Analysis of Willingness to Pay for Waste Evacuation in the Central Business District of Jos Town, Plateau State, Nigeria.

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Abstract

The study analyzed the public willingness to pay for waste evacuation in the Central Business District (CBD) in Jos, Plateau State, Nigeria. The study used a structured questionnaires and observation techniques. A total of 220 questionnaires was distributed, 200 were returned and used for final analysis. Charts, percentages and descriptive methods were used to present the results of the research. A Correlation analysis determined the relationship between the effectiveness of waste evacuation and willingness to pay. The result revealed that the public is willing to pay for waste evacuation but some cannot afford the present payment structure which was N 1,000 weekly. Findings showed that 65% were willing to pay N 200 or less weekly, while 20% were willing to pay N 500 weekly for waste evacuation. Government should collaborate with private sectors to come up with ingenious ways of paying for waste evacuation using different modes of payment. Similarly, sanitary inspectors should pay more attention to performance, monitoring and accountability to justify the payments made for waste evacuation in the study area.

Keywords: *Central Business District, Waste Evacuation, Willingness & Payment.*

Background

The rapid urbanization in the developing countries of Africa has brought about the rise of series of environmental degradation, simply with urbanization comes population rise which has a strong bearing on the nature, type and quantity of solid waste generated (Binbol, Ogboji & Lohor, 2013).

Poor and ineffective management of waste and its collection system is a general problem in Africa particularly Nigeria. Therefore, series of plans by the government have been made to regulate and control the transportation, disposal, and handling of various types of waste aiming at protecting human health and the environment. Despite the formulation of the Federal Environmental Protection Agencies (FEPA) and national environmental policy, the environment has not been adequately conserved (Napoleon, Momodu, Dimuna & Joan, 2017).

Wastes collection and disposal is irregular and restricted to the major cities. Improperly sited open dumps deface several cities, thereby endangering public health by spreading odors and diseases (Adegoke, 1989). The problems faced result from inappropriate planning by waste management authorities, inadequate governance, lack of resource availability and ineffective management in rapidly growing cities of the developing countries (Darfor, Nkansah & Essel-Gaisey, 2015).

Studies have researched waste management in Central Business District (CBD's) in particular (Tevera, 1991; Sanyanga et al, 1999; Masocha, et al, 2003), and its potential threats to the public and the environment. Pay as you throw (PAYT), is a variable rate based pricing charge based on the amount of solid waste sanitary sewer services where customers pay for what they use, except in this case, citizens pay for how much they throw away (U.S. EPA 2000). According to some Agency financial sources, the gap between what the public pays for the sanitation service and the actual cleansing management expenditure is one of the critical problems in solid waste management and services (Abebe, 2018).

A study conducted in South-Eastern Nigeria also showed that wiliness to pay was influenced by marital status, house hold size and income (Oyawole, et al., 2016). Yusuf et al, (2007) conducted a study on willingness to pay for improved household solid waste management in Oyo State, Nigeria. The findings revealed that the mean willingness to pay of households for improved solid

waste management is N 1,240:92. The Majority of empirical studies on the willingness to pay for improved waste collection and disposal systems showed that the variables that mostly influence willingness to pay for improved waste management and evacuation are; age, household size, sex, marital status, education and household expenditure, the quantity of waste generated, marital status and household size.

According to Plateau Environmental Protection and Sanitation Agency (PEPSA, 2003), the waste situation is not different in Plateau state. Jos is a rapidly growing urban center, and the city's mineral resources, vast natural terrain, and temperate climate are major pull factors for the rapid urbanization. As the city expands in size, population, private businesses, mining and agriculture; it became hard to manage the waste evacuation process. These refuse heaps in the terminus area has become an eyesore to the residents and visitors spreading diseases and vectors around in Jos, Plateau state.

The State government has put in place agencies that will be responsible for clearing these wastes. Terminus area is a central business district. It was once an indoor market but has become an outdoor market due to a fire incident on February 11, 2002. Terminus market is known for its variety; both residents and visitors come to trade in. With the population and trade in this area, a lot of waste is produced, the government has made efforts to put in place mechanisms like waste services and officers including the collection, transport and disposal of waste.

Methodology

The Study Area

Plateau State, East-Central Nigeria was, created in 1976 out of the Northern half of the former Benue-Plateau state. With an area of 26,899 square kilometers, the State has an estimated population of about three million people it is located between latitude 08°24'N and longitude 08°32' and 10°38' east. The state is named after the picturesque Jos Plateau, a mountainous area in the north of the state with captivating rock formations. Terminus market is located in Jos-North, Plateau state. Terminus market is a business area, where there is an exchange of goods and services. It is located on latitude 9.921314 and longitude 8.890999 (GIS Lab, University of Jos, 2019; Wikimapia, 2019).

