

**Installation of Surveillance Cameras in Bouaké: Inventory of Fixtures and Implications**Koffi Fiacre KOUAME<sup>1</sup> and Alain François LOUKOU<sup>2</sup><sup>1</sup>PhD in Digital Geography, Bouaké, Ivory Coast<sup>2</sup>Full Professor, Alassane Ouattara University, Bouaké, Ivory Coast**ABSTRACT**

The management of urban traffic is experiencing an upheaval with the installation of surveillance cameras. Like other cities in the world, Ivorian cities and mainly the city of Bouaké is part of this dynamic experience. However, drivers are indifferent to surveillance cameras. Thus, the objective of this survey is to show the reasons underlying this attitude. Our reflection will be focused first on an inventory of surveillance cameras and then analyzes will be carried out on the impact of surveillance cameras on road users. The methodological approach is focused on the grey literature, on interviews and on the field survey. The urban landscape reveals a disparate location of the cameras and a limited result in terms of their impact on the population.

**Keywords:** camera, geographical disparity, road safety, Bouaké

**INTRODUCTION**

The way which information and communication technologies have become part of everyday life has led to the development of various tools for geolocation, tracking, facial recognition and automatic identification of individuals. The recent development of the Internet of Things or IOT (Internet of Things) is giving a boost to these techniques, including the CCTV camera. The use of surveillance cameras is becoming widespread and gradually becoming commonplace (Kaenzig & Klauser, 2018, p. 63). This progress is made easy by the improvement of the technology used and by an increase in the social demand for security. Indeed, in recent years, security in the public space has become an issue that strongly influences the content of local, regional and national policies (Heilmann et al., 2012). In this context, video surveillance is often presented as a legitimate response to counter the rise in incivility and other forms of insecurity in urban areas. These Technologies have become embedded in the urban landscape of many European cities (Kaenzig & Klauser, 2018, p. 64).

This phenomenon is also spreading in the big cities of African countries. In Côte d'Ivoire, through the National Strategic Action Plan for Road Safety (PSNASR) 2016-2020, many video surveillance projects have emerged. The year 2018, proclaimed "year of road safety", made it possible the implementation of strong measures and actions by covering the country with fixed automatic speed cameras and the installation of video surveillance systems in the city of Abidjan. These measures aim to increase the safety of road users. In 2021, the Minister of the Interior and Security asserted that Côte d'Ivoire is giving itself the means to ensure the security of its populations with 4307 surveillance cameras installed in the main cities of the country, in particular Abidjan, Bouaké (Gouza, 2021).

As far as the city of Bouaké is concerned, nearly 80 surveillance cameras have been installed since 2020 in order to reduce misconduct on roads which led to 134 deaths in 2021 (fire brigade services). These cameras scattered on the various intersections of the city of Bouaké are supposed to deter and improve the safety of road users. But when you walk through the arteries of the city you can witness the deviant behavior of drivers. This raises the problem of the indifference of vehicle users vis-à-vis the presence of surveillance cameras in Bouaké. In this context, why, despite the presence of these devices, we are still witnessing the persistence of misconduct on roads across the city of Bouaké.



second is grounded on empirical approach. This is part of a direct observation on the ground to identify the geographical coordinates of the surveillance cameras and identify the neighborhoods in which they are deployed. On the other hand, a survey by semi-structured interview was conducted with the Head of Technical Department of the City Hall of Bouaké (HTDCHB), the Chief Commender (C.C) of the firefighters, a resident in the N'dakro district and with taxi drivers, called “woro-woro”, from the commune of Angré-château, in Abidjan. The interview with taxi drivers in Abidjan made it possible to assess the dissuasive and repressive function of the cameras in order to make the comparison with the impact of those of the city of Bouaké. The interview with the HTDCHB made it possible to avail information on the installation and operation of the surveillance cameras. Among the firefighters, we were provided statistical data on traffic accidents in the city of Bouaké from 2016 to 2021. The interview with the resident of N'dakro was necessary to better understand the ethical impact of traffic cameras.

