Volume 9, Issue 7, July – 2024 International Journal of Innovative Science and Research Technology
ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24JUL523

Social Perceptions of Air Pollution by Motorbike Taxi Drivers in Cotonou

Perceptions Sociales De La Pollution Atmospherique Par Les Conducteurs De Taxi-Moto a Cotonou

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Abstract:- Several studies have attempted to explain the increase in air pollution in Benin, but there is little work on the social determinants of this phenomenon. The aim of this research is to analyse the influence of social representations of exhaust fumes, developed among motorbike taxi drivers, on the evolution of air pollution in Cotonou. The research methodology is based on a literature review, 50 individual interviews, 10 focus groups with motorbike taxi drivers (Zémidjan) at a number of parking sites (Tokpa car park, Marina station, Kouhounou esplanade, Saint Michel station) and 25 questionnaires administered to institutional stakeholders. The sample values were retained once the empirical saturation point had been reached (Pourtois and Desmet, 1997).

At the end of the research, it emerges firstly that air pollution is subject to a diversity of perceptions developed by the players involved. Secondly, understanding of the risks associated with pollution changes when we move from drivers to institutional players. Finally, variables such as the level of education of the motorbike taxi driver and the feeling of being used to exhaust fumes that he expresses, influence air pollution in Cotonou.

Keywords:- *Cotonou, Social Representations, Air Pollution, Stakeholders.*

I. INTRODUCTION

Among the environmental components, air, which is the element with which the body is most directly in contact, has aroused the interest of the scientific community and the general public since the beginning of the 19th century (Barillon, 2006). In the Beninese context, this interest was much more strongly asserted in the Constitution of the Republic of Benin (11 December 1990), which stated in Article 27 that: "*Everyone has the right to a healthy, satisfactory and sustainable environment and has the duty to defend it. The State shall ensure the protection of the environment*". Despite this constitutional provision and the existence of the framework law on the environment in the Republic of Benin (Law n°98-030 of 12 February 1999), the city of Cotonou (the economic capital of Benin) is plagued by atmospheric pollution, which threatens environmental policies.

Indeed, it has been noted that *"among the factors contributing to the worsening of atmospheric pollution are: the poor condition of the rapidly growing fleet of vehicles (more than 240,000 second-hand vehicles of advanced age); the uncontrolled expansion of urban transport dominated by two-wheeled vehicles (around 100,000 motorbike taxis or 'Zémidjan' estimated to be in operation) in the absence of a collective urban transport system"* (World Bank, 2010: 27). According to the same study, motorbike taxis account for 59% of daily CO emissions[2] and 90% of daily HC emissions in Cotonou. This means of transport, which used to be used in the Benin-Nigeria border regions to smuggle goods from one country to the other, has flourished thanks to political and economic situations such as the aggression of 16 January 1977 and the economic crisis in Nigeria (Agossou, 2008)[1] . In such a context, the high cost of living and the decline in agricultural activities have amplified the phenomenon of the motorbike taxi, the number of drivers of which is growing faster than that of other means of urban transport, all of which puts land transport at the heart of the issues relating to atmospheric pollution in Cotonou.

According to MMEH (1997), the transport sector accounts for 62% of petroleum product consumption in Benin. Subsequently, the concentration of certain harmful pollutants has reached worrying levels in the city of Cotonou: a high concentration of CO_2 reaching 18 mg, i.e. almost double the permitted standard; a large volume of volatile hydrocarbons exceeding 2.000 µg/Nm3; a daily emission of around 83 tonnes of CO2, 59% of which is generated by two-wheelers, and 36 metric tonnes of volatile hydrocarbons (HC), mainly from two-wheelers; a high concentration of lead (Pb), with a maximum of 13 µg/Nm3, i.e. more than six times the permitted standard. To combat air pollution, which has health, economic and social consequences for communities[2] ,

[1] The aggression of 16 January 1977 led to the repatriation of Beninese living in Congo Brazzaville, while the economic crisis in Nigeria not only led to a mass exodus of Beninese from that country but also influenced the spread of zemidjan to Cotonou.