The Jos Main Market is surrounded by residential areas from Gangare and Yan doya. It is bounded by Jos University

Teaching Hospital JUTH, University of Jos, Murtala Muhammad Way, Ahmadu Bello Way, Bauchi Road. The CBD has the central bank of Nigeria branch and several other commercial banks branches such as First Bank of Nigeria, Zenith Bank, Diamond Bank, Union Bank, Guaranty Trust Bank, Access Bank, etc.

Jos metropolitan Development Board record indicates that the CBD is demarcated or circumscribed by the following roads and landmarks: Bauchi Road, Mango Street, Masallachi Juma Road, Enugu road, up to the Polo Field, Joseph Gomwalk Road, Standard Building, Tafawa Balewa Way, West of Mines Junction, Zoo Area, Central Bank/ Bank Street Area, Sharia Court of Appeal, Constitution Hill Road, Murtala Mohammed Way, Gangere Road, through Yam/ Potatoe Market, Dilimi Road, Nasarawa Road, Bauchi Road at Zololo Junction, Mango Street. The following are roads, areas and land marks, included in the CBD:

Areas;

I. The Masallachi Juma Street
II. Old Bukuru Park
III. Tafawa Balewa Way
IV. Rwang Pam Township Stadium
V. West of Mines Junction
VI. Rwang Pam Street
VII. Langtang Street
VIII. Shendam Street
IX. Panyam Street
X. Church Street
XI. Ahmadu Bello way - beach road
XII. Murtala Mohammed Way
XIII. Old Jos University Teaching Hospital
XIV. The Jos Main Market and Precincts
XV. Bauchi road, from terminus rotary interchange to Zololo junction.
XVI. Constitution hill road up to British America insurance junction

In this area there are 20 banks including the Central Bank, a total of 65 commercial buildings of over two storeys, over 30,000 stalls.

Method of Data Collection

Since this study employed the mixed-method approach, quantitative data was collected using questionnaires developed as the main data collection instrument and observation to verify some of the gathered primary data. The qualitative data was collected using an interview schedule which was also developed.

In addition, observation was employed where necessary to confirm details given by the respondents in the questionnaire. The

terminus market is very large so the researcher selected five zones for this study. Therefore, visual examination and categorization of the communities into three main groups of affluence was adopted. The process involved looking at areas where only PEPSA collection services were available (where bins are available for waste collection, and areas with open dumps).

Sources of Data

This study employed the use of both primary and secondary data. The primary data was sourced directly from questionnaires and interviews. Questionnaires were distributed to the respondents to fill and answer appropriately with guidance from the researcher.

Primary data

To support the survey, primary data was gotten mainly from the Plateau Environmental Protection and Sanitation Agency (PEPSA) and selected members of the population in the CBD. Methods of primary data collection used. Questionnaires was used to ask specific questions that suit the study and get responses from the respondents.

The questionnaire contained sections for easy understanding and interpretation. Section one was about the demographics of the respondents like the age, occupation and gender. Section two was about their waste evacuation systems. Section three was about their opinion on a solution to their waste evacuation system.

Secondary data

The secondary data include reports and documents published already (by some organizations, for instance). These include secondary data collection used in articles, newspapers, journals and technical publications. Secondary source data regarding the level of collection and sources of operational funds were collected from the Waste management authorities in Jos. The data collected from PEPSA was done through personal interviews.

Method of Data Analysis and Presentation

The quantitative data collected was sorted, coded and entered into the Statistical Software for Social Scientists (SPSS) and data cleaning followed before the analysis begins. Statistical tables and charts were constructed for easier interpretation. A correlation was used to determine the relationship between the effectiveness of waste evacuation and willingness to pay.

Target Population of Study

In this study, the target population was the populace based in the Terminus area of Jos metropolis located in Jos North local government. According to the official website of the state government, and the National Bureau of Statistics the population of Jos north local government as of 2006 population census is 429,300. According to a publication on terminus market by Business Insider, published on 01/ 04/ 2018, pulse. ng was quoted to have said the market was built to accommodate at least 2000 shops and also accommodate 3500 traders. The research considers 1200 as the population size.

Sample Size

With a population size of 1200 at 95% confidence level, margin error at 5.21% and 10% population proportion. A random sampling method was used to select respondents from the Terminus market area of Jos Metropolis.