The questionnaire survey, as a quantitative method, was applied to road users (car and motorcycle drivers). The determination of the sample is based on a random choice of 200 accidentally surveyed drivers. These people are distributed as follows: 50 taxi drivers, 50 private car drivers, 50 motorcycle taxi drivers and 50 private motorcycle drivers.

## RESULTS

### State of the Surveillance Cameras: from Description to Uneven Spatial Distribution in the City of Bouaké

#### *Description of surveillance cameras*

The surveillance camera is a video device that records and transmits images. It is placed in a public or private space to be monitored remotely. It is therefore a type of remote monitoring whose images can be automatically processed and viewed, then archived or destroyed. Those of the public space of Bouaké are carried by metal poles. Two types of cameras are installed on the poles. Special target area cameras or bullet cameras and wide area cameras or speed dome cameras. This difference is noticeable in Photo 1.



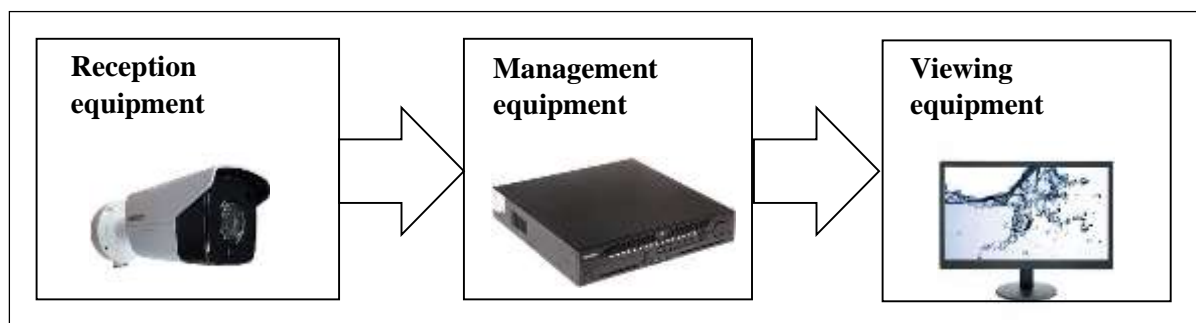
**Photo 1: Presentation of surveillance cameras in the city of Bouaké**

Source: KOUAME K. Fiacre, 12/11/2022, 13h10, lat : 7.720, long : -5.051

All the surveillance cameras in the city of Bouaké are in the image of Photo 1. The bullet camera is in the cylindrical form. It is equipped with a wide motorized lens with variable or fixed focal length, which allows it to be monitored over larger areas. In addition, the infrared LED built into a bullet camera is very powerful, allowing it to provide extremely precise images day and night and in various light conditions. As for the dome camera, it is equipped with an integrated infrared LED for night vision, which allows high quality video surveillance. Like bullet cameras, dome cameras also feature durable housings to provide protection against vandalism and damage. These cameras are able to rotate 360° on their horizontal axis and 180° on their vertical axis following objects automatically or on signal from particular target area cameras. These devices have a benchmark of 25 frames per second (fps) allowing a smooth image to the human eye (HIKVISION, undated).

**Composition of the videosurveillance system**

A video surveillance system is made up of three types of equipment: a camera, a screen and a storage system. Figure 1 illustrates this.



