MOTORIZED TWO-WHEELERS IN SUB-SAHARAN AFRICAN CITIES: PUBLIC AND PRIVATE USE

Diaz Olvera, Lourdes – Laboratoire d'Economie des Transports, ENTPE, University of Lyon, lourdes.diaz-olvera@entpe.fr

Plat, Didier – Laboratoire d'Economie des Transports, ENTPE, University of Lyon, didier.plat@entpe.fr

Pochet, Pascal – Laboratoire d'Economie des Transports, ENTPE, University of Lyon, pascal.pochet@entpe.fr

Sahabana, Maïdadi – Communauté Urbaine de Douala, sahabana@yahoo.fr

ABSTRACT

In a number of Sub-Saharan African cities, motorized two-wheelers, which are traditionally intended for private use, have been appropriated for a commercial activity, the motorbike taxi. The aim of this paper is twofold: first, to determine the conditions which have made it possible for motorized two-wheelers to become a major public transport mode; second, to highlight the roles of motorized two-wheelers in daily travel, whether they are used as a personal or public transport mode. Our analysis is based on empirical material gathered in quantitative and qualitative surveys in Niamey and Douala.

The commercial use of motorized two-wheelers can be explained by the combination of three factors: shortage of transport supply, availability of factors of production and deficiencies in the regulatory framework and the enforcement of regulations. Whether used as a private vehicle or a taxi, motorbikes widen access to motorized modes, in terms of both users and travel. In Niamey, the users of private motorbikes are mainly young male middle-income earners, while in Douala the clientele of motorbike taxis consists of young working poor. The boom in the use of motorbike taxis is also due to the fact that they meet travel needs not satisfied by the other public transport modes, i.e. trips or segments of trips that are simultaneously too long to be made on foot and too short to represent a profitable market for other public transport modes. In both cities, attitudes towards personal and commercial motorbikes vacillate between prizing the flexibility of usage and rejecting its dangers. The most pressing needs for research into motorbikes, particularly taxis, relate to environmental, social and public health issues, with a view to improving regulation of the activity.

Keywords: motorized two-wheelers, personal motorbike, motorbike taxi, travel behaviour, attitude, public transport supply, urban transport, poverty, Niamey, Douala, Sub-Saharan Africa

1. INTRODUCTION

With 35% of the population living in cities in 2005, the countries of Sub-Saharan Africa (SSA) are among the least urbanized in the world, only the countries of South Asia being less so (28%). However, the region has the highest rates of urban growth, on average 4.4% a year in the period 1990-2005 (World Bank, 2007), due largely to natural growth of the urban population.

The rapid demographic growth is accompanied by an increase in the density of central zones and above all, the extension of urban areas in zones that lack basic infrastructures and services and some are unsuitable for housing. The surface area of the cities is thus tending to increase more rapidly than their population, at almost twice the rate in the 1990s in cities with populations of over 100,000 (Angel et al., 2005). The nature of current urban growth is distinctive of cities that are marked by poverty of population and insufficient capacity on the part of central government and local authorities to meet the growing population needs for services and infrastructure.

The situation with regard to urban transport illustrates the lack of resources. The road network is generally underdeveloped and in poor condition, the few asphalt roads are in the centre and on the main routes between the centre and the periphery. In most of the cities state-run transport companies ceased to exist in the 1980's and 1990's due to the combined effect of poor management, of the absence of a coherent transport policy and of macroeconomic policies based on the withdrawal of the State from social services and the reduction of public expenditure. Urban transport deregulation, strongly encouraged by Transport Sector Projects, became the rule and facilitated the expansion of transport services provided by small entrepreneurs, registered and unregistered. In a context where car ownership is affordable to only a minority of the population, the rapid growth of transport supply by the private sector has also been fostered by the strong demand for public transport, the absence of the obligation to provide a public service and the complexity of the regulatory framework which is only applied very loosely by the authorities.

Transport supply dominated by small entrepreneurs involves the operation of vehicles of various sizes, from saloon cars to freight vehicles that have undergone more or less rudimentary transformations that enable them to carry passengers. An unusual form of public transport has appeared in a number of cities. Motorized two-wheelers, which are traditionally intended for purely private use, have been appropriated for a commercial activity: the motorbike taxi. This form of public transport currently meets a major share of the population's transport needs but elicits a number of criticisms from users, other public transport operators, authorities and the population at large (Mahlstein, 2009).

The aim of this paper is twofold: first, to determine the conditions which have made it possible for motorized two-wheelers to become a major public transport mode; second, to highlight the roles of the motorized two-wheeler in daily travel, whether it is used as a

personal or public transport mode. This paper is organised as follows. Section 2 highlights the features of the socio-economic, political and sectoral contexts which have fostered the emergence of motorbike taxis in a number of SSA cities since the 1980s. Section 3 analyses the travel behaviour of the users of motorized two-wheelers by comparing the cases of Niamey (private use) and Douala (motorbike taxis). Next, Section 4 presents the attitudes of the population of both cities towards private or commercial motorized two-wheelers, respectively. Last, the conclusion (Section 5) summarizes the main findings and considers the role of motorized two-wheelers, particularly the motorbike taxis, in the transport system and within the urban system as a whole. Il also provides suggestions for further research.
Our analysis is based on data gathered in quantitative and qualitative surveys. We have processed household travel survey data from Niamey (1996) and Douala (2003) and we have analysed interviews carried out in 2003 in Douala with low-income inhabitants and motorbike taxi drivers.