The formula used for calculating sample size using Yamane`s rule of 1967:

$$n = \frac{N}{1+N(e)^2}$$

Where

e is the margin of error = 0.05

N is population size= 12 00

n is the sample size

$$n = \frac{1200}{1+1200(0.05)^2}$$

$$n = \frac{1200}{1+1200(0.0025)}$$

$$n = \frac{1200}{1+5}$$

$$n = \frac{1200}{6}$$

$$n = 200$$

The sample size is 200.

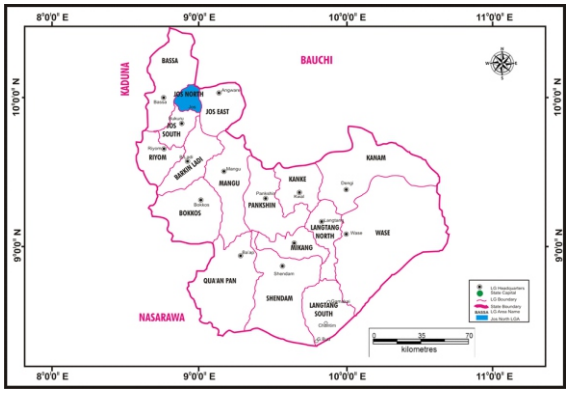

Figure 1: Plateau State Showing Jos North.
Source: GIS Lab, University of Jos, 2019.

