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# Application of Systems Approach to Achieving Cleaner and Sustainable Environment: A study of Waste Dumping Issue on Idiroko Road, Ota, Ogun State, Nigeria

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**Abstract**

This research explores waste management activities and the strive to achieve a cleaner environment for man's habitation. The work applies a case study approach and the use of observation method was applied in the data collection along with a description of the case of waste dumping issue on Idiroko Road, Ota, Ogun State, Nigeria. This study suggests the application of systems approach to enhance a participatory waste management practice, that embraces the involvement and active consultation of the concerned stakeholders for effective and sustainable waste management practice. The research also highlights the need for further research to consider the application of other data collection tools such as interview and workshop to have a broader data needed to further explore the research area.

**Keywords:** Clean environment; Environmental pollution; Systems approach; Waste management.

## 1. Introduction

The strive to have a clean and habitable environment has become a common challenge in man's habitat. This has been as a result of complex activities engaged in by man, leading to various pollutant effects which are hazardous to the environment (Oguntunde, Odetunmbi and Adejumo, 2014). It is a common place to note that the effects of man's interaction with the environments, especially the urban areas where population density is high, have yielded challenging effects in terms of sanitation issues to the habitat (Levy and Dinopoulos, 2016). This has been the obvious situation in the case in Idiroko Road, Ota, Ogun State, Nigeria. The location is a major assess road that links Nigeria with Benin Republic. Its poor state of affair is due to inappropriate management of solid waste dumping has remained a critical issue of interest that is focused on in this research process.

Many cities, which host growing population density have had inherent sanitation challenges that have posted complexity to the government and the private participants in attempt to manage the pollutant effects (Osuntogun and Koku, 2007). Olukanni and Oresanya (2018) highlight the participatory approach initiated by the Lagos State government in Nigeria, as a working medium to address the waste management challenge. This creates a platform for the implementation of waste management and environmental sustainability via a program focusing on Reduction, Reuse, Recovery and Recycling of waste generated across the state. Their finding shows that the involvement of key stakeholder in the process was instrumental to addressing about 12,000 metric tons of waste generated daily across the state. This has generated a positive tourist attraction in the focus location of this research, being the destination of notable events and activities that draw interest from tourists across the globe. Nevertheless, Idiroko road which serves as a critical linkage tends to remain a conspicuous case of concern, due to the indiscriminate dumping of pollutant waste on the road.

Researchers reckon that key environmental pollution are generated from different activities engaged in by man. This is due to demographic issues (population growth), industrial activities, household wastes and other issues which in turn result to critical concerns to human survival (see, Kan, Chen and Hong, 2009; Rohde and Muller, 2015; Awasthi, Zeng and Li, 2016; Elum, Mopipi and Henri-Ukoha, 2016).

This paper is focused on the aspect of environmental pollution that are generated by households and its effects on Idiroko Road, Ota, Ogun State, Nigeria. The study presents a critical literature review on the activities that result in environmental pollution engaged in by man. It highlights the effects on life and the shortfalls in the respondent action by the concerned stakeholders to address the issues of pollution and other environmental hazards. Importantly, the use of observation method was applied in the collection of data along with a description of the case of Idiroko Road, Ota, Ogun State, Nigeria. This is followed by

discussion and suggestion on the use of system approach and its effectiveness as a remedy to address the identified issues of waste dumping on the focus location of this research.

## 2. Human Activities and Environmental Pollution

The nexus of man's interactions with the habitat in his strive for survival is a historical perspective to the generation of waste and pollutant objects that affect our environment and life in general (Leontiev,2014). These challenges have also resulted to global concerns such as climate change which tend to pose critical threat to sustainability of man's habitat (Barbante, Spolaor, Cairns and Boutron, 2017). A fundamental source of pollutant waste is the household, which generates different items of wastes ranging from biological wastes, and other wastes items relating to human inhabitant activities in the environment (Palabiyik, Yilmaz, Fryer, Robbins and Toker, 2015). The critical challenges posed by the waste generation activities coupled with man's inability to develop a sustainable waste management approach that can effectively address the aftermath effects result in the pollutant danger in the environment (Wong, Huang, Yang, Hsieh, Kuo, Chen and Chen, 2018).

Effective waste management is therefore a critical issue that calls for due attention from the relevant authorities and the concerned stakeholders to the issues of enhancing a cleaner environment, especially in residential locations that have population density. The effects of environmental pollution have resulted to challenges ranging from health issues to outright degradation on the affected environment (Omole and Longe, 2008). For instance, China is faced with massive air pollution in recent times that has led to death in an alarming number (Rhode and Muller, 2015). Similarly, Zabbey (2017), observes that the activity of Oil and Gas exploration firms in generating toxic waste in the Niger Delta region of Nigeria has created devastating effects, resulting to critical concerns for man's survival. This narrative tends to balance man's activities and strive for his survival with adequate attention to the end-to-end effects on the environment, to have a sustainable habitat.