2. THE BEGINNING OF MOTORBIKE TAXI SERVICES

While the urban motorbike taxi is a relative newcomer, its rural ancestor, the bicycle taxi already existed as far back as the 1930s in the Senegalese city of Kaolack (Morice, 1981) and the 1960s in Kenya, Uganda and Benin where it was used to carry both people and goods (Malmberg-Calvo, 1994; Tossou, 1993). Motorbike taxis appeared in Nigeria in the 1970s (Oyesiku, 2001) but their true rise seems to have started in the mid-1980s in Niger, Cameroon and Togo, and in Benin and Uganda as a development from the bicycle taxi (Agossou, 2004; Howe, Maunder, 2004). While the motorbike taxi still exists in Uganda, its use has above all developed in West and Central Africa under a variety of different local names: zemidjan in Benin, bendskin in Cameroon, kabu-kabu in Niger, okada or alalok in Nigeria, boda-boda in Uganda, oleyia in Togo (Agossou, 2004; Ngabmen et al., 2000; Dille, 2002; Mahlstein, 2009; Oyesiku, 2001; Malmberg-Calvo, 1994; Segbor, 1998).
As with other forms of informal transport, the number of motorbike taxis operating in the various cities is unknown and what we have at best are estimates. For example, at the beginning of the 21st century, there would appear to be 50,000 vehicles in Cotonou (Godard, Ngabmen, 2002) and 70,000 in the whole of Uganda (Maunder, Howe, 2004); 22,000 in 2003 in Douala (Sitrass, 2004) and in the same city almost 25,000 in 2008 (Breit Consulting, 2008); the figure of 10,000 has been put forward for Calabar in Nigeria in 2008 (Mahlstein, 2009).
The commercial use of motorized two-wheelers can be explained by the combination of three factors: the shortage of urban transport supply, the availability of factors of production and the permissiveness of the regulatory framework.

2.1. The shortage of transport supply

The motorbike taxi is a “bottom-up” response to a shortage of transport affecting private vehicles, infrastructure and public transport. As the purchase and use of motorized personal vehicles is too expensive in view of the population’s low income levels, household vehicle ownership rates are extremely low. The majority of the population is thus dependent on

public transport for the motorized trips it needs to make. The lack of roads and their poor condition make it difficult for motor vehicles to make their way and mean that transport operators are unable to provide the urban area with a dense network of services, particularly in unplanned peripheral zones. Moreover, while public transport is very inadequate in major cities, there is usually none at all in smaller ones.

Two types of situation have exacerbated the dearth of transport and stimulated the emergence of motorbike taxis. The first of these is the closure of the border between two countries with strong economic and social ties, as was the case between Kenya and Uganda in the early 1970's (Howe, 2003) and between Niger and Nigeria in the mid-1980s (Dille, 2002).The second type of situation involves social tension caused by citizens' demand for democracy, with calls for general strikes as in Lomé, Douala and other cities in Cameroon in the early 1990s (Godard & Ngabmen, 2002; Ngabmen et al., 2000). Neither public transport nor private vehicles could move about, and motorized two-wheelers took advantage of their unobtrusiveness and handiness to travel off the roads to make up for the lack of transport.[1]

2.2. Available factors of production

The appearance of motorbike taxis has also been encouraged by the availability of three factors of production: vehicles, fuel and labour.

In the cities where motorbike taxis have developed, some of the population possessed a motorized two-wheeler as a personal transport vehicle. The individuals in question were employees, including civil servants, but also persons who were unemployed or economically inactive who had purchased a vehicle with their redundancy money and/or their savings, as was the case for Beninese citizens who were expelled from Nigeria and returned home with a motorbike. The purchase of these vehicles has been facilitated either because manufacturing or assembly units exist locally, as in Nigeria, or because of the nearness of ports and borders which creates the possibility of, legally or illegally, importing vehicles (usually second-hand) from Nigeria, Europe and Japan, and more recently new vehicles from China.

The situation as regards the availability of fuel is similar to that for vehicles. Either it can be purchased directly in oil producing countries or legally or illegally imported from them. Here too, Nigeria plays an important role in promoting this mode in its neighbouring countries. For example, bendskin drivers in Cameroon have used "*zouazoua*", much cheaper fuel smuggled in from Nigeria which became widespread during the urban strikes. The price of smuggled fuel is much below the official price, which improves the short term profitability of motorbike taxis compared to other public transport modes. Other operators are less likely to use fuel which may damage their engine and shorten the life of their vehicle.

The economic deterioration that has affected SSA since the end of the 1970s resulted in a considerable shrinkage in the paid employment market, a large surplus in skilled, and above all unskilled labour, and a continuous fall in household purchasing power. Moreover, a variety of events, such as the sending back of intra-African migrants to their country of origin, civil

[1] A similar situation was observed in Mexico City in August 2006. When the political party that had lost the presidential election blocked vehicular traffic in the downtown area, paid transport by private motorbike appeared spontaneously within the affected area.

wars, or periods of drought have played a major role in the deterioration of the economies in the area.

The impoverishment of urban populations has led to a continual search for survival strategies and the increasing importance of low-paying jobs in the informal sector. In developing countries, the transport sector has traditionally been open to males without the need for specific training or experience. In this way, former salaried earners and the unemployed of various ages are able to drive public transport vehicles or do other jobs associated with public transport operation (see Teurnier and Mandon-Adoléhoume, 1994, who describe the case of transport operators with university degrees in Dakar, and Kponhassia, 2003, who recounts the story of an accountant who became a *woro woro* driver). Even more than in the case of other modes of transport, being a motorbike taxi driver constitutes a last resort from which 86% of them earn the majority of their income (Breit Consulting, 2008).

2.3. A loose regulatory framework

The emergence of motorbike taxis was also facilitated by shortcomings in local public transport regulations. When the first motorbike taxis appeared, motorized two-wheelers were thought of exclusively as a personal transport mode. In some cases, depending on the characteristics of the vehicle, there was no obligation either to register the vehicle or hold a driving licence. At the time, the administrative and regulatory texts did not envisage their use for public transport purposes.