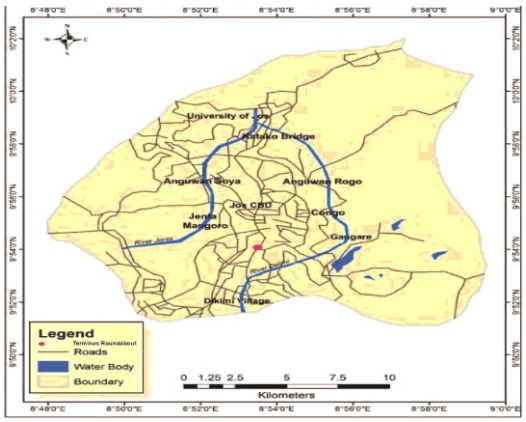

***Figure 2*:** Central Business District (CBD), Jos, Jos North.
Source: GIS Lab, University of Jos, 2019.

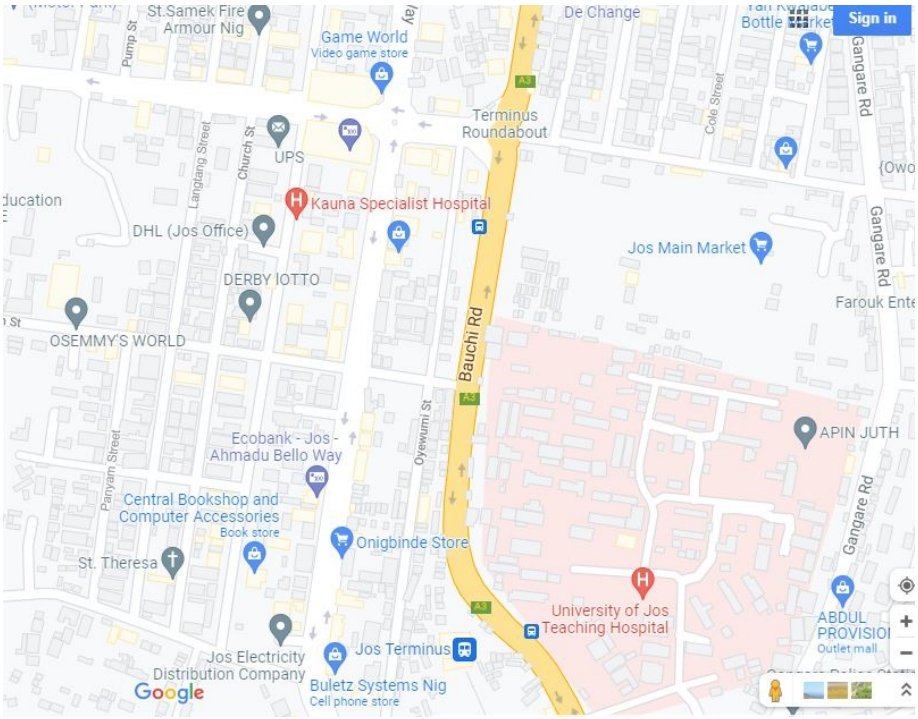

***Figure 3*: Central Business District, Jos North (Street Map)**
Source: Google Map, Accessed 01/09/2021.

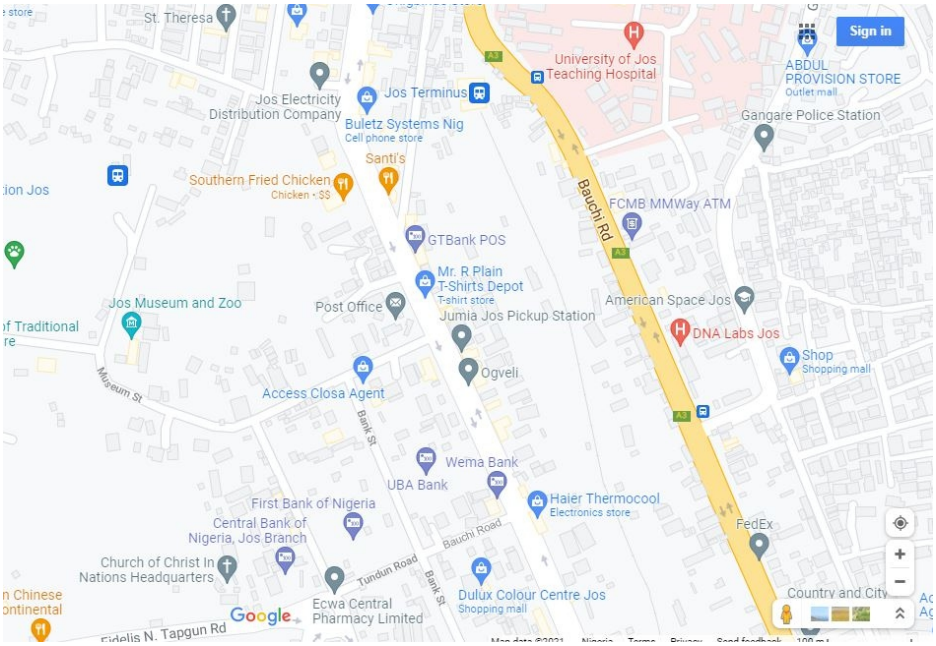

***Figure 4*: Central Business District, Jos North (Street Map)**
Source: Google Map, Accessed 01/09/2021

Results and Presentation of Findings

The data obtained were analyzed and presented using charts, descriptive analysis and contingency valuation in the presentation, analysis as well as interpretation of the data.

Socio-Economic Characteristics of Respondents

Analyses of the results reveal that, of the 200 respondents, 73.5% were males while 26.5% were females. Therefore, the shop owners were more males than females. The findings from this research revealed that 33.55% were 36 years of age, 42.5% were between the age of 36 and 50 years, and 24% were 51 years and above. Investigation into the educational level of respondents revealed that 49% of the respondents did not go beyond the basic secondary education, 23% had attained tertiary education. This is contrary to the preference of white-collar jobs by people with tertiary education in Nigeria while 28% had attained primary education.

This investigation showed that trading was the major occupation of the respondents with 53%, this was mainly because most of their educational level was secondary education level. 15.5% of the respondents were students while 31.5% were civil servants. The study showed that Nigerian students owned shops and used them to support themselves and their families. This indicated that they had multiple income streams. From the survey, 22.5% of the respondents earned every month from their shop an average of about N20, 000 or less, while 11% earned over N40, 000:00 as monthly incomes.

Waste Types and Evacuation

Findings showed that 44.5% of the wastes generated were plastic, furthermore, most of the waste was disposable polybags, and tapes used for packaging clothes. As shown in figure 5, for paper waste, 29% generated paper waste, mostly cartons used in packaging items. From the survey, 16.5% generated cloth waste, this was mainly from shops that sold materials and also tailoring shops.

Respondents who generated food waste were 10%, this was the lowest type of waste generated. This implies that most of the waste in the CBD can be recycled. Public health and safety has been the major concern. This means waste must be managed effectively in order to minimize health hazard. Currently society has seen beyond this and the major demand now is how waste management can be sustainable.