Many approaches have been adopted by the public sector to address waste issues in the environment at different times (Beard and Green, 1994). For example, many state government authorities in Nigeria adopt the end of month environmental sanitation exercise. This can help the project of environmental cleaning via the involvement of both households and the government agencies to engage in environmental cleaning to address the waste management issues (Stock, 1988; Arimah,1996). However, these efforts have been speculated to be inadequate in addressing the challenges of having a clean and sustainable environment. This level of waste management challenges, especially in residential locations have made the government agencies to take a step further by

embarking on further cleaning exercises, other than the monthly general sanitation (Nwaka, 2005).

Furthermore, researchers, (such as Olukanni and Mnenga, 2015), suggest a bottom–up approach embedded in co-operation among the actors in environmental waste management in southern Nigeria, with due regulatory attention to land use and address the complexity in urban waste management. Particularly, Berrado, Demicheli, Lavalle, Kasanko and McCormick (2004) argued that studies on environmental sustainability issues in developing countries, would enhance the need to pay more attention to urban growth and economic development issues.

Nevertheless, it seems that despite these efforts, the achievement of a sustainable approach to managing environmental waste remains an ongoing challenge necessitating the search for a more effective approach to address the issue in human activities on environmental sustainability, especially in one of the major cities in Ogun State, Nigeria. Based on these challenging issues relating to effective waste management, this research is set out to suggest systems approach which is underpinned by productive engagement with the right stakeholders in the process of joint identification and development of solution to the issues of waste management on the focus location.

## 3. Overview of the Focused Location

The focused location for this research study is Idiroko Road, Ota, Ogun State Nigeria. Ota is a commercial hub and a fast-developing nerve centre of Ogun State. Its popularity stems from its proximity to Lagos State, the nation's commercial capital and linkage to the boundary with Cotonou in Benin Republic. The road also links different towns and villages within Ota. Idiroko Road, Ota hosts several developing settlements where construction of residential houses and industrial sites are ongoing. It also hosts many manufacturing and service organisations. It has high traffic of movement, both vehicular and pedestrians who ply the road all year round. The towns have become a new haven for traders, who now have unrestricted access to the roadsides and display their wares to prospective buyers. While this development is driving traffic to Sango, it has left behind a blight, such as reckless dumping of refuse along Idiroko Road, Ota (Olukanni and Mnenga, 2015).

## Materials and Methods

### Data collection tool and Analysis

The research applies observation method to explore the behavioural exertion of man towards a sub-conscious degradation of the environment. The focus is on gathering qualitative data along Idiroko Road, Ota, Ogun State, Nigeria, which is the focused location of this research. The earlier choice to use in-depth interviews with residents were refused by most selected respondents, due to the sensitivity of the topic, many residents approached declined to interviews. Whilst the usefulness of other qualitative tools for data collection such as focus group interviews, workshop have been well applied among researchers, especially in the focus location (Fayomi et al, 2015). The participant's consent which is a common requirement for the application of such tools could not be achieved in this research process (see, Olukanni et al, 2014), nevertheless the researchers chose to apply observation as an effective tool to source adequate information for this research.

## Results and Discussion

### Observed Incidences of Waste Dumping on the Focus Location

Incidences of waste bag dumping on the road-divide were first observed in the works of Olukanni*et al*, (2013). These were mainly carried out by residents of different age grades (see, Appendix). This development has since provoked talks among groups of worried residents, most of whom expressed fear of likely outbreak of epidemic in the city if urgent steps are not taken by the Ministry of Environment, who is statutorily saddled with the responsibility of a clean State. It has been observed that clustered houses around focused location lack modern waste disposal systems and regulations needed to ensure an environmentally friendly habitat. This background tends to have resulted to the habit of indiscriminate dumping of refuse into available spaces, including Idiroko Road, Ota, especially among residents, pedestrians, and other road users.

Residents generated the waste items from household waste products and indulge in dumping on the focused location, which is the centre of Idiroko Road, Ota, Ogun State, Nigeria. These observations were noted to be a consistent practice within the focused location. This observation corroborates the assumption of researchers who argue that the researcher interprets observed phenomena and produce findings that will affect people's understandings of a research topic (see, Polkinghorne, 2005; Aiken, Sloane, Bruyneel, Van den Heede, Griffiths, Busse, Diomidous, Kinnune, Kózka, Lesaffre and McHugh, 2014; Colchero, Popkin, Rivera and Ng, 2016).