The increasing role of motorbike taxis in public transport gradually led the authorities to take more notice of them. Initially, ignorance, indifference and tolerance held sway (Godard and Ngabmen, 2002). In a context where there was a shortage of transport supply, the authorities often tolerated this mode of transport, considering it as a temporary situation or as a means of reducing the effect of strikes called by the opposition (Ngabmen et al., 2000). Subsequently, the growing number of motorbike taxis has changed the relationship between the different stakeholders in the transport sector. In a short gap of time, motorbike taxis came to be demonized by the general public and the local authorities because of several reasons: their competition with other operators, their power as a pressure group acting on the authorities, other operators and the rest of the population, their aggressive behaviour and driving and the negative externalities (accidents, air pollution, security) they generate.

The local authorities have gradually attempted to control the activities of the motorbike taxis by taking more account of them in public transport regulations. There has generally been a considerable disparity between contents of regulations and their application but the situation varies greatly from one country to another or even from one city to another in the same country. In Cameroon, even though the decree that set out the conditions and terms for operating motorized two-wheelers against payment was issued in November 1995, all the operators still do not have the necessary licences and administrative documents. Furthermore, they still do not comply with other formalities such as the need for the driver and passenger to wear a helmet or the need to paint the vehicle yellow (Sahabana, 2006b). A study of motorbike taxis conducted in 2008 in Douala found that 17% of the drivers did not hold a driving licence and that 34% of the vehicles were without registration documents (Breit Consulting, 2009). Even worse, only 73% of the drivers had at least two of the seven necessary administrative documents, and only 40% had three.

In some exceptional cases, application of the regulations soon proved more successful. In Calabar, in Nigeria near the Cameroonian border, the enforcement of regulations started in early 2007. One year later, there was a clear tendency for both the driver and passenger to wear helmets and for the driver to wear a reflective jacket, even though these accessories were not always worn correctly (Mahlstein, 2009).

This brief description of the factors that have led to the existence and development of motorbike taxis reveal close similarities with the other forms of informal public transport that preceded them in Sub-Saharan cities: they appeared as a reaction to shortages in public transport supply and shortcomings in the content and implementation of public transport regulations. Similarities are also apparent in their operating conditions, such as drivers renting the vehicles, the sharing of operating costs between the driver and the vehicle owner and the demanding nature of the work.

The physical characteristics of the motorized two-wheeler are extremely important for its use as a public transport vehicle. The motorbike taxi provides a service which could be described as “personalized” or “minimal”: a single passenger without bulky baggage, in theory, and a trip for which door-to-door service is possible, even in areas with poor roads or no roads at all. There is therefore little difference between them and the motorized two-wheelers that are used for private purposes, apart from the systematic presence of at least one passenger and the fact that the journey is paid for. Are there also similarities between private and public use in terms of daily travel and the users?

3. MOTORIZED TWO-WHEELERS IN DAILY TRAVEL

The household travel surveys conducted in Niamey in 1996 and Douala in 2003 allow us to study the role of motorized two-wheelers in daily travel. The seven year gap between the two studies means that the picture we have is staggered in time, which is a result of the scarcity of information on travel in the cities of SSA.

The classification of individuals according to their use of private or public transport modes on a weekday (Table 1) shows that at Niamey, motorized two-wheelers have the status of a personal vehicle (9% of the population) while in Douala it is very clear that their status is that of a public transport mode, the *bendskin.* On average in Douala, only 1% of the population travels on a personal motorbike, while 28% use a bendskin on a weekday.

A motorbike taxi may be used either as a principal mode of transport or in combination with another transport mode, generally public, for the initial and/or final segments of the trip. This flexibility of motorized two-wheelers means it can replace walking for these segments and thus increase the possibilities for using other public transport modes, both in terms of users and trips. In Douala, there are as many bendskin users as there are individuals who exclusively use traditional public transport modes, but they are more mobile. This characteristic is even more marked in the case of users that combine the use of bendskins with that of conventional public transport in a weekday.

The travel levels of those using private motorized two-wheelers are very much higher than average. In Niamey, motorcyclists travel as much as car users. Residents who combine the use of motorized two-wheelers with other private or public motorized modes seem to be hypermobile travellers, but there are very few of them. In Douala, a similar situation is

observed for motorcyclists, they travel more than all the other categories, but they constitute a small sample.

Table 1 – Travel on a weekday for residents of Niamey and Douala according to their modal use

	Niamey		Douala	
	%	Number of trips	%	Number of trips
Nontravellers	10	0	8	0
Walkers*	53	4.4	31	4.8
Public transport users	19	4.3	28	4.8
Users of the bendskin solely	-	-	15	5.2
Users of the bendskin and other public transport modes	-	-	14	5.5
Users of private motorbikes	7	6.4	1	6.7
Users of private motorbikes and another motorized mode	2	8.0	-	-
Private car users	9	6.3	3	5.7
Total	100	4.3	100	4.5

* "Walkers" consist of individuals who made all their trips in the day on foot.

3.1. The users of motorized two-wheelers in Niamey

The users of motorized two-wheelers have a characteristic profile. 90% of those for whom the motorized two-wheeler is the only mechanized mode used in the day are male, otherwise, for those who use a motorbike and other public transport modes, the figure is 75%. More than half of the users are in employment, while this group represents less than a quarter among public transport users. They have average incomes, and are in the majority of cases household heads (60 %) and young (more than a half of them are between 18 and 34 years of age, and a third between 35 and 55 years of age).