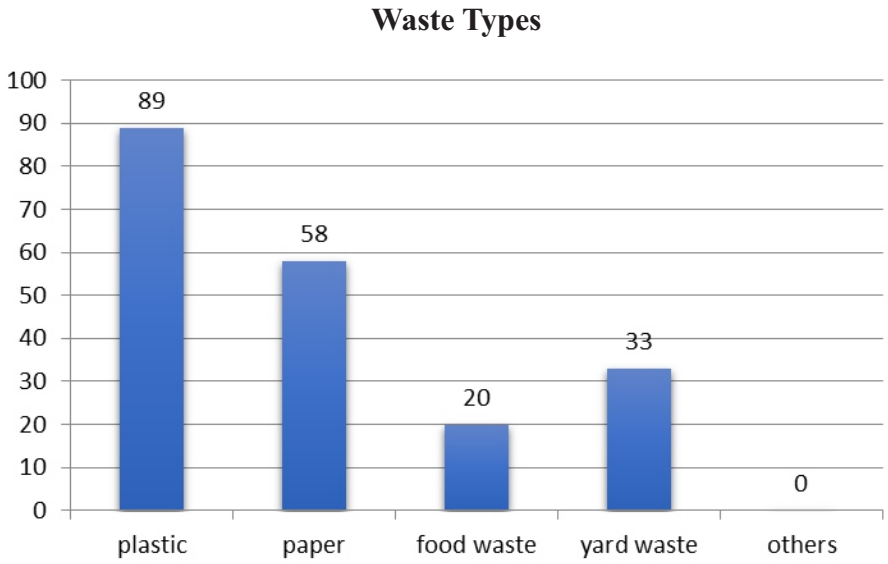

Figure 5: Different waste types generated

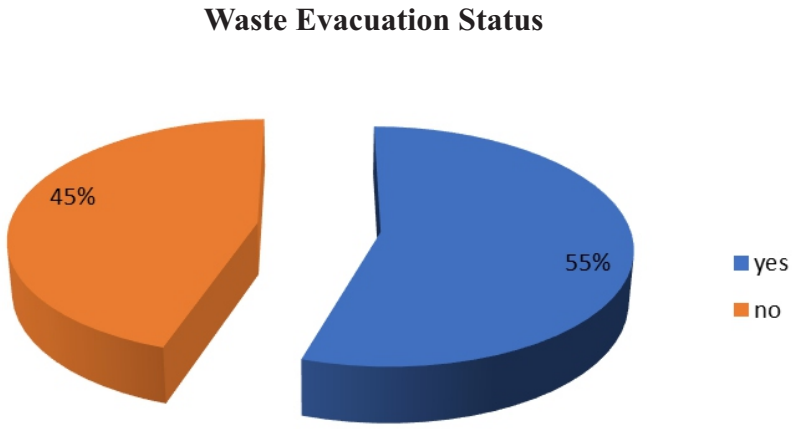

Figure 6: Evacuation status

Method of Evacuation of Waste.

Study findings showed that 55% of the respondents agreed that the services rendered by the waste officials were satisfactory, while 45% were not satisfied with the services rendered. These disparities showed that people got a fast and prompt response from the Waste Management Officials (WMO) based on how they paid for the evacuation of the wastes, shown in figure 7.

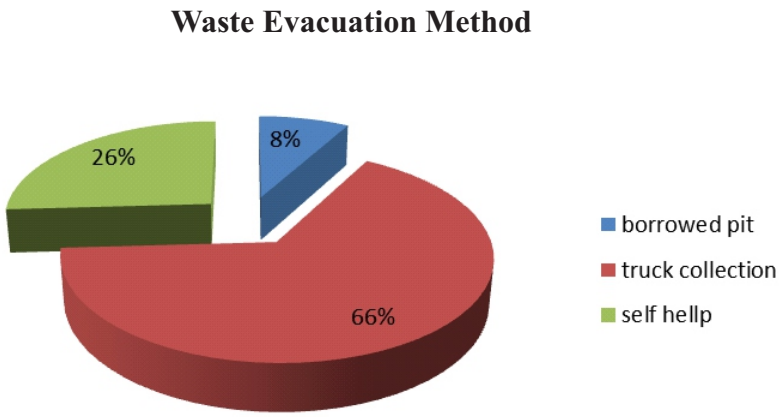

Figure 7: Evacuation method

Waste Unit Evacuation

The waste collection unit sometimes takes into consideration depending on the type of waste generated in the Central Business Districts. From the response obtained, findings showed that 49% had their waste evacuated once a week, 46% indicated twice a week while the lowest 5% indicated twice a month.

Waste Evacuation Techniques

To avoid the accumulation of waste that has been generated alongside the accompanying problems, waste evacuation is very important, shown in figure 7, 66% of the respondents attested that trucks were used to evacuate waste more than any other technique. However, people who indulged in self-help which was recycling the waste themselves, paying people to dispose of the waste, and sometimes burning the waste themselves accounted for 26%.