Observation tool applied in this research allowed the researchers to have a critical reflection on the context of the data collection process in order to enhance an analytical use of collected data towards the achievement of the research objectives (Liamputtong and Ezzy, 2005). However, researchers note that the interpretation of observed events are sometimes influenced by the researcher's expectations, experiences and theoretical assumptions (Weimer, 1979; Midgley, 2000) The use of diverse observation methods, including the use of technology such as video and scanner-tracking device was used in this study. However, researchers still needed to apply observational method with absolute caution to ensure proper documentation and reporting of observed data in the entire research (see, Lee and Broderick, 2007).

The government authority was observed to assume the responsibility to clear these waste items, usually wrapped into carrier bags of different sizes, from the road-divide. And this has gone on intermittently for a long while, as the chosen approach to address the situation on the road. However, the actions of the authorised waste management agencies, in engaging in the acts of clearing wastes from the Idiroko Road, Ota, Ogun State, Nigeria, was also noted to have created a further challenge to public use of the road. This was observed to have resulted to breach of vehicular traffic challenges, each time the waste collection vehicles assume sanitation duty on the road. The breach of traffic on the road was observed to have led to further problematic situations, such as risk of theft, accidents and even damages on the road.

These observations were noted to pose a serious problem situation as it affects man's activities (Rittel and Webber, 1973; Grint, 2005). It would therefore require more than a mere collection of waste from the focused location to address, if the quest for a cleaner environment must be achieved (Mingers and Brocklesby, 1997). Moreover, Mingers and Rosenhead (2004) placed emphasis on structuring of identified problem situation. This will enable a thorough process of effective data collection that will cover the entire issue of interest. Such platforms could enhance possible modification and combination of chosen data collection methods to suit the context of the research process (Taylor and Taylor, 2009). The inadequate attention given to addressing the challenge of waste in the focused location of this research, suggests the need for the development of a more resilient approach that can sustainably meet the need for an effective waste management practice within the focused location of this research. The next section presents further discussion and recommendations.

## 4. Further Discussion on Waste Management issue on the focused Location

Indiscriminate dumping of refuse by roadsides and street corners have become a major problem in recent times, impending the flow of traffic and endangering health of people in many parts of Ogun State. Heaps of refuse spilling onto the road have been noticed around Ota axis of Idiroko Road, either at the middle of the long dual carriage way or on the pedestrian walkways.

On a few occasions, some portions of refuse were observed to be burned by some concerned residents. However, the failure of most residents and pedestrians in many of the affected areas to dispose waste properly has contributed to this disturbing trend. It was also observed that negligence and insensitivity of various stakeholders such as landlords, waste collectors, community leaders and members seem to have contributed to dumping of refuse in many sections on the focused location. These habits of negligence have already resulted to critical issues such as, blocked drainages and poor environmental sanitary conditions, and other ugly sights that litter the streets, around the focused location.

There seems to be a lack of consultation between the key stakeholders to the project of waste management on Idiroko Road, Ota, Ogun State, Nigeria. From observation, the government agency tend to focus on embarking on intermittent cleaning process on the focused location, with minimal interest in having a systemic solution to the challenge as identified by Olukanni and Mnenga, (2015), in their study, they identified that inadequate regulatory framework, uncoordinated institutional functions, low political will, low capacity to discharges duties, poor data information for planning, and wrong attitude of waste generator constitute some of the challenges to proper waste management. They concluded that involvement of all stakeholders become a more effective way to proper waste management scheme. Researchers such as Grace, et al (2016), affirm that government authorities should take responsibility for effective waste management to enhance positive impacts on human lives and the environment. However, the situation at the focus location for this research seems to be further challenging. This suggests the necessity to deliberate on a more suitable approach that could address the waste management issues which seems to have been neglected. Such approach could prevent the occurrence of parallel operational effort between the household and the government agency (Oloyede et al, 2010). The current efforts by the government agency tended to be grossly inadequate or failed to address the environmental challenge of waste management in the focused location.

From further critical observation, it seems that the residents who dump waste items on this major road feel no guilt just as no recognised government law enforcement agency has made any formal resistance or any confrontation aimed at stopping the act. As a result of

this negligence, the guiding legal framework tend to have lost its potency in restricting the residents from committing the crime of waste dumping on the focused location and help to preserve the environment. The study of Okoye (2012) reckon that when there is negligence by the regulatory stake holding partners, there are bound to be institutional fractures that can lead to fraud and sundry derailment from expected projections. Nwagbara and Ugwoji (2015) highlighted in their study that proper institutional framework ensures an all-inclusive corporate-stakeholder engagement which assures transparency and accountability. This study observation tends to explain the reason why the focused location of this research which could have projected the overall environmental beauty, has been on the opposite direction, posing the danger of offensive pollutions to life within the region.