Research into the role of the private car in the daily travel of SSA citizens has shown that car users include those who have permanent use of a car and those for whom availability of a car is indirect, such as children belonging to motorized households and non-motorized fellow workers (Diaz Olvera et al., 2008). A very similar situation applies in the case of motorized two-wheelers, and three types of users can be identified on the basis of household ownership and vehicle availability: *exclusive users* (70 % of users) belong to households that own a motorized two-wheeler which is available to them on a permanent basis; *related users* (10%) also belong to the households that own a motorized two-wheeler, but either it is not available to them at all or it is available only occasionally; *deprived users* (20 %) belong to households without a motorized two-wheeler and their only access to one is via their personal or occupational contacts.

The *exclusive users* structure their daily travel around the motorized two-wheeler, to the exclusion of all other mechanized modes, and also reduce their walking trips (which account for less than a quarter of all their trips). *Related users* and *deprived users* constitute a population which includes more women, who has a lower level of education and which includes fewer employed persons than the *exclusive users*. Their access to a motorized two-wheeler is limited, but it nevertheless allows them to travel more than residents with no

access to one at all, e.g. 70% more than public transport users. They are more frequently passengers on two-wheelers, even though they drive for 40% (in the case of *related users*) and 30% (in the case of *deprived users*) of their trips. For them, the motorized two-wheeler is a mode they use when the opportunity presents itself, particularly for social trips. In this case, the great majority of the trips made by *exclusive users* (81 %) are return journeys, while this proportion is slightly lower amongst *related users* (71 %) and drop amongst *deprived users* (41%). Thus, these differentiated configurations in travel patterns reveal the degrees to which the groups have an extremely hierarchical control over the vehicle.
Compared with the private car, use of private motorized two-wheelers among *related users* and *deprived users* is considerably lower. This is firstly explained by the capacity of the vehicle, in spite of the fact that in day-to-day use it frequently carries more than two people at the same time. But the main impediment relates to social constraints which determine whom the driver can carry as a passenger. For instance, travelling with a person of the same sex and the same age group is more acceptable than other alternatives. However, social barriers seem to be less decisive in Douala, where the motorbike taxi has acquired an important role in public transport.

3.2. The clientele of *bendskins* in Douala

The first difference between private and commercial use of motorized two-wheelers is that women are more numerous than men among motorbike users (54%). The second feature is that young adults account for an even higher percentage: 69% of users are between 18 and 34 years old. Incidentally, this feature is also very marked in comparison with other transport users in Douala as this age group only accounts for 42% of other public transport users, 36% of walkers and 15% of motorists.
In fact, the bendskin appears to be the motorized mode that is the most used by the poor in Douala, but not the poorest. The economically active population accounts for 70% of users and among those with jobs outside the home, two in five women and a third of the men report using the bendskin to go to work. Motorbike taxis are a transport mode used by a majority of working poor and this is the main feature that distinguishes “public” use of motorized two-wheelers from their private use. These difference is confirmed by two figures: while in Niamey, the “poor” (the population earning less than the median income) account for only 21% of motorbike users who use motorbikes to the exclusion of other motorized modes (30% otherwise), in Douala, the poor account for 45% of the motorbike taxi users who use these vehicles in an exclusive manner (49% otherwise), but the poorest quartile of the population is relatively under-represented. The clientele of the bendskins also appears to be poorer than that of “conventional” public transport which “only” has 41% of poor users. We can put forward two hypotheses to explain this: either there is an economically based decision to prefer bendskins, because they are more affordable than shared taxis, at least for short distances in the city centre and for initial and final segments; or decision is simply due to a lack of modal choice because of the remoteness of some poor suburbs and the poor condition of the service roads which means that motorbike taxis have little or no competition from other transport operators.
As we have already seen, bendskins may be used either as the principal mode of transport or for the initial and final segments of trips. In the first case, the trips are short, 16 min on

average, and made up of 1.5 trip legs. Three-quarters of bendskin trips take place between the individual's home district and a distant district but there are still a significant number of trips to neighbouring districts (more than 20%). Two out of five trips are for work purposes, the rest being shared between trips for domestic and social activities. The trips for which the motorbike taxi is used for initial and final segments are longer (40 min on average), more complex (2.8 journeys) and in almost all cases (98%) involve trips between the home district and a distant district. These trips are dominated by occupational trips (more than half of them are for work, almost a fifth for education), but more than 20% of the trips are still made for social reasons.

Motorbike taxis, either alone or combined with other modes, thus provide services that other transport modes, particularly shared taxis, do not: trips or segments that are simultaneously too long to be made on foot as they would be too physically demanding, and too short to represent a profitable market for other public transport modes[2]. Bendskins therefore seem more to complement than to compete with other forms of public transport, both in very dense areas and in the parts of the city where it is difficult to provide four-wheeled transport. They therefore meet needs for transport which are not satisfied by other public transport operators. Nevertheless, motorbike taxis are unable on their own to compensate for the accessibility disparities that affect the different residential zones in the city.

4. THE AMBIVALENT IMAGE OF THE MOTORBIKE

In Niamey and Douala, attitudes towards the different transport modes were collected using a grid of attributes that took account of distinct dimensions of travel that may influence user modal choice.

In Niamey, the grid contained 8 attributes. The first was purely economic (*Cheap*). Six others related to quality of service, three of these being fairly abstract (*Free to come and go at any time, Goes everywhere, Saves time*), and the rest more concrete (*No wind and dust, No accidents or thefts, Possibility of travelling with others*). The last involves a dimension that is rarely considered in attitudinal studies of different transport modes, but which is important in societies in which a rigorous modal hierarchy exists, namely the possibility of showing one's social position during the trip (*Being seen by others*).

During data collection, the interviewer began by asking which three of the eight attributes a transport mode should generally possess. The respondent then stated whether or not each mode that operated in Niamey fulfilled these eight conditions. The two phases can be analysed separately, but it is also interesting to calculate, for each mode, an indicator that combines the results from both phases: if we do this, the score varies from 0, when the mode meets none of the individual's expectations, to 3, when it satisfies them all. Calculating the score solely on the basis of the individual's three criteria provides summarized information and means that the evaluation of the different modes does not take account of the dimensions that matter less to the individual, such as the cost for the wealthiest individuals.