[2] According to Seidou (2001: 48), the overall cost of air pollution in Cotonou is 1.6% of GDP, or 20 billion euros.

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the Beninese government has taken a number of measures aimed at motorbike taxi drivers, including retraining drivers, awareness-raising campaigns organised by the Direction Générale de l'Environnement (DGE), and a reduction in customs fees for 4-stroke motorbikes, with the aim of removing 2-stroke motorbikes from circulation[3] . Despite these efforts, air pollution from motorbikes persists. At the same time, motorcycle-taxi drivers are showing resistance to the solutions provided by the institutions responsible for environmental protection (drivers' resistance during technical inspections organised by the Direction Générale de l'Environnement). There are thus several logics of actors based on arguments that have a specific consistency (Grize, 1993).

The city of Cotonou was founded in 1830 by King Guézo. It is the capital of the coastal department and, by extension, the economic capital of Benin, due to its economic and administrative infrastructure. Cotonou covers an area of 79km^2 and has an estimated population of 1,125,000 (INSAE, 2002). Bordered to the north by Lake Nokoué, to the south by the Atlantic Ocean, to the east by Sèmè-Kpodji and to the west by the commune of Abomey-Calavi, the city of Cotonou has thirteen arrondissements subdivided into one hundred and forty city districts. The city is also the country's most important commercial and industrial centre. It is home to the main political and administrative services, port infrastructures and major shopping centres. As a result, the density of economic activities carried out there increases the demand for transport among social players. This research focuses on motorbike taxi drivers, who develop a variety of environmental logics and interactions that are likely to shed light on the actors responsible for environmental protection.

II. METHODOLOGICAL APPROACH

The methodological approach adopted to analyse social perceptions of air pollution was based on two phases: a pre-survey to explore the phenomenon and the survey itself. The sample was drawn from four neighbourhoods in two arrondissements, namely the 7th and 10th arrondissements[e] . Once the empirical saturation threshold had been reached, the number of people surveyed was as follows: 200 motorbike taxi drivers and 25 institutional players. The districts of Saint Michel, Sikè Codji, Kouhounou and Vèdoko were selected by reasoned choice, given the density of traffic on the arterial roads in these city districts. Individual interviews, a document review, direct observation and a focus group were used to analyse the strategies of the players involved and their responsibility in preventing the risks associated with air pollution.

Similarly, the interactionist model was adopted, enabling the various aspects of the specific problem to be analysed.

III. MAIN RESULTS

A. Social and Cultural Dimensions of Air Pollution Caused by Motorbikes

- *Social Determinants of Air Pollution Linked to Motorbike Taxis*

You only have to look at how Durkheim (1893) highlighted the law of gravitation of the social world to understand that the phenomenon under study is the result of a double causality. The first cause is that the concentration of motorcycle-taxi drivers leads both to new behaviours on the part of the driver and to representations linked to the use of his working environment. In turn, these two causes give rise to behavior likely to encourage air pollution, similar to the resistance they develop to the maintenance recommendations made to them. Drivers' living conditions are a key variable in this explanation. A striking contrast emerges: motorbike taxi drivers are practically the first to wake up for work and the last to go to bed. Instead of working 7 to 8 hours a day for a "hard-working" civil servant, 62.5% of the motorcycle-taxi drivers we met admitted to constantly working 10 to 15 hours a day. However, income is not proportional to the length of time worked. If we draw a parallel with pollution, we can say that it is low revenue that leads drivers not to put into practice the recommendations on engine maintenance. This low revenue justifies the competition that can be seen at the roadside, where any potential customer is accosted by several drivers: the offer shows the struggle for survival. It should also be pointed out that the rural exodus is one of the factors driving the increase in the number of motorbike taxi drivers in Cotonou, which in turn is an indirect factor in air pollution.

