etc.);
- Installation of publicly known infrastructure (public toilets, public landfills, public schools, public lighting, leisure centers, cultural and sports centers, etc.);
- Development of the transport network (Road classification, road maintenance, road signs, road traffic control, road traffic information systems, transport legislation, development of public transport, interconnectivity of rail, road, maritime and air networks, development of intermodal transport techniques, etc.).

The challenge of integrating the urban logistician into the thinking of the new city

The urban logistician will lead a series of discussions aimed primarily at improving urban mobility in the city of Yaoundé, with the dual aim of optimizing time and costs, but also respecting various environmental constraints (safety, pollution, noise pollution, etc.). He will anticipate variations in urban flows and work on better organization of supply chains. The urban mobility logistician will be responsible for:

- The geography of logistical flows of people and goods (study of the size and dispersion of the main flows in the city, external flows and peri-urban and inter-urban links, etc.);
- The choice of locations for logistics and transport infrastructure in the urban center;
- The organization and planning of operations for transporting products, materials and equipment to consumers (last mile delivery, night deliveries to facilitate daytime traffic flow, etc.);
- Optimizing road traffic through the creation of shared centers for processing the flow of goods, people and road vehicle flows;
- Develops alternative solutions to address traffic jams and road congestion (maintenance of transport infrastructure, maintenance of road signs, use of the advanced urban traffic information system, etc.);
- The study of transport supply and demand, supported by a rationalization of resources (switching from certain road flows to rail and river modes);
- Organization of urban traffic (definition of public transport

lines, location of ends and ends of lines or termini, location of taxi ranks, regulations, etc.)
- Optimization of urban logistics costs

The Challenge of Urban Roads in the cCty of Yaoundé

The aim is to open up neighborhoods by paying particular attention to local roads and seeking suitable road designs to allow the passage of lighter vehicles (motorcycle taxis and shared taxis) on the one hand, and to ensure sustainable maintenance on the other. Improving traffic conditions for container operators' vehicles in order to increase their productivity and efficiency. It appears that the capacity to accommodate the number of vehicles on the road network is limited for various reasons. However, significant improvements could be made in terms of capacity by improving management and maintenance.

The challenge of Pedestrian Mobility

Provide more space for pedestrian walkways in the city of Yaoundé, whether in peripheral and isolated neighborhoods, along major roads and drains, or on the sidewalks of the city center. Essential actions must consist of facilitating these pedestrian movements through a set of development measures at low unit cost but concerted and supported by a strong political will. Explicitly integrate this mode into urban development policies, so as to limit the inconvenience linked to the overall urban environment.

The Challenge of Providing Public Transport

Organize multimodality by prioritizing existing forms of transport: buses, minibuses, shared taxis on major roads, and bendskins in outlying neighborhoods. Roadworks and negotiations with transport representatives can help facilitate minimal services in poor/isolated neighborhoods. Encourage lower fares through productivity. The fare levels necessary for the financial stability of non-subsidized companies largely exclude poor users. Overall productivity actions (improving traffic flow, efficiency of stations and bus terminals) should make fare reductions possible. Create a Public Transport Organizing Authority. Prioritizing the network, addressing road blackouts, issuing permits by zone, supporting operators, negotiating fare setting, and informing users would be its responsibility. A prerequisite is clarifying responsibilities for the organization of transport in Yaoundé. Act on employment in transport by pulling it up. The urban transport sector (particularly artisanal) offers a number of low-skilled jobs, accessible to the poor (there are an estimated 45,000 direct jobs in urban public transport in Yaoundé).

The Challenge of Relocating Equipment and Related Infrastructure

Equip neighborhoods with basic services (especially peripheral neighborhoods with "spontaneous" housing). Indeed, responding to the needs of poor populations does not only depend on the transport offer but also on the location of basic services (schools, health centers, markets, standpipes, etc.) with a view to reducing the distances to be covered. For example, improving water supply would reduce the inherent difficulty of this supply. The time saved and the fatigue saved would contribute to encouraging women to participate in paid activities, and children's engagement in school. Accessibility conditions for facilities must be taken into account from the design phase, in consultation with the relevant administrations. It is necessary to create and relocate to the urban peripheries the annexes of hospitals, ministries, schools, universities, markets, etc., which do not facilitate urban mobility. Stadiums and other infrastructure of this magnitude should be built further away from the city center and outskirts, preferably in areas like Sa'a-Mbalmayo-Okola-Nkolafamba-Esse-Mbankomo-Ntui.

Ecological and ICT Challenges

E-commerce is therefore becoming a solution to avoid traffic jams and achieve home deliveries. We can also opt for a computer system for managing GPS-based taxis that will not operate every day in the city, but in peri-urban areas. A dynamic of new modes of transport (canal, tramway) that are environmentally friendly and the relocation of certain polluting industries from the city of Yaoundé to rural areas. Establish a public-private partnership for ecological urban transport with transport companies using hybrid vehicles and others. Companies such as HYSACAM must promote reverse logistics and good hygiene for sustainable development. We can also create helicopter travel that is less polluting and facilitates urban mobility. Finally, in the futuristic urban policy, the metro and air transport should prevent the mobility of travelers from Yaoundé to other regions of Cameroon from depending solely on road transport.

Conclusion

The objective of this work was to analyze the link between urban logistics and urban mobility in the Yaoundé metropolis. In other words, to explicitly question the impact that urban logistics in the city of Yaoundé can have on urban mobility. At the end of this study, it emerges that Yaoundé is far from a new city. It is a city that does not facilitate urban mobility. It is an old city that must be decongested by modeling the city of tomorrow under the demographic pressure of the latter. This work is part of the field of various reflections on the challenges of urban development policies both in Cameroon and in most countries in sub-Saharan Africa. The Yaoundé metropolitan area will continue to grow and expand beyond its administrative boundaries. The city may continue to expand in an unplanned manner, reaching a radius of about 11 kilometers in 2025 and about 13 kilometers in 2035, 4,000,000 inhabitants in 2025 and 5,500,000 in 2035. This population could increase to 16 to 17 million inhabitants by the end of this century. If no measures are taken, urban mobility will become more of a problem. The urbanized area in 2035 could be nearly twice as large as today's and be nearly six times larger by the end of the century, reaching an urban mass equivalent to that of Kinshasa today. The role of decentralization in the context of the local public service is also questioned. It will therefore also be necessary to manage urban mobility at the inter-municipal level as proposed in the 2004/018 law on decentralization.

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