In Douala, the aim of the study was to elucidate the nature and the scope of the major needs

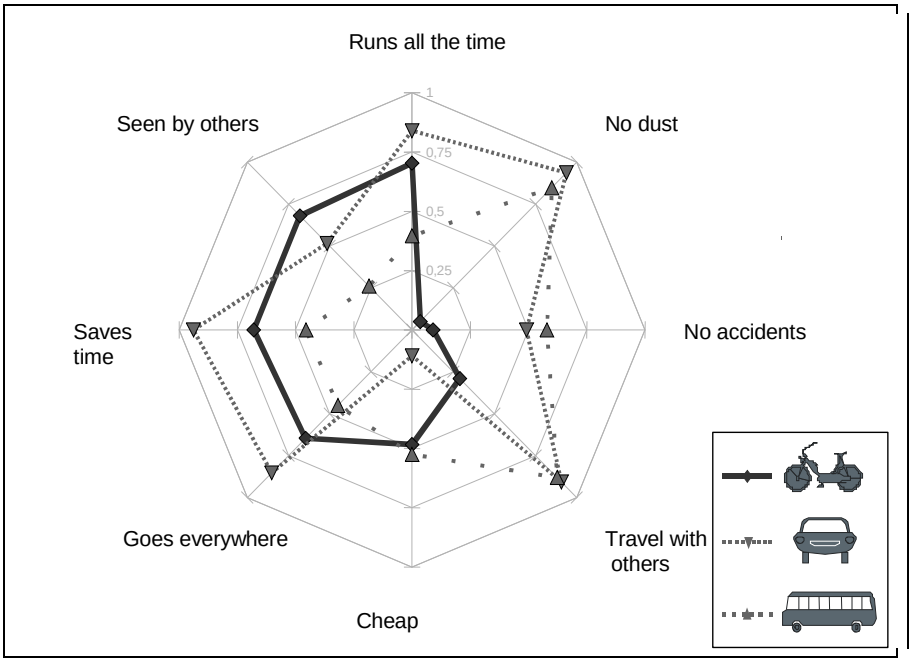
[2] On weekdays, the average duration of a shared taxi trip is 26 min (10 min more than the average duration of a bendskin trip), in particular because of the need to make access journeys on foot.

of the poor with respect to daily mobility and therefore the list of items was modified and the methodology was improved. The list of nine attributes also included the economic dimension (*Cheap*) and the three abstract quality of service attributes formulated in the same or a very similar way (*Runs all the time, Goes everywhere, Fast*). The five other attributes were new (*Stops nearby, Short wait, Carries merchandise*) or made more precise (a distinction was introduced between *No accidents* and *No assaults*). All the respondents were asked to state whether or not a mode had a particular attribute, but only for the transport modes they used most frequently (two at most). The respondents described 1.8 modes on average, mostly shared taxis (51% of all respondents) and bendskins (42 %). The results from Niamey and Douala are therefore not strictly comparable, but they nevertheless allow us to identify clearly the main advantages and disadvantages of motorbikes in relation to other modes, whether they are used as a personal mode (as in Niamey) or a public mode (as in Douala).

4.1. The motorbike in Niamey: a mixed image

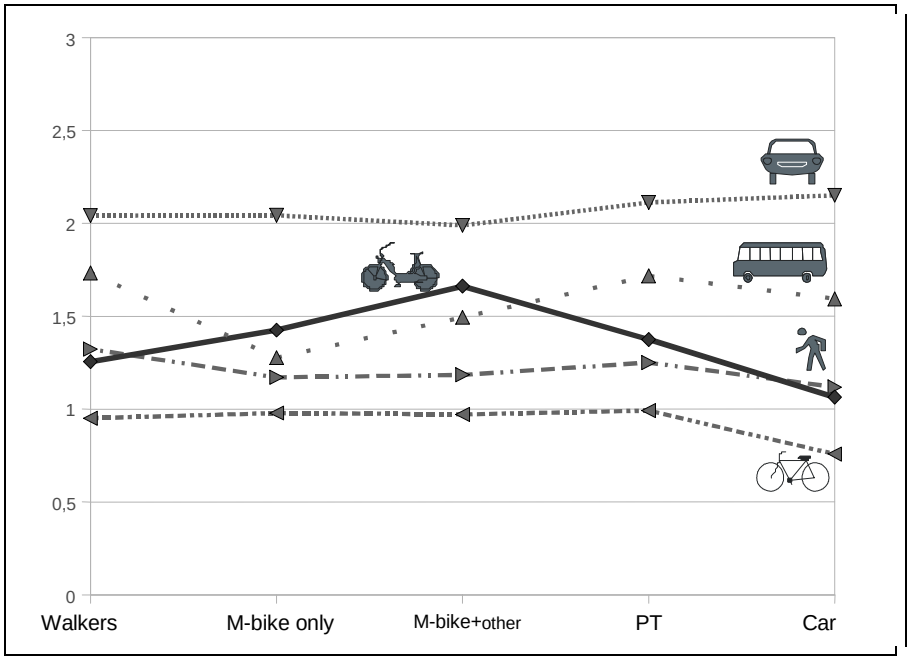
For almost three-quarters of the respondents the main advantages of the personal motorbike relate to the abstract dimensions of quality of service (*Goes everywhere*, *Runs all the time* and *Saves time*; Figure 1). However, a much larger majority emerges if we consider the mode's physical shortcomings: it is hazardous, open to the weather, and, to a lesser extent, makes it difficult to travel with others. Half the respondents perceive the personal motorbike as being a cheap mode of transport, like the public transport modes. This similarity is, however, deceptive, as it probably does not reflect the same perception of mean cost of use for each of them. On a monthly basis, this was of the order of 13,000 CFA Francs for the motorbike at the time of the survey (two-thirds of which being the cost of fuel), i.e. twice the cost of public transport reported by its users. However, in unit price terms, due to the high level of vehicle use the motorbike costs about 100 CFA Francs per trip, without vehicle depreciation, which is equivalent to the price of a bus journey and considerably cheaper than informal public transport.