- *Level of Education of Motorbike Taxi Drivers: an Indicator of the Variability of Social Perceptions*

Motorbike taxi drivers do not perceive the risks associated with air pollution in the same way, although they are, in one way or another, victims of the phenomenon. Indeed, 70% of those surveyed (uneducated drivers) felt the harmful effects of pollution through colds and sore eyes. Only 15% of drivers mentioned cardiovascular, eye and respiratory ailments. Given that 50% of drivers have no schooling, compared with 30% with primary education, 13% with secondary education and 7% with university education, we can safely assume that half of this target group is uneducated. On this basis, the level of education is considered to be an indicator of variation in perceptions. This variable determines drivers' perceptions of exhaust fumes. The different behaviours observed among drivers when exposed to clouds of smoke appear to be more evocative. For example, of the 114 motorbike taxi drivers who admitted to inhaling the exhaust fumes as if nothing had happened, 95 were not in education. The group of drivers who did not attend school (over 30% of drivers) compared exhaust fumes to cooking smoke, referring to their pungent and less offensive nature. It may be that this perception of exhaust fumes defines driver behaviour during air pollution risk prevention campaigns.

[3] The reduction in customs charges for 4-stroke motorbikes is a dissuasive policy which has set the customs price for 2-stroke motorbikes at 86,000 compared with 13,000 and 23,000 respectively for 100 and 125 cm motorbikes[2] .

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24JUL523

B. Resistance of Motorbike Taxi Drivers to Awareness Campaigns

Motorbike taxi drivers are sometimes resistant to the awareness campaigns and technical inspections that the Direction Générale de l'Environnement (DGE) sporadically organises for them[4] . Of the 200 drivers surveyed, 32.5% considered the awareness-raising activities to be appropriate, 52% disapproved of them and 15.5% opted to remain silent on the subject. As a result, some drivers avoided the exhaust gas testing sessions, while the majority of those who agreed to have their vehicles tested said that they did not often follow the technical instructions given to them by the DGE and the Environmental Police. This shows that there is resistance to anti-pollution strategies. This resistance can be seen in the following graph, which summarises the positions of motorcycle-taxi drivers on the subject of awareness-raising and exhaust gas checks organised by the DGE.

