

Perspectives on Integrated Waste Management: A Case Study for 2 West Rand District Municipalities, Gauteng, South Africa

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Abstract—This paper demonstrates the effectiveness of public awareness and participation on successful waste management and minimization practices in Mogale city Local Municipality (Mogale CLM) and Westonaria Local Municipality (WLM) in the West Rand District Municipality (WRDM), South Africa. Questionnaires were used to understand community perspectives on awareness, attitude and involvement in waste management. A critical component in any waste management program is public awareness and participation, in addition to the Municipal Systems Act legislation [1]. In addition, strong technical support and adequate funding are also key components towards effective waste management. Waste is a result of human activities and everyone requires a proper understanding of waste management issues, without which the success of even the best conceived plans becomes questionable [2]. Separation at source and the collection of recyclables separately has become a requirement with the promulgation of the Waste Act (No. 59 of 2008). This paper concludes by emphasizing public awareness in particular the consequences of improper waste management such as illegal dumping.

Keywords—Perspectives, public awareness, recycling, separation, waste management and minimisation

I. INTRODUCTION

WASTE management is generally given a low priority in government. This perception influences the resource allocation processes which negatively impede service delivery and good waste management practices. This perception is further translated into community attitude towards waste management. The main driver behind this sentiment is lack of knowledge. Waste management systems must meet local community needs and priorities if they are to be effective. Accordingly, solid waste management decisions must be informed by community perspectives as well as by technical analysis. This approach encourages participation and enhances the efforts of waste managers as they seek new innovative ways to provide effective and efficient services to the community. Education and awareness also form the foundation of integrated waste management policy tools where all the

stakeholders understand the need for the retirement of existing habits so as to embrace new and innovative approaches offered by the policy.

Sustainable national education and community participation programmes should be developed to engage all target groups and reinforce waste minimization and diversion through reduction, reuse and recycling. Young people should be nurtured to develop habits that support best practices in the waste diversion initiatives where appropriate responsibility and behavior will precede misguided disregard for the environment. The private sector through the various commercial and manufacturing associations should also be encouraged to participate as partners to bring change among its workforce. Corporate mandates and directives should begin to inculcate a new culture towards waste diversion, where labour appreciate and embrace this national initiative in defense of the environment [3].

Mogale CLM and WLM need to work with non-governmental organizations, communities and other stakeholders in order to understand and respond to community priorities in solid waste management to ensure: (i) A participatory approach to solid waste management for all stakeholders (ii) Two-way communication, in which information and ideas are exchanged between government and communities at national and local levels (iii) Public awareness programmes that effectively communicate waste management issues and initiatives (iv) Appropriate communication (v) Ongoing feedback mechanisms that include responses to complaints and information on significant changes that can affect solid waste management (vi) Monitoring and evaluation of communication programmes and interventions. .

II. RECYCLING

Recycling of waste refers to the separation at source of recyclable materials from the general waste stream. The quality of recyclable materials is higher when separated at source than when mixed with other waste. Recycling reduces the amount of waste that needs to be disposed at landfills. In addition, recycling through resource recovery has the potential for job creation and is a viable alternative to informal salvaging at landfills, which is undesirable due to the problems of health and safety [4]. Fig. 1 shows that 85% of Mogale CLM and WLM communities strongly support recycling and

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that municipalities should provide recycling opportunities to both private sector and the public.

■ Strongly Agree ■ Agree

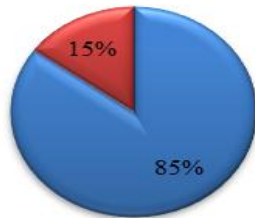


Fig. 1 Recycling support

Data obtained from Mogale CLM recycling personnel questionnaire, Fig. 2 show that 40% of the community sort paper and cardboard, and this sold to recycle depots and buyback centers. 20% of Mogale CLM participates in waste paper campaigns while 80% make use of bins for waste paper collection. The survey showed that 20% and 10% of population participate in glass bottles and can recycling respectively, Fig. 3. About 20% of the participants take their plastics to the collection cage in Kagiso while 80% are not aware of the presence of such facilities. 60% of the participants take plastics bags to the supermarkets where a levy is charged as part of the government recycling, reduce and re-use initiative. The study shows that there are no composting initiatives in Mogale CLM. Composting can reduce the waste stream as the biodegradable fraction is utilized to enrich the soil for agricultural purposes.