This contrasted perception of motorized two-wheelers resulted in a low average score (1.3), somewhat behind public transport (1.7) and a very long way behind the car (2.1). The maximum score for motorbikes was among its users, who used this mode almost exclusively during the day (Figure 2). This "extra value" that is given to the mode that is actually used is not specific to the motorbike and it is also observed here for other transport modes (Diaz Olvera et al., 2008). It expresses the constrained rationality of modal choice, but also reflects the reduction of cognitive dissonance that is observed in various situations (Golob et al., 1979; Kaufmann, Bassand, 1996), which consists of bringing attitudes and effective behaviour closer together by overvaluing one's own practices.



Key: one in two respondents thought the motorbike was cheap and practically none of them thought it protected them from dust.

Figure 1 - Perception of transport modes in Niamey



Key: the score for each mode may vary between 0 and 3 according to whether it satisfies 0, 1, 2 or 3 of the criteria that the individual considers to be important for a transport mode.

Figure 2 – The score of the different modes according to user category, in Niamey

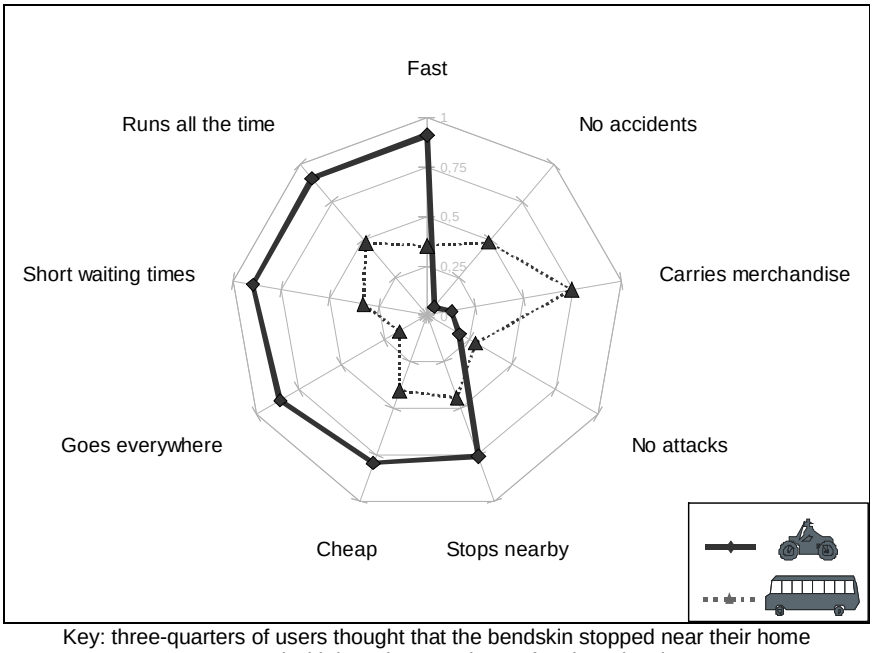
4.2. The *bendskin* in Douala: recognized assets, very marked faults

In Douala, almost all users appreciate the quality of service provided by the motorbike taxi (Figure 3). Almost nine-tenths of users state that bendskins run all the time and that waiting times are low. The bendskin also facilitates access to locations which are problematic for other vehicles, going everywhere (nine-tenths of users) and stopping near their home (three-quarters of users). However the spatial availability of motorbike taxis in the city has its limits, and only one in two of the users living in zones with difficult access considered that the motorbike taxi stops near their home.

> "Of course, the road from my house to the main road is not tarred, it is difficult to find motorbikes that are willing to pick up customers". Employed 29 year-old man living in Bépanda Petit Wouri

Although leaving home is occasionally difficult because there is no bendskin available, a door-to-door service is possible for the return journey.

> "Coming back from the market I use a bendskin… because it is quicker, and above all it takes me all the way home". A trader with a stall on the central market.



Key: three-quarters of users thought that the bendskin stopped near their home compared with less than one in two for shared taxis.

Figure 3 - Perception of bendskins and shared taxis by their users in Douala

Four-fifths of users considered the bendskin to be cheap. On average, a motorbike taxi trip costs two-thirds as much as a shared taxi trip (122 CFA Francs and 185 CFA Francs, respectively, at the time of the survey) and is slightly cheaper than a bus journey (150 CFA Francs). But the base fare of a bendskin journey (100 CFA Francs) is usually negotiated at

any time, by either the driver or the client: 65% of motorbike taxi trips cost 100 CFA Francs, but 21% of them cost 150 CFA Francs (i.e. the base fare of a shared taxi) and 13% cost at least 200 CFA Francs. Like the other informal transport modes, prices are directly linked to the length of the journey. On average, the price is a third higher when the duration of the journey increases from 5 minutes to over 20 minutes. This may be the reason why bendskins are mainly used for short journeys, to link up with other public transport modes or to travel into districts.

> "At times, very early in the morning, you pay 125. When there are a lot of them, if you are lucky, you can find one that will charge 100 F, sometimes for long distance it is difficult to find anybody…for what you can afford to pay." A stonemason with a small shop selling foodstuffs and living in Maképé Yoyong.