The task of pursuing a cleaner environment in the focused location projects the necessity for the concerned stakeholders' consultation that would support the needed awareness of the effects of the challenges of waste dumping on the focused location. Ufua, et al (2018) highlight the importance of involving the affected stakeholders noting that it would encourage ownership mentality and empathy towards the achievement of set objectives. Although the practice of waste dumping on the focused location has remained a contextual norm over the years, extant literature has shown that the application of a consultative approach could provide a process of re-orientation among stakeholders and projects re-adaptation of a more effective practice that is acceptable to the concerned stakeholders to this project (Ufua et al, 2015). When stakeholder groups are able to see the waste management project as sacred (what they jointly treasure), the development and adaptation to an agreeable approach to address it can become the resultant effect (Midgley, 2007). It can also provide the motivation to jointly work on the clearly defined common goal which is to strive for a cleaner environment (Jackson 2003).

Furthermore, this study observed that consultative approach to addressing waste management issues on the focused location can enhance a participatory process that is void of marginalisation on any stakeholders' group or interest, and secures a win-win effect between stakeholder groups, such as the government agency, local residents and road users. This could be achieved via partners' engagement on a repetitive critical reflection and deliberation on the subject matter, which also triggers the process of creative development and improvement approaches to addressing the issues identified (Flood and Jackson,1991). The study of Phong, Nguyen and Zhu (2018), identified that sustainable solid waste management lies in its practical application to issues, where all stakeholders are integrated into the management process, to harness their different resources and build collective strength with a clear division of each partners roles and responsibilities. In their conclusion, the integrated sustainable waste management process involves three components of (i) system element stage of waste separation and collection for use in

agriculture; (ii) aspects of environmental, institutional, legal, technical, social and economic framework and (iii) stakeholder's participation.

The suggestion of authors like Berrado *et al*, (2004) and Olukanni and Mnenga (2015), who emphasised a bottom-up and cooperation between the government and the residents tend to have a significant gap in addressing the issue of relationships and marginalisation. Olukanniand Mnenga (2015) emphasized that through social and environmental institutional frameworks, public education campaigns can be developed to encourage public participation in sustainable waste management behaviour such as sensitizing the public on the locations for disposal of waste, development of city recycling programs and the need for handy carriage bags taken to marketplaces to minimize nylon bags usage. A mere bottom-up without relevant details would seem to create a source of power play between stakeholder groups that could breach interest in the project as identified by Ulrich (2002).Yet, this re-affirms the need for further awareness and proper orientation among affected stakeholders to the identified challenging issue, to create a fair platform to jointly address the identified challenge of effective waste disposal management in the focus location. As Mappasere and Idris (2016) rightly identified that integrative waste management framework requires educating all stakeholders on the administrative mechanism through which all categories of stakeholders interact with one another in strengthening their collaboration and roles. Phong, et al (2018) in their study emphasized that when stakeholders understand their different levels of integration and become aware of their roles in the management of waste processes, these influences their knowledge, interest, attitude, power and alliance to solving the challenges of waste management.

The nature of participation of all key stakeholders, their level of inter-relationship and characteristics constitute part of the essential framework towards ensuring sustainable solutions to waste management challenges. Key stakeholders include environmental regulators, planning agency, politicians, sector agencies, NGO, Financial institutions, media, scientific community as identified by Joseph, (2006). His study emphasized that identification of stakeholders varying interests is important in coordinating their participation and involvement in various waste management activities. The study of Mappasere and Idris (2016) broadly categorized stakeholders' groups into: private sector, public sector, community/citizen. Their study emphasized that collaboration between government and its stakeholders should be on an increasing continuum consisting of 5 patterns of interactions between government and citizens in form of coerciveness, delegation, responsiveness, collaboration/partnership, and citizenry coerciveness. These levels of interaction help in identifying the specific role of each participant for effective integrative waste management procedure. Hamad, Hanafiah, Akbar and Sheikh (2017) identified in their study that solid-

waste management is a multidimensional issue that incorporates the involvement of key stakeholders whose activities determine the solution to waste management challenges.

This study argues that the strive for a cleaner environment in the focused location can be achieved if the key stakeholders are involved and encouraged to participate actively in making contributions towards achieving the objective of a cleaner environment. As ulrich, (2012) has identified in his study that only when oppressive or dictatorial exertions by one stakeholder group upon another is completely addressed, then, the full potential of partners' contributions towards waste management and enhancing a cleaner environment can become a sustainable reality.