The self-help by respondents was a result of either truck not getting to the exact point of the waste or people not waiting for the

truck(s) to come. Borrowed pit accounted for 8% of the disposal methods. These pits were easily seen within the area and were used for dumping waste. The pits, most times, became filled and overflowed. This helped in archiving the objective of accessing then waste evacuation practices in the terminus area.

Period preferred for wastes evacuation

A total of 49% preferred daily waste evacuation, while 46%, weekly evacuation and 5%, monthly evacuation. These different responses were dependent on the kind of waste generated from the businesses. This is shown in figure 8

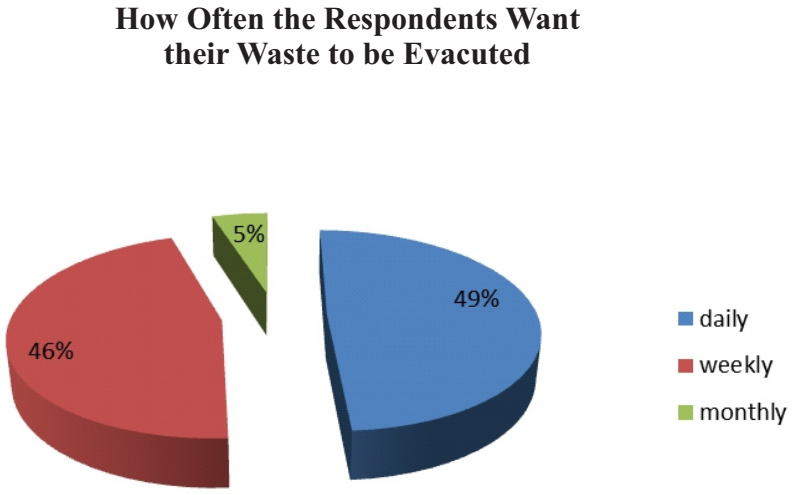

Figure 8: Period for waste evacuation

Motivation for Payment of Waste Evacuation in the CBD

Hygiene, sanitation, environmental health among others were found to be the main reasons why the respondents would pay for waste evacuation in the CBD; figure 9, shows that 35% and 32% settled for hygiene and sanitation respectively.

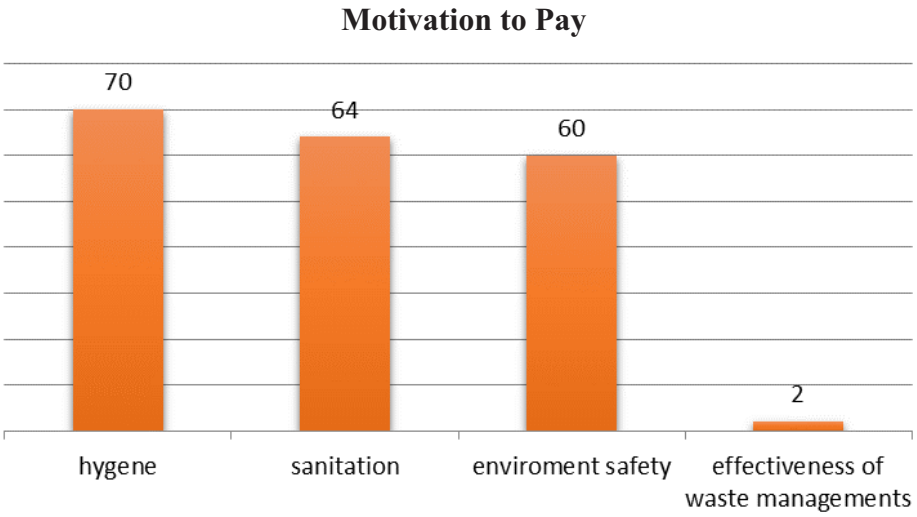

Figure 9: Motivation for payment

The Efficiency of Waste Management Officials

A total of 56% confirmed that the Waste Management Officials (WMO) were effective in responding to waste problems during evacuation while 44% of the respondents disagreed that the Waste Management Officials were ineffective in managing waste. Shown in figure 10.

Figure 10: *Efficiency of waste officials*

Effectiveness of the Government in tackling the problem of Waste in the Central Business District (CBD)

Findings showed that 50% of respondents agreed that the government tackled waste problems in the CBD area effectively, while 14% disagreed. They indicated that waste management was highly ineffective or was not well managed by the government in the Central Business District (CBD). Furthermore, 7.5% of the respondents attested that the government tackled waste problems very effectively in the Central Business District (CBD). This is graphically shown in figure 11.