As is the case in Niamey for personal motorbikes, while attitudes towards motorbike taxis are very positive as regards quality of service and cost, the respondents almost unanimously stressed the danger of accidents (95% of respondents) and attacks (80% of respondents), to such an extent that some city residents stated that they never travel by motorbike taxi and prefer shared taxis or walking. Last, only one in ten users considered that it was feasible to carry merchandise on a bendskin, in spite of the fact that this mode is fairly used on a daily basis for this purpose. Bakers, for example, make increasing use of bendskins to supply grocer's shops and female street vendors selling prepared dishes. Likewise, some merchants report transporting their merchandise by motorbike.

> "I'm mad about bendskins; I use a bendskin to go to the market and to come back. Sometimes, when I have a lot to carry, I take two bendskins. In this case, one carries my supplies and the other carries me with part of the food that I have bought". A 36 year old female trader whose husband is unemployed.

There are strong similarities between the attitudinal profiles of personal motorized two-wheeler users in Niamey and motorbike taxi users in Douala. In both cases, attitudes are divided between prizing the flexibility of the transport mode and rejecting its dangers.

5. CONCLUSION

Whether used as a private vehicle or a taxi, motorized two-wheelers play an important role in the transport systems of African cities by widening access to motorized modes. In Niamey, there are as many private users of motorized two-wheelers as there are car users, and in Douala there are as many bendskins users as users of the other public transport modes. In both cities, the users of motorized two-wheelers, whether personal or public, travel much more than the "average" resident of the city. Furthermore, the majority of the motorcyclists in Niamey are exclusive users of the mode: as a vehicle is available to them at all times, they use no other mechanized mode in the day and they travel as much as car users.

The results of this research also remind us that the availability of a private vehicle is an important marker of social differentiation in the cities of SSA. In Niamey, the users of private motorbikes are mainly young male employees on medium salaries who are household heads. Conversely, in Douala the clientele of bendskins consists of more women, more poor working population and an even higher proportion of young adults than in Niamey. While admittedly it is better to be adult and in good physical health when using a motorbike taxi, these are not the only factors which explain the features of the clientele. The increasing economic difficulties encountered by young adults naturally make them the principal users of this transport mode.

From this point of view, motorized two-wheelers improve spatial as well as temporal accessibility of low- and middle-income populations and, in the case of public transport use, the least underprivileged segment of the urban poor. This improved accessibility facilitates the use of urban amenities and limits, to some extent, the effects of the inegalitarian processes in SSA cities. The population's image of the motorized two-wheeler is quite ambiguous, and fairly similar in both cities. On the one hand, its good quality of service and affordable cost are highly prized. On the other, its disadvantages in terms of risk of accidents and risk of assaults are clearly perceived, particularly in the case of commercial motorbikes.

The influx of cheaper vehicles from Asia (China, Indonesia, etc.) is fuelling the boom in motorbike use in SSA cities. Given the structural deficit in transport supply, this dynamic is particularly strong in cities where motorbikes are used commercially. The rise of the motorbike taxi shows that the travel benefits for users are markedly greater than the disbenefits. The motorbike taxi is effective for short trips in city centres or peripheral areas, and also for access journeys in zones with poor transport services. It is a rapid mode because it avoids the congestion and operating constraints that affect shared taxis and conventional buses.

However, the "dark side" of the motorbike taxi becomes apparent when one looks at the social conditions which prevail within the activity and the negative externalities that are generated by its growth. It is of course true that the motorbike taxi sector provides a great many young people with a source of income, in a context where finding a job presents enormous difficulties. It provides a living for 30,000 people in Douala, most of them young as more than 70% of the drivers are between 18 and 35 years of age. But the job of motorbike taxi driver does not seem to be a long-term activity: two-thirds of the drivers have been working as such for less than 5 years (Breit Consulting, 2008). This high turn-over is explained by the difficulties involved in the job: motorbike taxi drivers suffer from long working days and difficult working conditions, are vulnerable to accidents and attacks, and are also the most exposed to urban transport pollution.

The lack of vehicle maintenance and the poor quality of the fuel used have an adverse impact on combustion processes and pollutant production, which contribute to greenhouse gas production. Furthermore, these local pollutant emissions also contribute to the deterioration of the conditions of public health. The health issues are even more apparent when we consider the large number of fatalities and injuries due to road traffic accidents in which motorbike-taxis are involved. The dangers are so great that the population has named hospital casualty departments after the local name of motorbike taxis or the name of the most popular brand of motorcycle (Wamé, 2002, Mahlstein, 2009).

Probably the most pressing needs for research into motorbike taxis relate to these environmental, social and public health issues, with a view to improving regulation of the activity. In particular, comparative analyses would enable us to understand why, in some situations, a greater level of regulation is accepted. Many questions still remain unanswered. How can motorbike taxis be better integrated into urban public transport policies (Sahabana, 2006a)? Is it possible to link them more formally with other modes of public transport, and thereby make their activity more permanent, limit the negative external impacts while retaining their benefits for the transport systems of Sub-Saharan Africa cities ? In any case, the motorbike taxi sector shows how the “bottom-up” production of a service supplied by small entrepreneurs may be successful and profitable in a context of crisis, weak supervision from local administration, job scarcity, poor facilities in districts and low user incomes. The relevant local and national authorities can no longer ignore this success, even though they have not yet found a way of including these vehicles effectively within integrated urban transport policies.

REFERENCES

Agossou N.S.A., 2004, Les taxis-motos zemijan à Porto-Novo et Cotonou, Autrepart, n°32, 135-148.

Angel, S., S. Shepard and D. Vivco (2005). The Dynamics of Global Urban Expansion. World Bank (Transport and Urban Development Department), Washington, D. C. http://www.williams.edu/Economics/UrbanGrowth/WorkingPapers.htm (accessed on 5/12/2007).