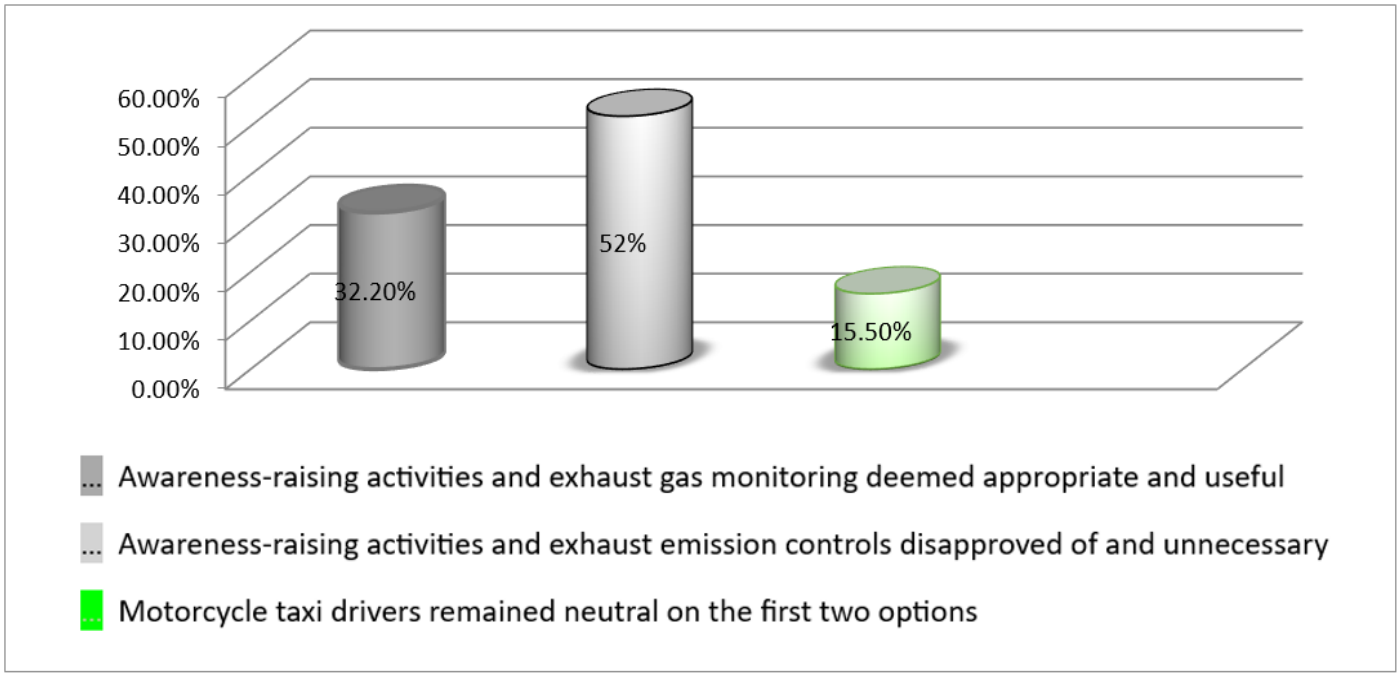

Fig 1 Views of the Motorbike Taxi Drivers Interviewed on the Awareness Campaigns and Exhaust Gas Checks Organised by the DGE
Source: Field data, 2013

Graph 1 shows the opinions of motorbike taxi drivers. The 52% figure reflects rejection of the awareness campaigns and exhaust gas checks organised by the DGE. This is because the combination of those who are reluctant and those who abstain accounts for more than 60% of responses. What's more, more than half the drivers were opposed to the awareness-raising sessions. From these results, we can conclude that motorbike taxis are not aware of the nuisance their activity causes to humans.

C. Diverse Social Perceptions of Air Pollution

Perceptions of air pollution vary from one stakeholder to another. Not only do educated drivers not always say the same things as uneducated ones, but the environmental rationale of institutional players often differs from that of motorcycle-taxi drivers.

For institutional actors, the abundance of exhaust fumes is a sign of atmospheric pollution of the air in Cotonou. On the other hand, for the majority of motorbike taxi drivers (especially the uneducated), the abundance of exhaust fumes appears to be an indicator that the engine is working properly. Exhaust fumes don't bother drivers too much, but it's the opposite that worries them. This is what emerges from the words of a driver who reported the following:

Box 1:

In our business, motorbikes can't be smoke-free.

Comments from E. R, motorbike taxi driver in Cotonou

[4] The awareness-raising phase begins with exhaust gas checks to measure CO content, in accordance with the relevant legislation in force; then the Environmental Police and Health Police officers move on to technical advice on proper engine maintenance. The awareness-raising lasts 5 to 20 minutes at most, depending on the recommendations they have to make to the owners of the vehicles (motorised or car).

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24JUL523

This opinion was echoed by another respondent who, on seeing a road user close his nostrils behind a six-cylinder lorry emitting a thick cloud of smoke, was astonished:

Box 2:
Why does he close his nostrils? He's wasting his time, because God has already given us something in our lungs to deal with smoke.
Comments from A. P, a motorbike taxi driver I met in Cotonou.

From these opinions, we can deduce that drivers' images of exhaust fumes condition the interactions they develop with the environment. Unlike the institutional players, who have a negative opinion of the abundance of exhaust fumes, drivers tend to be indifferent or talk about being used to them. The behaviour observed among these players at traffic lights where exhaust fumes are abundant provides a better explanation of the environmental rationale that emerges. These behaviours are as follows:

- 57% of motorbike taxi drivers say they inhale smoke as if nothing were wrong;
- 10.3% of drivers said they regularly use a muffler;
- 17.7% instinctively pinch their nostrils momentarily by hand;
- 15% wave their hand or a makeshift cloth just long enough to get through the smoke;

Over and above these trends, it should be noted that most educated motorbike taxi drivers are more or less aware of the harmful effects of air pollution, even if the feeling that they are used to gas influences their awareness of the risks involved. So what is the rationale behind the different perceptions?