## 5. The relevance of Systems Approach to addressing the identified issue

At the fore of our recommendation is the use of systems approach to address the identified issues of ineffective waste management on the focused location of this research. Systems thinkers assume that everything in the world, ranging from events or actions are related to something else (Checkland, 1981; Midgley, 2008; Midgley, 2011). Systems approach can enhance the development of critical understanding of the depth or structure of the issue identified, and trigger a joint development of a working approach, via the engagement with the concerned and involved stakeholders (Midgley, 2000). Systems approaches therefore combine different methods, ideas, and techniques to achieve desired change (Rajagopalan and Midgley, 2015). It would also provide appropriate structuring identified issues into boundaries and prompt suitable attention of the participants in the right directions to address and ascertain the extent to which developed solution has been applied to address the identified issues (Ufua, 2019). Ufua and Adebayo (2019) reckon that systems approach can enhance a clearer view of the 'bigger picture', and also projects the examinations of complex and contextually embedded issues such as the waste management in the focused location of this research, and foster the development and combination of suitable approaches to address identified issues (Midgley, 2003).

Heylighen, *et al*. (2006) identified in their study that application of systems approach can help recognise the process of waste management as a whole and the behavioural demarcations of the concerned stakeholders towards the project. These can function in an unstructured alignment that sometimes create acritical problem situation, resulting to further challenges in coordinate the system as identified by the study of Pyne, *et al*, (2018). Therefore, systems approach can provide a working platform for effective waste management in the focused location, from multiple stakeholders' perspectives. This should be based on their level of connection to the identified project as identified by Gharajedaghi,

(2011). These could include the involvement of the residents, the road users, the government agency and other relevant partners to the waste management project in the focused location. Systems thinkers assume that the involvement of the affected stakeholders could inform value judgement that can result to the drawing of boundaries (Cabrera, *et al*, 2008). This approach according to Gregory, *et al*, (2013) help in shaping the approach to participation in addressing the identified issue and prompt the setting of parameters for measurement of performance. Systems approach also creates the extended thought of effective 'end to end' effects of actions and decisions in the implementation of its principles by the participating stakeholders (Stacey, 2002).

As it relates to the effective waste disposal management process on Idiroko Road, Ota, Ogun State, Nigeria, the application of systems approach, while laying the ground for a complex participatory and responsive approach, could also result in other benefits. These benefits such as better understanding and structuring of the waste management project and the assumption of responsibilities among participating stakeholder groups which aimed to have a continuous strive to achieve a cleaner environment (Gregory, 2007).

Systems approach could also facilitate the practice of authentic information circulation which is a critical necessity to enhance the entire process. This is because right and timely information is a requirement to project the entire actions by the participating stakeholders in the application of systems approach to address the waste management issue identified (Laudon and Laudon, 2015). Also, it will possibly position the focused location in the strive to become compliant to current global environmental standards as identified by Cassidy, (2016).

## 6. Conclusion

This research paper explored the application of system approach to waste management in attainment of a cleaner environment in Idiroko Road, Ota, Ogun State, Nigeria. This study applied observation method as the data collection tool. Stakeholder consultation and the application of systems approach were suggested after a critical analysis of observed data and reflection from extant literature relating to systems and waste management.

It was found that the government officials, community members and leaders have developed less attention to the possible risk posed to health, as residents dump their trash bags/cans along the research location as a result of the non-availability of a well-organized refuse collection system. Hence, refuse is often indiscreetly dumped on the centre of the road. It is advised that the government agencies should adopt a systems approach to jointly develop a working and agreeable approach to address the challenge of waste dumping on

the focused location. It is also suggested that the involvement of the affected stakeholders to the project as a systemic whole, can facilitate agreement and commitment to decisions by the affected stakeholders. This could form a suitable platform to generate productive ideas and solutions to the issue of effective waste management in the focused location.

However, there remains a limiting factor to this study which is the inability to use other data collection tools due to resistance encountered from key participants in the study who were unwilling to participate in the research process. Attempts to conduct interviews were declined by the residents along the focused location of this study. Whilst this study is viewed as foundation to further research in this area, especially in the focused location, it would be suggested for further research to consider applying other data collection tools such as the workshops and interviews which were also not used in this study.

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**Appendix**

Picture 1: Iyana Junction, Idi-IrokoRoad, Ota, ogunState, Nigeria.

Picture 2: Mosalashi Junction, Idi-Iroko Road, Ota, Ogun State, Nigeria.

Picture 3: Davol Junction, Idi-Iroko Road, Ota, Ogun State, Nigeria.