Optimizing waste collection in Yaoundé: waste collection and management application

Dongmo Wandji Chelsie Carel, Data Science Student, chelsiedongmo@gmail.com
Ayolo Emmanuel Junior, Art and Artificial Intelligence Student, emmaayolo237@gmail.com
Thierry Minka, Sr-Eng., Lecturer, minkathierry@gmail.com
Computer Sciences Department, National Advanced School of Engineering, Yaoundé, Cameroun

Abstract

This article presents a waste collection and management application name CLEAN-UP which will be use designed to improve the work already carried by waste collection companies in the city of Yaoundé in particular. This application will already offer geolocalisation of the various waste collections points on a map, as well as the calender of collection and how to recycle waste from our various households to reduce the amount of theme on the streats. With this application, waste collectors can reduce fuel costs, travel costs and thus, reducing the overall carbon footprint of their activity and air pollution. In addition, it will allow data retention for later analysis.

Key Word : Geolocalisation ; application ; waste ; air pollution ; carbon footprint.

1. Introduction

In view of rapid urbanization, the increase in the standard of living of populations and population growth, the amount of waste produced in Cameroon continues to increase. Their volume will reach 0.5 billion tons per year in 2030 according to the World Bank. According to the International Energy Agency, waste produces about 5% of greenhouse gases.

In Yaoundé city particularly, nearly 1800 tons of waste are produced every day, around 70 000 tons each year (75% from households,20% from public services and economic activities and 5% from markets) and most of it litters the ground of the streets, often out of bins scattered over significant distances.

It is therefore obvious that the current collection mechanism is not adapted to current realities and waste collection absorbs most of the time 40% of municipal budgets allocated to waste management. It seems necessary to define a collection process better suited to the current context, backed by recent technological advances, in particular artificial intelligence coupled with the use of waste collection application, for more efficient collection, respectful of the environment with a lower carbon footprint.

2. Tools and Methods

➢ Tools

In the Cameroonian context, where the quantity of rubbish outside the bin is greater than the quantity in the bin.

At the moment, we are working on the basis of designing an application that can not only help waste collection companies but also initiate the recycling process because the companies in charge of waste collection in the city of Yaoundé are still using the old technique of burying waste and also burning it but waste, apart from being a pollutant, is also a resource if it is properly exploited. The application is called CLEAN-UP and is already in the prototyping phase and comprises four main functions such as:

- **Localization** to know the position of different bins in town
- **Recycle** to raise people's awareness of recycling practices and provide them with recycling methods and examples
- **Collection Calendar** to inform population about collection periods
- **Notification** to remind people of the small steps they can take to keep their community clean. It will take into account the realities of waste collection problems in Yaoundé and will be adjusted as new parameters are taken into account, in particular the tendency of garbage trucks to collect waste and the collection tools used by the truckers.

➢ METHODS

In most of Cameroon's big cities, the waste problem is more a question of the mentality of the local population. We don't have this culture of caring about the garbage lying around in the streets, most of which clogs up the gutters and is responsible for flooding in the neighborhoods and diseases such as cholera and malaria. It's rather difficult to talk to the various waste collection companies to find why they keep the old collections methods such as daytime collection, which block traffic, or use shovels to collect waste. Concerning method used for our study, we first made an observation on the time taken to fill street garbage cans and the time taken by the agencies to collect them. The observation made is that this time is relatively very long because by the time the collection companies get to the site, the garbage has already been there for days and is in state of decomposition. People often push their garbage into the water, thinking that it will be washed away by the current.

3. Results

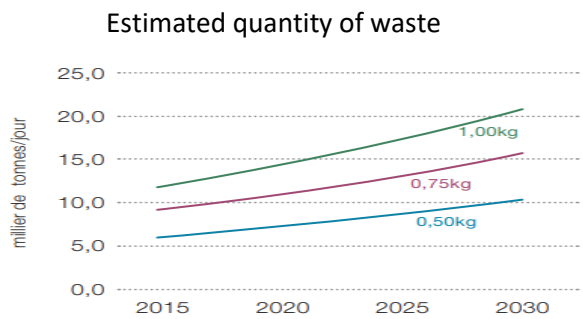
Given the speed with which garbage cans are filling up, and based on data produced by the United Nation we can see from these diagrams that this is due to the ever-growing urban population. For this reason, collection techniques need to be adapted to the current context.

Population	Année	2015	2020	2025	2030
	Totale	22 835	25 958	29 339	32 980
	Urbaine	12 463	14 942	17 740	20 857

unité : millier de tonnes/jour

Quantité de déchets	Taux de production	2015	2020	2025	2030
	0,50 kg/pers./jour	6,2	7,5	8,9	10,4
	0,75 kg/pers./jour	9,3	11,2	13,3	15,6
	1,00 kg/pers./jour	12,5	14,9	17,7	20,9

Quantity of waste=$(production\ rate) \times (urban\ population)$



The main expected results from the implementation of this application are as follows:

- regular, reliable waste collection service
- Reduction of greenhouse gases emitted by waste
- Better decision-making in waste collection
- Improved quality of service for citizens through more efficient and regular collection
- Participate in sustainable and environmentally friendly development;
- Optimization of the distribution of garbage dump sites

4. Discussion

Waste management application is a current issue, so it is approached from several angles. Some consider the recycling aspect, others the gas and fuel production aspect, still others that of pollution, etc. In this article, the angle of analysis is that of waste management application in the sense of collection, removal and recycle. We have proposed a simple and functional application that combines several existing and mastered elements such as Iot, geographic information system and data analysis. As it stands, this application is still under development. The next step is therefore the finalization and testing of our application, and make it available to both citizens and waste collection companies.

5. Conclusion

This article is a contribution to the problem of waste which is current and global. Yaounde, like many other cities in Cameroon such as Douala, is overflowing with rubbish. In the streets and neighborhoods, it's already become normal to see garbage cans spread out over kilometers and in a state of decomposition. We have tried to present a realistic and functional solution that provides a solution to the problems posed by garbage collection in large cities by adding unsanitary, disease and harmful issues related to the presence of garbage in living spaces. This solution we propose is not only adapted to the Cameroonian context and will make it possible to sweep away the traditional methods of collection but also to improve the standard process already in place. To date, the finalization of the application is ongoing.

6. References

1. Les pratiques populaires à la rescousse de la salubrité urbaine
2. STRATEGIE NATIONALE DE GESTION DES DECHETS
3. UN-Habitat https://unhabitat.org *› 2022/07 › cameroon_fr*
4. L'environnement urbain au Cameroun : Le diagnostic sur la gestion des déchets à Douala et les perspectives de recyclage
5. LES DÉCHETS : cette mine d'or qui salit nos rues
6. Logiciel gestion des déchets
7. Tri&Go : une application citoyenne pour le tri et la gestion des déchets
8. Déchets : 5 applications pour passer à l'action
9. Montri L'application des villes pour la gestion des déchets
10. TrashBack, l'application qui motive à ramasser les déchets