**Figure 1: Composition of the a video surveillance system**

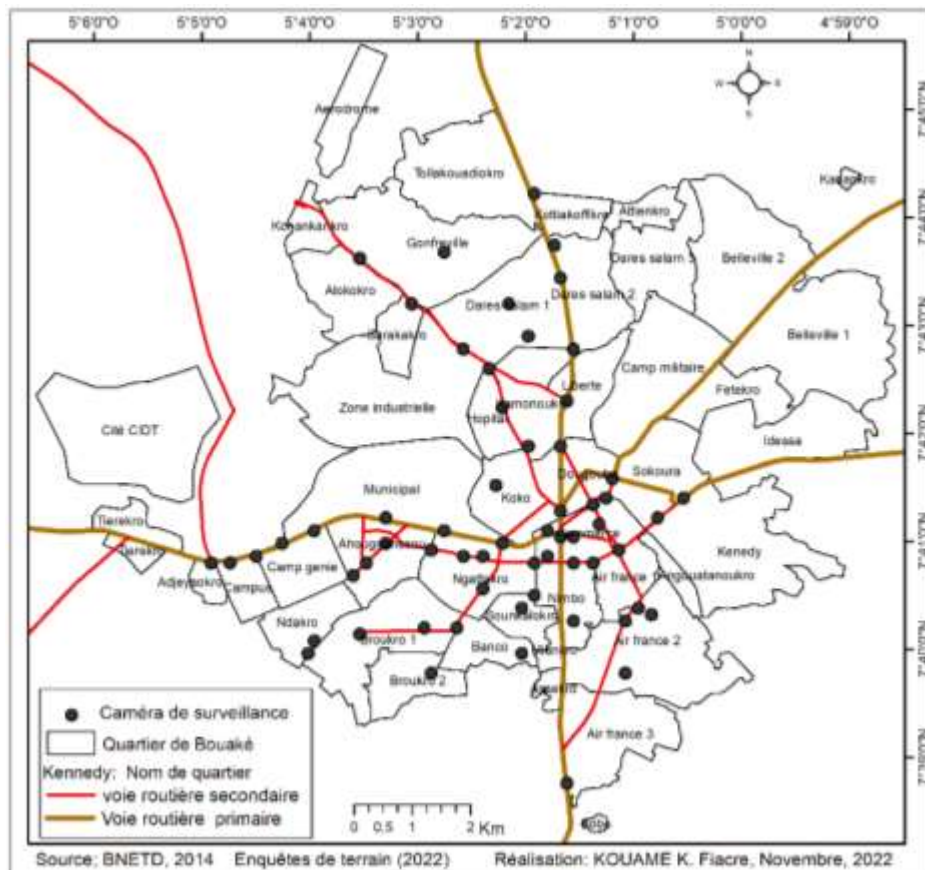
Source: KOUAMÉ K. Fiacre, 03/12/2022, <https://fr.wikipedia.org/wiki/Vid%C3%A9osurveillance>

The camera is the fundamental element that ensures reception in a video surveillance system. It comes in several forms (color or black and white camera, fixed or mobile camera, vandal-proof or discreet camera, sound camera, infrared, etc.). For the management of the system and the exploitation of the filmed images, there are several pieces of equipment (DVR, NVR, servers, software, etc.). The Digital Video Recorder (DVR) or Numeric Video Recorder (NVR) is a digital video surveillance recorder, it is the central point of the system. It is the brain of the installation. It can accommodate all the cameras and save video streams on an internal Hard Disk Drive (HDD). Finally, the monitor or screen is the basic equipment that ensures the visualization of live images by cameras or recorded in a video surveillance system.

**Geographical distribution of surveillance cameras in the city of Bouaké**

Surveys reveal an uneven distribution of surveillance cameras across the city of Bouaké. Map 2 supports this fact.

Map 2 shows the location of surveillance cameras in the city of Bouaké. From a geographical point of view, the location of these cameras reveals a disparate character. Indeed, the investigation revealed sixty-one (61) surveillance cameras distributed on the main roads and crossroads of the city. These strategic locations have a high accident rate. According to the HTDCHB, 60% of accidents happen on the main roads of Dar-es-salam and Alassane Ouattara University (UAO). On the road to Dar-es-salam, these accidents are due to the misconduct of the drivers and ignorance of the highway code. On the other hand, on the main road of the UAO, the accidents are more related to the character of the boulevard, it is the most open boulevard in Bouaké. It is on this great track that all drivers want to test their engine. Although it is technically possible to locate the cameras in all areas of the city, they are not evenly distributed.



**Map 2: Uneven distribution of surveillance cameras across the city of Bouaké**

These cameras are much more noticeable in the city center in the commercial district because of the practice of commercial, financial and administrative activities. These buildings, I because of their activities attracts the maximum of the population to the commercial district. The particularly of this district has required the installation of several surveillance cameras in order to counter the numerous cases of theft, accidents, vandalism and banditry.