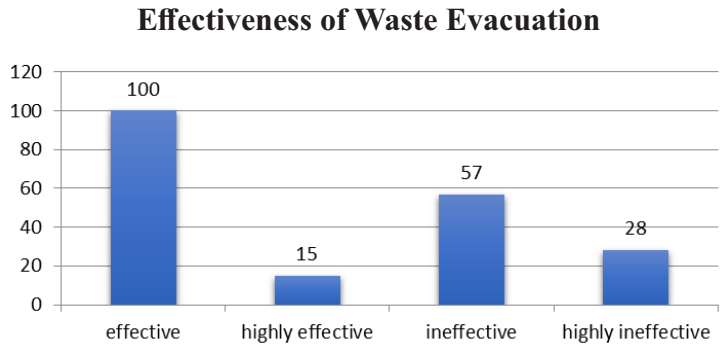

Figure 11: Effectiveness of Waste Evacuation

Payment for Waste Evacuation

Figure 12 shows a total of 55% of the respondents did not pay for waste evacuation because the fee was too much, while 45% of the respondents paid for waste evacuation to keep their business environment clean.

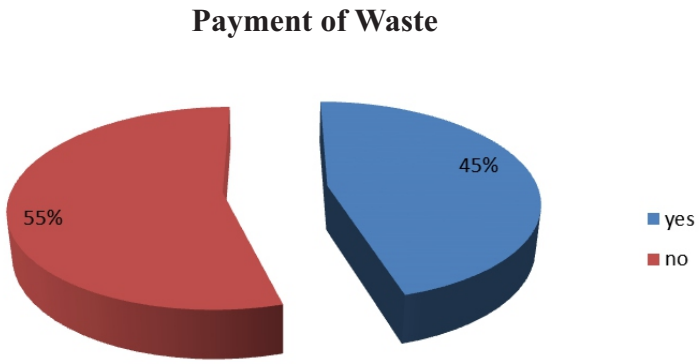

Figure 12: Payment for Waste Evacuation

Amount Paid for Waste Evacuation

The survey showed that 95% of the respondents paid N1000 weekly, for their unit of evacuated waste by the Waste Management Officials (WMO) while only 5% paid N500 for their waste to be evacuated, as shown in Figure 13. This helped answer the research question of identifying waste evacuation payment structure and the status of the public's payment for waste evacuatio

Figure 13: Payment for Waste

Period of Payment

Further subjections of the data acquired showed that the Waste Management Officials only come to evacuate the waste once a week. With this, 100% of the respondents agree and they pay weekly. And cash is accepted for the wastes to be evacuated by the officials.

Unwillingness/Willingness to Pay for Wastes Evacuation

Figure14. Shows that most of the respondents, 33.5%, attested that the monetary charge for waste evacuation was too much for them to pay while 25.5% resorted to managing their waste by themselves and 28.5% were unwilling to pay for waste evacuation as a result of the poor services rendered to them by the Waste Management Officials (WMO). This answered one of the objectives of determining the factors responsible for payment and nonpayment for waste evacuation.

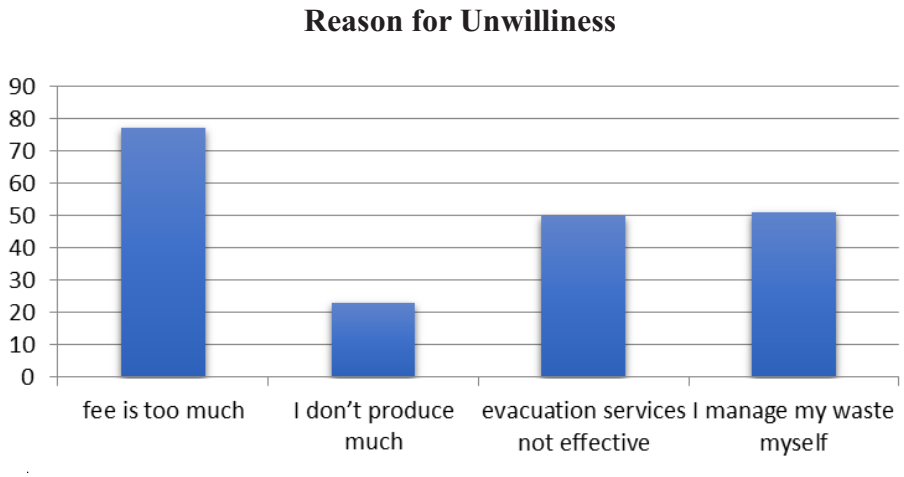

Figure 14: Reason for Unwillingness

Amount Willing to Pay

To develop an effective framework, the study sought the amount the CBD community would be willing to pay. Findings showed that 65% were willing to pay N200 or less weekly, while 20% were willing to pay N500 weekly for waste evacuation as shown in figure 15. Putting in consideration the amount most of the respondents are willing to pay, waste evacuation officials can consider collecting N 500 and will be evacuating the waste twice a week.