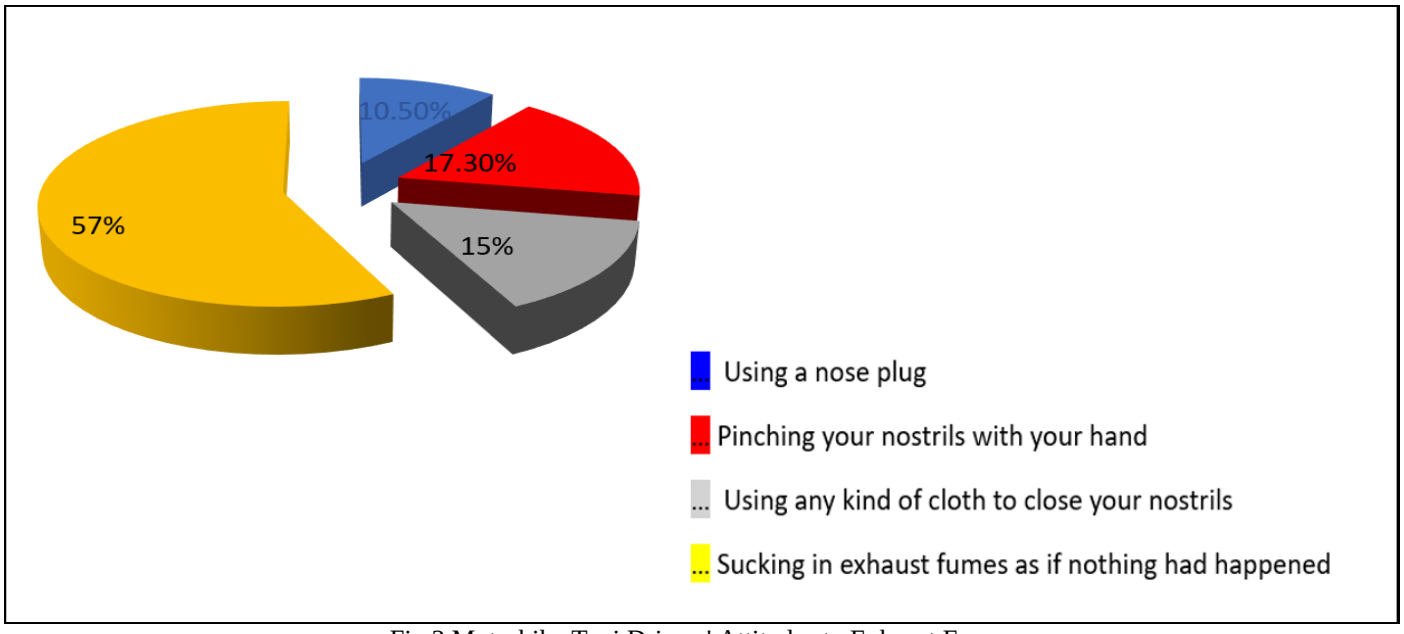

Fig 2 Motorbike Taxi Drivers' Attitudes to Exhaust Fumes

IV. DISCUSSION

➢ *Logics Surrounding Environmental Management*

Two environmental logics emerge from this research. These are the regulatory rationale of the institutional players and the economic rationale of the motorbike taxi drivers. For the institutional players, exhaust gases act as a technical indicator, which justifies the actions taken by the Direction Générale de l'Environnement (DGE) and the related structures of the Ministère de l'Environnement, de l'Habitat et de l'Urbanisme. In the current context, the fight against atmospheric pollution involves reducing exhaust gas emissions, the excessive and thick nature of which poses a risk of disturbing the environmental balance. According to decree no. 2001-140 of 4 April 2001 setting air quality standards in the Republic of Benin, which is applied during roadworthiness tests, any motorbike emitting more than 2% carbon monoxide (CO) is declared to be out of specification. In fact, the awareness-raising activities of the Environmental Police and the coercive controls carried out by the DGE are seen as strategies for reducing pollutants. Institutional players therefore intervene to ensure compliance with air quality standards.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24JUL523

However, we can see that these institutional strategies come up against the rationality of the motorbike taxi driver, driven by a utilitarian logic. It is against this backdrop that we need to understand drivers' resistance to the policy of phasing out 2-stroke motorbikes, drawn up by the Ministry of the Environment, Housing and Town Planning (MEHU) in favour of 4-stroke engines, which not only pollute less, but also have strategically lower customs costs.