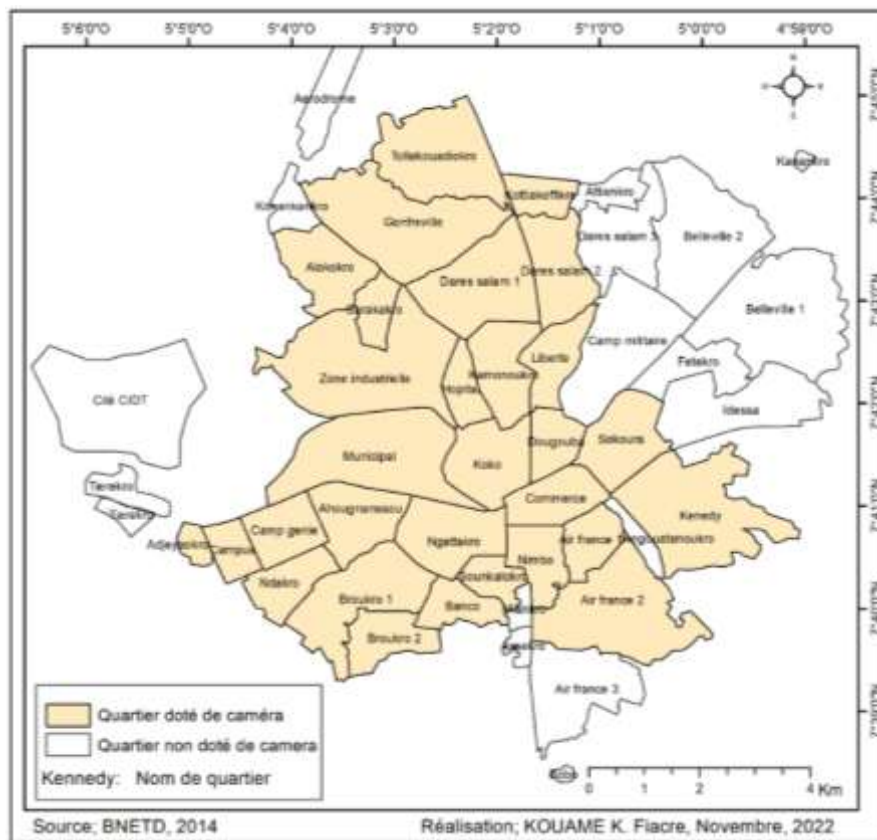
The empirical investigation based on observation also revealed that some dangerous intersections are not equipped with surveillance cameras, as is the case of the "fire of the amadonne" intersection in N'gattakro. Photo 2 illustrates this.



**Photo 2: Absence of surveillance cameras at the crossroads of the « fire of the amadonne » in N'gattakro**

Source: KOUAME K. Fiacre, 30/01/2023, 12h24, lat : 7.680, long : -5.038

In terms of the installation of surveillance cameras by neighborhood, the city of Bouaké suggests neighborhoods not equipped with these surveillance technologies, as shown in Map 3.



**Map 3: Unequal distribution of surveillance of cameras by neighborhood**

Map 3 shows an unequal distribution of surveillance cameras by district. Indeed, not all neighborhoods have surveillance cameras. These are seventeen (17) peripheral districts, or 36.17% of the districts of the city of Bouaké against 63.82% which are not equipped with surveillance cameras. According to the HTDCHB, the coverage of the city of Bouaké with surveillance cameras is a process. This process began in the city center and will gradually extend to all outlying districts. Neighborhoods without cameras will be given priority during the start of the 3rd phase of the installation of cameras in Bouaké.

The location of surveillance cameras across the city of Bouaké is characterized by geographical disparity with wide coverage overall. Moreover, what is the effectiveness of the surveillance camera in road safety?