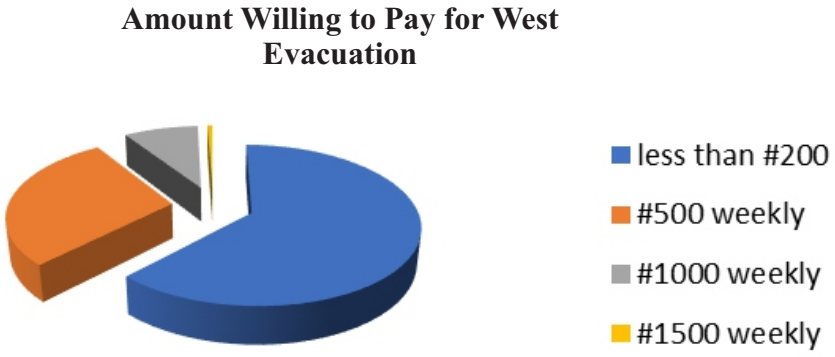

Figure 15: Amount Willing to Pay for Waste Evacuation

Table 1: Relationship between effectiveness of waste evacuation and willingness to pay

CORRELATION		Effectiveness of waste evacuation	Willingness to pay
Effectiveness of waste evacuation	Pearson correlation	1	0.133
	Sig.(2 tailed)		0.041
	Total number	200	200
Willingness to pay	Pearson correlation	0.133	1
	Sig.(2 tailed)	0.041	
	Total number	200	200

Table 1 is the relationship between the effectiveness of waste evacuation and willingness to pay. This helps in achieving the objective of knowing the relationship between waste evacuation and public payment for waste evacuation. A Pearson Correlation = 0.133 signified a weak positive correlation between the effectiveness of waste evacuation and waste payment willingness.

The weak positive correlation means the more effective the waste evacuation the more willing the public will be to pay and vice versa. The P-value [Sig (2-tailed)] = 0.041 < 0.05. This signified a statistically significant correlation between the effectiveness of waste evacuation and waste payment willingness.

Summary, Conclusion and Recommendation

The study evaluated the attitude of business men and women in the CBD towards paying for waste evacuation in terminus area, it has become imperative because indiscriminate dumping and evacuation of waste especially in commercial centers has become a perennial and enormous task proving difficult within the CBD, this study examined the framework of waste evacuation and the effectiveness of planning agencies responsible for waste management and evacuation in Plateau State.

Summary

Against this backdrop and based on the results, the following are some of the major findings of this study:

I. From the study, 55% of the respondents disposed of their wastes properly, but not evacuated efficiently.
II. For effective waste evacuation, WMOs need funding.
III. There is confusion with the waste evacuation authority and shop owners in the terminus area. The research shows that 33.5% of the respondents agree that the fee paid to get their waste evacuated is too much.
IV. The shop owners are aware of the effects of unevacuated wastes like pollution, environmental degradation and bad scenery.
V. The relationship between waste evacuation and non-payment is that waste cannot be evacuated if the waste officials are not paid.

Conclusion

The findings of the study revealed that residents and shop owners in the Terminus area are willing to pay for waste evacuation if Waste Management Officials (WMO) are more effective. The findings of this study also show that to improve the willingness to pay for waste evacuation in the CBD, the government should be more efficient in the evacuation of waste in the area and provide facilities that increase access to information regarding its benefits. Private firms should be partnered within the framework for payment for waste evacuation. The sanitary inspectors must pay more attention to performance monitoring and accountability about the payment being made.

Recommendations

Willingness to Pay for Waste Evacuation (WPWE) is important in the waste management process and should be given top most priority for the health of the environment. Thus, the following recommendations are made:

I. Traders have insufficient knowledge about waste evacuation and management. Thus, a suitable awareness program should be considered to educate the public about waste payment, evacuation and management.
II. Research initiatives and various studies on the payment of waste evacuation should be extended for deeper understanding.
III. The Waste Management Officials should employ the services of health personnel to sensitize the public.
IV. There should be a prompt and efficient

response from the WMOs for waste evacuation to build trust among the public.

V. The government should collaborate with private sectors to come up with ingenious ways for paying for waste evacuation using different modes and information should be readily available regarding the future benefits in the involvements of more private firms in the provision of ways of payment for waste evacuation.

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