Mill (1836) teaches us that the pursuit of particular interests is the principle and norm of all action. From this point onwards, the reluctance of drivers to accept the proposals of the institutions responsible for environmental management should not be seen as a lack of will, but rather as the latent expression of the socio-economic condition of this actor. Drivers act like good Homo economicus. In other words, the rejection of solutions to combat air pollution is not a gratuitous act, but rather a response to capitalist economic interests on the part of motorcycle-taxi drivers. Implementing institutional strategies requires drivers to maintain their engines regularly, which can reduce their daily income, which is already threatened by competition from other drivers.

With regard to drivers' resistance to having their exhaust fumes checked during awareness-raising sessions, this research has shown that the presence of the security forces is a systematic reminder of the coercive checks for which drivers had paid fines[5] . Thus, for the majority of those interviewed, these awareness campaigns appear to be a reiteration of the fine sessions that took place in the recent past, where vehicles that were declared polluting were fined between 10,000 FCFA and 35,000 FCFA, depending on the engine inspected.

- *Relatively Low Levels of Apprehension among Drivers*

Interviews with motorbike taxi drivers revealed that they have little understanding of the risks associated with air pollution. However, it should be noted that the level of knowledge of the risks associated with air pollution is generally lower among uneducated drivers than among those who have acquired an education (especially drivers with secondary education or more). Over 50% of drivers, especially uneducated drivers, limit the harmful effects of air pollution to burning eyes and coughing. It is also among uneducated drivers that the idea is put forward that "pollution is limited to traffic lights" and "because fumes disappear into nature, they are no longer dangerous to humans". This situation is the result of their low level of civic education, which to some extent legitimises behaviour that contributes to atmospheric degradation, such as not maintaining engines. Clearly, the organisation of the cognitive field of the zemidjan depends on the information to which it has been entitled.

Several comparative studies carried out elsewhere have highlighted other explanatory variables. This is the case of the study of Ile-de-France residents carried out by Grange (2010) and that of Roussel (2007) on French populations in general. These studies showed that the diversity of perception profiles depends on the living environment, socio-economic status and age of the French population. For example, "the least affluent residents of Ile-de-France, who live in degraded environments or are perceived as such, are particularly concerned, whereas affluent and/or older residents of Ile-de-France seem to be more serene" (Grange, 2010:6). It should also be pointed out that "blue-collar workers, white-collar employees and people with no occupation more frequently think that pollution is getting worse, that smells and fumes are a manifestation of it, and that rural areas are protected" (Roussel, 2007:32). Although this work does not focus on target groups similar to those affected by the research, it does provide information on the reality that "air pollution is thus considered to be a strong health determinant, but one that is highly unequal because of the variability of exposure to different contaminants" (Charles et al., 2007).

- *The Need to Refocus the Debate on Air Pollution*

Today, there is a tendency to blame the transport sector (especially motorbike taxi drivers) as the sole polluters of the city of Cotonou, ignoring the other players and the root causes of the problem.

While it is true that pollution from transport is highly dependent on urban planning (Escourrou, 1996), it is nonetheless the government that is responsible for implementing urban planning policies. However, in several West African cities, governments are not always up to the task, for reasons that the focus of this research does not allow to be highlighted. The city of Cotonou is a victim of the narrowness of its roads and the absence of roadside vegetation, all of which lead to excessive smoke emissions as a result of road congestion, prosaically known as "*go slow*"[6] . Such a reality makes the government the autonomous actor responsible for pollution, since this problem does not depend solely on the polluter but also on the governors who are in charge of the major anti-pollution policies.