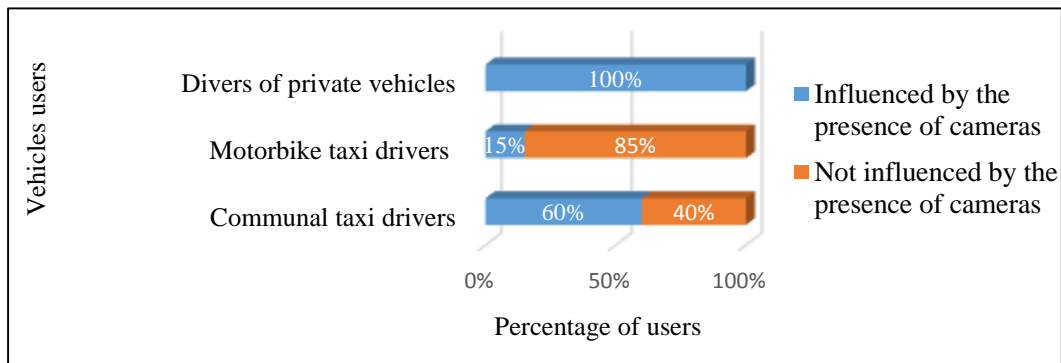
### **Limited Impacts of the Surveillance on Road Safety**

The impact of the presence of surveillance cameras is measured through the following four indicators: deterrence, repression, strengthening of security and the ability to intervene quickly.

#### ***The dissuasive and repressive function of surveillance camera***

The agents of the firefighters' video surveillance center claim that the presence of the cameras has a limited deterrent effect on road incivism. From their screens, they observe daily drivers of vehicles, in particular motorcycle taxis, tricycles and taxis who have not given up excessive speed, running the red traffic light, doing dangerous overtaking, not wearing the seat

belt, etc. These remarks can be seen through the opinions of taxi and motorbike taxi drivers. On the other hand, private vehicle drivers say the opposite, as shown in Figure 2.



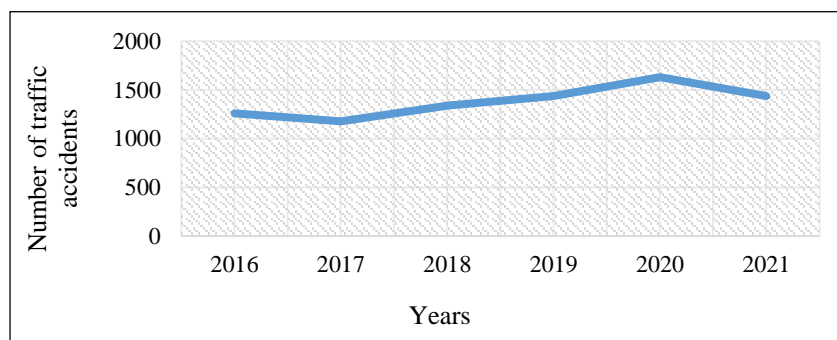
**Figure 2: Percentage of vehicle users influenced or not by the presence of cameras**  
Source: Our field surveys, November 2022

Figure 2 reveals that the presence of cameras has no influence on most motorbike taxi drivers and some municipal taxi drivers. In fact, 85% of motorcycle taxi drivers compared to 15% of these said that the presence of cameras has no effect on the way they drive. They believe that the cameras are installed for cases of assault or theft and not to monitor road users. Thus, they continue to drive without respecting road safety measures. This situation stems from ignorance of the role of surveillance cameras due to lack of awareness and poor communication on the role of surveillance cameras as well as on repressive measures. Contrary to this category of users, all private vehicle drivers interviewed said that the presence of these devices often leads them to comply with road safety rules. If 60% of municipal taxi drivers are influenced by surveillance cameras, it is because they are regularly checked by police officers and fear reprisals during the technical inspection of their car.

Consequently, the absence of the repressive function of video surveillance does not favor its dissuasive role towards all vehicle drivers in Bouaké. The installation of cameras for dissuasive and repressive purposes is limited. Therefore, can video surveillance can have an influence so far as traffic accidents are concerned in Bouaké ?

***The influence of video surveillance on the evolution of traffic accidents***

Based on a quantitative approach, from 2020 to 2021, the number of traffic accidents will decrease slightly as shown in Figure 3.



**Figure 3: Evolution of the number of traffic accidents from 2016 to 2021**  
Source: Statistic of the Bouaké firefighter, November 2022

The graph reveals three trends: from 2016 to 2017 it is decreasing, from 2017 to 2020 it is increasing and from 2020 to 2021 it is decreasing. The first trend is explained by the

ignorance of the squad of firefighters by the greatest number of the population. Thus, not all cases of accidents were mentioned in the fire brigade's traffic accident register since they were not informed. This explains this slight decrease.