Breit Consulting (2008). Analyse de l’impact de l’augmentation du parc de motocyclettes dans la ville de Douala. Rapport provisoire pour le Ministère des Transports du Cameroun. Programme de politiques de transport en Afrique subsaharienne. Breit Consulting, Yaoundé.

Diaz Olvera, L., D. Plat and P. Pochet (2008). Logiques d'usage et formes d'appropriation de la voiture en Afrique subsaharienne. In: Automobilités et altermobilités. Quels changements? (F. Clochard, A. Rocci and S. Vincent, eds.), pp. 199-211. L'Harmattan, Paris.

Dille, B. (2002)., K comme Konni ou la mobilité dans une ville moyenne. In: Les transports et la ville en Afrique au sud du Sahara. Le temps de la débrouille et du désordre inventif (X. Godard, ed.), pp. 167-180. Karthala-Inrets, Paris-Arcueil.

Godard, X. and H. Ngabmen (2002). Z comme Zemidjan, ou le succès des taxis motos. In: Les transports et la ville en Afrique au sud du Sahara. Le temps de la débrouille et du désordre inventif (X. Godard, ed.), pp. 397-406. Karthala-Inrets, Paris-Arcueil.

Golob, T.F., A. D. Horowitz and M. Wachs (1979). Attitude-Behaviour Relationships in Travel Demand Modelling. In: Behavioural Travel Modelling (D.A. Hensher and P. R. Stopher, eds.), pp. 739-757. Croom Helm, London.

Howe, J. (2003). “Filling the middle”: Uganda's appropriate transport services. Transport Reviews, 2, 161-176.

Howe, J. and D. A. C., Maunder (2004). Boda boda – lessons from East Africa's growing NMT industry. 10th World Conference on Transport Research, Istanbul, 4-8 July 2004, 10 p.

Kaufmann, V. and M. Bassand (1996). L'automobilité urbaine : une impasse ; In: Villes et transactions sociales. Hommage au professeur Jean Rémy (L. Voye, dir.), pp. 29-50. L'Harmattan, Paris.

Kponhassia, G. (2003). Reconversions professionnelles, reconversions mentales. La reconversion des salariés ivoiriens au chômage dans le secteur des activités informelles autrefois abandonnées aux 'étrangers'. In: L'Afrique des citadins. Sociétés civiles en chantier (Abidjan, Dakar) (F. Leimdorfer and A. Marie, eds), pp. 343-354. Karthala, Paris.

Le Bris E. (1991). Crise urbaine et effets urbains de la crise : le cas de l'Afrique Noire. Espaces et Sociétés, 65, 61-81.

Mahlstein, M. (2009). Shaping and Being Shaped. The Regulation of Commercial Motorcycle Operation and Social Change in Calabar, Nigeria. University of Basel, Basel.

Malmberg-Calvo, C. (1994). Case Study on Intermediate Means of Transport. Bycicles and Rural Women in UgandaSSATP Working Paper n°12. Wor ld Bank, Washington, D.C. http://www4.worldbank.org/afr/ssatp/Resources/SSATP-WorkingPapers/SSATPWP12.pdf (accessed on 01/2010).

Morice, A. (1981). Les vélos de Kaolack. Cahiers d'Etudes Africaines, 81-83, 197-210. www.persee.fr (accessed on 05/2007).

Ngabmen, H., M. Habyarimana and C. Eboumbou Jemba (2000). Etude exploratoire sur les taxis-motos dans les villes africaines. Les "bend skin" de Douala. Rapport pour le Ministère français des Affaires Etrangères. Groupe Interdisciplinaire d'Etudes et de Recherche sur les Transports (Giret).

Oyesiku, K.O. (2001). City poverty and Emerging Mobility Crisis: The Use of Motorcycle as Public Transport in Nigerian Cities. 9th World Conference of Transport Research, Seoul, 22-27 July 2001, 16 p.

Sahabana, M. (2006a). Les autobus en site propre intégral, une solution à la crise des transports dans les grandes agglomérations subsahariennes. Thèse pour le Doctorat de Sciences Economiques, mention Economie des Transports. Université Lyon 2, Lyon.

Sahabana M. (2006b). Les motos-taxis à Douala et leur perception par les pouvoirs publics: entre tolérance d'un secteur pourvoyeur d'emplois et de transport et volonté d'éradiquer une activité incontrôlable. Secondes rencontres internationales CIDEGEF/Ville management "Evolutions institutionnelles et gouvernance dans le système de transports en Afrique Sub-Saharienne". Douala, 20-24 November 2006, 15 p.

Segbor, P.K. (1998). Quels transports urbains à Lomé en l'an 2000 ? In: Urban Transport Policy. A Sustainable Developement Tool (Codatu, ed), pp 827-830. Balkema, Rotterdam.

Sitrass (2004). Poverty and Urban Mobility in Douala. Final Report, SSATP Report No 09/04/Dla, World Bank, 143 p. http://www4.worldbank.org/afr/ssatp/Resources/PapersNotes/Douala_en.pdf (accessed on 01/2010)

Teurnier, P. and B. Mandon-Adoléhoume (1994). L'intégration du transport artisanal dans un service public de transport urbain : le cas de Dakar. Inrets-Codatu, Paris.

Tossou, C. A. (1993). Les taxi-motos urbains de Cotonou : sécurité et environnement. In: Actes de la Codatu Transport urbain dans les pays en développement, section XII, pp. 45-55, Tunis, 15-19 February 1993.

Wamé, B. (2002). Les moto-taxis ou la danse de la mort. http://www.afrik.com/article4754.html (accessed on 02/2007).

World Bank (2007). World Development Indicators, World Bank, Washington, D.C. http://siteresources.worldbank.org/DATASTATISTICS/Resources/table3_10.pdf (accessed on 16/03/2009).