It should also be noted that air pollution by motorbike taxis is the result of the failure to apply the repressive texts drawn up in this area (Tchoca, 1998). This is the case, for example, of the "polluter pays" principle, a technical mechanism for reducing atmospheric pollution based on coercive controls which, for nearly five (5) years, has not been applied in Benin. In this context, the non-implementation of certain anti-pollution policies is becoming a major cause of air pollution. This view is borne out by the fact that public transport, once envisaged by the Cotonou Municipal Development Programme, was only really tried

[5] The owners of engines declared to be polluters pay a fine of : 10,000 CFA francs for 2- and 3-wheeled vehicles, 20,000 CFA francs for tourist vehicles, 25,000 CFA francs for commercial vehicles and 35,000 CFA francs for heavy goods vehicles. Once the fine had been paid, the owner could take possession of his motorbike or vehicleThese explanations were given to us by the institutional players present at these awareness-raising sessions.

[6] The word "go slow" literally means "to go slowly". This expression describes the slowness with which machines move with difficulty.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/IJISRT24JUL523

out after the country had been independent for fifty years (towards the end of 2012). If the three-wheeled public transport offer has taken off in the city of Cotonou, at a given period, it is because of the difficulties relating to the absence of public transport and the lack of private sector investment in this sector.

In addition, air pollution caused by motorcycling also provides information on the nature of the interrelationships developed by the institutions responsible for combating air pollution. During empirical observations, a lack of synergy was noted between the institutional players responsible for combating air pollution, in particular the players in the environment, planning and forecasting, health, justice and land transport departments (the problem of air pollution cuts across all these levels of socio-economic life). Without genuine collaboration, any action to combat air pollution will be incomplete and limited in the short term.

- *Poverty as an Explanatory Factor for the Level of Air Pollution*

It would be difficult to consider air pollution caused by motorcyclists in Cotonou without looking at the variable relating to poverty. In fact, it is enough to look at the biographical trajectories of motorbike taxi drivers to realise that this activity is no more than a palliative to the country's current situation, which is characterised by underemployment, unemployment, the drop in agricultural production and the high cost of living. These different situations are leading young people to leave their villages to drive motorbike taxis temporarily or permanently (they do it more temporarily than permanently) in order to make a bit of money.

As pointed out by MEHU and GIZ (2002), the fundamental basis of the phenomenon of atmospheric pollution is poverty. This finding is also confirmed by the ILO (2002), which showed that poverty affects 67% of farmers, 43% of self-employed farmers and 32% of wage earners. These statistics highlight the existence of poverty in both urban and rural areas. Consequently, any policy to reduce air pollution in Cotonou should take into account the variable of poverty.

V. CONCLUSION

This research has shed light on the representational foundations of air pollution in Cotonou. In fact, we set out to establish the correlation between the social perceptions of motorcycle-taxi drivers and the evolution of air pollution in Cotonou, and we arrived at results that were as diverse as they were profound. These results show that, as we move from institutional players to motorcycle-taxi drivers, the cognitive climate, interests, logic and perceptions change. Thus, each stakeholder acts according to his or her perception of air pollution, which perception is the result of the stakeholders' representations of exhaust gases.

For institutional players, the abundance of exhaust fumes is an indicator of atmospheric pollution in Cotonou, which justifies the multiplication of projects and programmed to combat it. In contrast, motorbike taxi drivers perceive pollution in terms of their level of education and the economic stakes involved in their activity. The risks incurred are perceived to be higher for human health among educated drivers, although it should not be forgotten that the idea of being used to exhaust fumes influences their degree of exposure. Lastly, no concerted environmental policy would emerge in this "Cotonois area", which is largely marked by a divergence of environmental logics. Consequently, it would be complex, not to say unrealistic, to try to combat air pollution from motorcycling in Cotonou without highlighting the individual motivation of the players involved, and the issues relating to poverty, employment and demographic growth, which are far from favorable to anti-pollution policies.

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