The second trend is marked by the distribution of the numbers of the fire department; namely 0102807603 and 180. These numbers have opened up communication between the population and the fire brigade so that in the event of an accident, even before the injured become aware of the damage, the fire brigade is informed of the location and description of the accident. In addition to the fluidity of the communication system between the population and the fire department, the increase in the population of Bouaké is also an explanatory factor for the increase in accidents from 2017 to 2020.

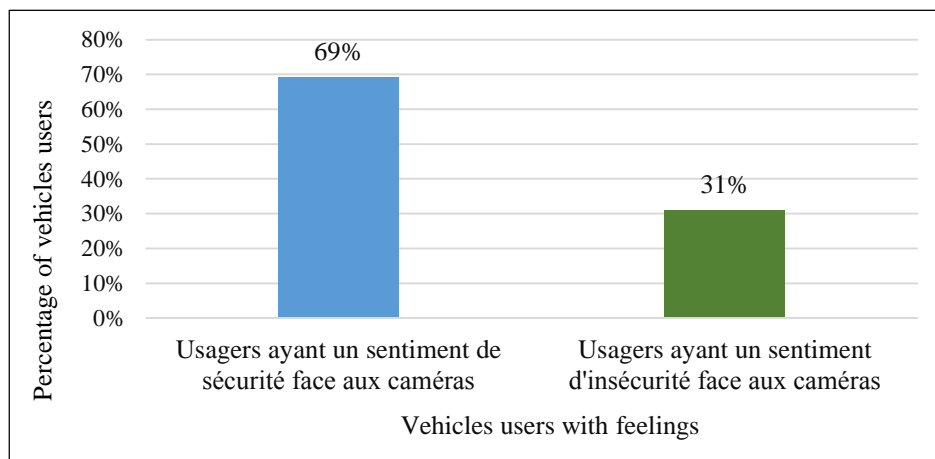
The latest trend, which decreases from 2020 to 2021, is explained by the fact that the firefighters and the civil-military NGO carried out several road safety-related awareness campaigns in mosques, churches, at the wholesale market, and through the media. They also met several associations of young people, motorcycle taxi drivers, taxis to ask them to drive with caution. This sensitization, education and information has proven necessary because the main cause of road fatalities remains 92% linked to driver behavior (Charbit, 1997, p.1).

This period is also marked by the advent of surveillance cameras. Their presence reinforces the existing conventional provisions, namely the presence of traffic lights and the regulation of road traffic by police officers. However, the C.C confirmed to us that the presence of cameras is not one of the explanatory factors for the slight decrease in traffic accidents because their installation is recent.

The video surveillance system has not yet had an impact on the evolution of the number of traffic accidents in the city of Bouaké. Beyond their ineffectiveness in relation to the evolution of the number of traffic accidents, can surveillance cameras be a source of strengthening the feeling of safety among vehicle users and local populations?

***The influence of video surveillance on the feeling of insecurity/security***

The ethical aspect of the impact of the video surveillance system on vehicle users is revealing through two categories of users. On the one hand, there are those who have a feeling of security and on the other hand those who have a feeling of insecurity in front of the cameras. Figure 4 shows this state of affairs.



**Figure 4: Percentage of users having a feeling of insecurity or security in the face of the presence of cameras**

Source: Our field surveys, November 2022

Figure 4 indicates that 69% of vehicle users said they feel safe with the presence of cameras. For them, these devices deter troublemakers, robbers, criminals, etc. These tools monitor and help sanction traffic violations. They feel like they are protected 24 hours a day.



On the other hand, 31% of vehicle users feel insecure about the presence of cameras. For them, the cameras can see and hear everything, the fact that they are constantly observed constitutes a violation of their individual freedom. As proof, a taxi driver affirms that he is afraid to criticize the actions of the government for fear of suffering reprisals. This feeling is shared by a resident of the N'dakro district where one of these camera masts is spotted just at the entrance to her home as shown in Photo 3.



**Photo 3: Installation of surveillance cameras at the entrance to the courtyard of a resident**

Source: KOUAME K. Fiacre, 26/11/2022, 17h21, lat : 7.666, long : -5.067

Photo 3 shows the presence of surveillance cameras at the entrance of a home. Indeed, the owner of the house declares that she does not feel more secure than before. When these devices were being installed, she was told that it was for her protection against any sort of assault. But today, after information, she believes that these electronic machines violate her privacy. Her private life is constantly observed by discreet observers. Also, for her, these cameras only allow investigations to be carried out after the crimes have been committed instead of preventing them.

***Video surveillance, a tool for information and rapid decision-making***

Video surveillance is considered by the C.C of firefighters as a tool to help guide the interventions of agents. When an alert is given, viewing the place of the intervention makes it possible to better assess the means to be deployed. With video surveillance, the intervention team gathers enough information on the nature of the area of intervention (traffic accident, fires, etc.) and the condition of the victims before reaching at the site. The geographical location of the disaster site is done quickly and allows the intervention team to be quickly on site in order to save lives or reduce pain.

Before the installation of surveillance cameras, it was first necessary to receive a call from a witness and ask him several questions to locate the place before preparing to deal with the consequences of the disaster on the spot. According to the C. C, it happens that the witness of an accident or a fire cannot describe the environment of the scene because of the difficulty of access. In this case, remote monitoring is used to quickly identify the location.

In addition, with this technological device, the viewing of a crowd on the road or in a home is an alert that prompts rapid intervention without the Firefighters' Communication

Service (SCSP) receiving a call. In addition, the saved images or videos are kept for one month on site to be used if necessary. According to the HTDCHB, this data can be used as legal evidence.

## DISCUSSION

The discussion will be based on the one hand on the uneven nature of the installation of surveillance cameras in the city of Bouaké and on the other hand on their implications for road safety. In addition, a review will be carried out on the method of data collection.

### **The Uneven Installation of Surveillance Cameras**

The geographical distribution of surveillance cameras is heterogeneous in the city of Bouaké. They are more concentrated in the commercial district because of the density of the population and the nature of the activities carried out there. This result coincides with that of November et al. (2002, p. 8) in Geneva. They claim that the distribution of surveillance cameras is not homogeneous on the territory of Geneva. They find a very high density of surveillance cameras in the banking districts. Similarly, to the explanation given, they claim that the discontinuous and heterogeneous spatial distribution of the surveillance cameras is explained by the density of the population and the qualitative and functional character of the place. In the same logic, Gormand (2017, p. 85) maintains that the continuity of the capacity of supervision of the center of the municipality constitutes the priority of the services of the community because the city center is a geographically densely populated or convergent sector, population flows due to significant and diverse daytime and nighttime activity. In addition, population concentrations lead to a high number of incidents that produce negative public safety statistics. This justifies for the prime contractors to produce efforts in this sector.

### **Video Surveillance, a Tool for Deterrence and Repression**

Overall, the study found that most vehicle users are not impacted by the presence of cameras. If in Bouaké, the drivers do not pay attention to the surveillance cameras, in Abidjan, precisely in the commune of Angré plateau, the drivers do not have the same behavior. All of the private car or taxi drivers we encountered wear their seat belts and ask passengers in the front seat to do the same. One of the drivers said they are watched by surveillance cameras every day. He pointed out that the drivers fear repression during the technical inspection of the car. Thus, the cameras have a deterrent presence on car drivers. They lead them to respect the rules of road safety under penalty of a fine. Indeed, since September 2021, video-verbalization has been effective in Abidjan. The devices capture the offense which is directly notified to the offenders. Officers have fifteen (15) days to notify and the offender eight (8) days to pay the fine. In case of non-compliance with the payment deadline, a device called smart roadblock is installed on the main roads to arrest offenders and impound the vehicle. It relies on a network of fixed and mobile radar cameras. Currently, six (6) types of traffic offenses are recorded by the camera, namely: going through a red light; speeding; failure to wear a seat belt; the lack of a technical visit; driving in the opposite direction and non-compliance with time slots.

Contrary to the result of the present study, that of Mariotte et al. (2004, p. 71) conducted in the Ile-DE-FRANCE region on the security of public transport confirms that the impact of video surveillance in terms of deterrence is still difficult to assess given the lack of clear communication from the various carriers about the presence of cameras. Hiding the cameras does not deter fraudsters and incivilities. It is “word of mouth” and the repression resulting from video surveillance that seem to discourage potential offenders.

## **Video Surveillance, a Tool for Strengthening the Feeling of Security and Helping with Security**

Video surveillance is a tool for information, organizational support and rapid decision-making. It is in the same vein that the result of the study by Mariotte et al. (2004, p. 29) when they state that security guards are reassured in their professional activity and consider video surveillance as an assistance, an accompaniment which reinforces their moral and physical comfort. Physical and verbal attacks against security officers seem to decrease more significantly, suggesting a positive impact of video surveillance on acts of crime against officers; but the number of simple thefts continues to increase.

Surveillance cameras have a security-enhancing effect on 69% of vehicle users who believe that they feel constantly protected on roads or intersections equipped with cameras. To corroborate this result of the ethical dimension, Carli (2008, p. 10) affirms that in the event of a drop in the crime rate, the resulting increase in the feeling of security can contribute to strengthening social cohesion within communities, a district, a region, or even a country. Thus, video surveillance systems contribute to a large extent to lowering the crime rate, and therefore to facilitating the creation of new links between the residents of a neighborhood hitherto considered sensitive and dangerous. The study also reveals that 31% of respondents feel insecure about surveillance cameras. In the same vein, Carli (2008, p. 14) asserts that video surveillance raises a number of questions relating to the insufficient protection of privacy, the violation of individual freedoms in the name of the “public good” or to the exacerbation of the feeling of insecurity.

Regarding the effectiveness of video surveillance in terms of a management tool, the result of the study by Carli (2008, p. 11) corroborates the result of the present study. The author maintains that video surveillance is a management tool intended to facilitate the monitoring and operation of transport networks, to rationalize the maintenance of infrastructures and to optimize fire prevention, or even to manage public spaces.

### **Advantages and Limitations of Data Collection Methods**

The use of the computer tool KoboCollect has advantages and disadvantages. The central element of digital data collection is the availability of Android devices (smartphone and tablet). It is probably more expensive than the printed questionnaire. Although data collection requires a smart phone, it also requires arduous preparation. Training and practice in both the use of these devices and an appropriate approach to setting up the application for data analysis and processing should be carried out. Technical assistance should also be provided to enumerators to download the application and obtain the form to use. When these preparations are satisfied, the actual data collection process is less tedious. It should be noted that the interviewers can record the responses offline and send the validated forms which will be completed later. This is particularly useful when covering a remote area where mobile data reception is difficult. This avoids carrying large luggage of printed questionnaires. In addition, the collection of data from the smartphone makes some respondents reluctant, who fear the recording of their statement for other purposes.

## **CONCLUSION**

In summary, it appears that the installation of surveillance cameras on major roads and crossroads modifies the urban landscape of Bouaké. The city presents a non-homogeneous distribution of surveillance cameras which are more concentrated in the city center. This spatial distribution is explained by a logic of population density and by the nature of the activities carried out in the district. For the public authorities, the installation of surveillance cameras must make it possible to reinforce the security of the populations at the scale of the city of Bouaké.

However, their influence remains limited on the indicators analyzed. The evaluation of the impact of surveillance cameras on deterrence, repression, the evolution of traffic accidents, the feeling of safety and management reveals a mixed picture. First, the study indicates that CCTV has no deterrent effect on most vehicle users in Bouaké. It is also not used for repression against the violation of road safety rules. It is important to emphasize that before the implementation of video verbalization in Bouaké, awareness and prevention must be carried out.

Then, it also emerged from the study that video surveillance has no impact on the relative slight drop in the number of traffic accidents from 2020 to 2021. Some vehicle users and local residents feel insecure about the presence of video surveillance; they accuse it of violating their rights to individual liberty. Thus, the balance between freedom and security risks becoming very fragile.

Finally, the video surveillance system has a convincing impact on the effective management and speed in the interventions of the firefighters in Bouaké. Beyond the fight against road insecurity, the impact of this innovative security system on crime in the city of Bouaké should be studied. This study can be conducted if and only if statistical data are made available.

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