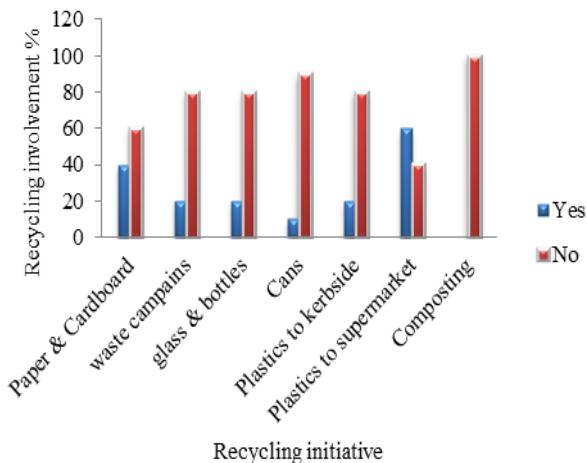


Fig. 2 Mogale City LM personnel recycling involvement



Fig. 3 Separated cans and bottles @ buy back centre [5]

If composting of organic waste is practiced the formation of methane gas (which is 21 times more potent in creating climate change than CO₂) is prevented [5]. A normal household can reduce the production of CO₂ by 550 kg if its waste is reduced by 10% and another 1100 kg per year if half of the waste is recycled. 87% of the participants supports energy recovery from waste as a sustainable waste management policy. Methane can be captured and used as a vehicular fuel or for heating.

■ Strongly Agree ■ Agree



Fig. 4 Energy recovery as a sustainable waste management policy

Some of the benefits and highlights of recycling are (i) Recycling and composting all recyclable and organic waste can cater for as much as 80% of waste generated (ii) Recycling 125 aluminum cans saves enough energy to power one home for a day (iii) Recycling one glass bottle saves enough electricity to light a 100-watt bulb for 4 hours (iv) More than 5,700 Kilojoules of energy are conserved for every pound of steel recycled (v) One ton of recycled paper can save 17 trees [6]. Without recycling, the bulk of the re-usable and recyclable waste is disposed at landfills and this contributes to the diminishing capacity of available landfill airspace. 98% of Mogale CLM and WLM strongly agree that the quantity of waste sent to landfills should be minimized to prolong the life spans of Luipaardsvlei and Lebanon landfill sites. Local municipalities should continue to support and fund waste minimization.

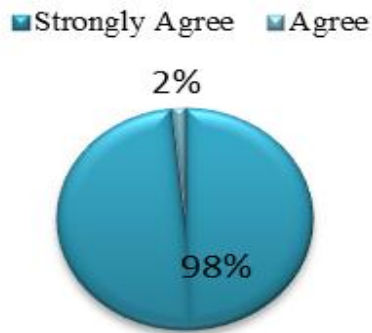


Fig. 5 Minimisation of landfill disposal

In order to ensure maximum diversion of re-usable and recyclable waste from landfill, a wide range of re-use and recycling programmes, including composting should be initiated. It is important to ensure sustainability of such programmes through the provision of the necessary support such as resources for establishing recycling and composting facilities and the creation of sustainable markets for the products. Fig. 6 shows that 92% of the participants strongly agree that the local municipality should continue to promote the use of home composting bins while 8% agrees.

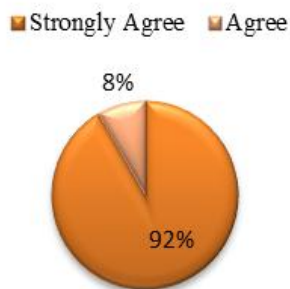


Fig. 6 Promoting the use of composting bins

The WLM recycling personnel questionnaire shows that 40% of the people sort paper and cardboard for selling to recycle depots and buyback centers. 20 and 10 % of the WLM participants are involved in glass bottles and can recycling respectively. About 40% take their plastic waste to the collection cage in Westonaria and Bekkersdal. 60% of the participants drop their plastics bags at while 40% send their plastics to waste bins. Westonaria LM communities are still not well versed with garden and biodegradable waste, hence they are not involved in composting initiatives. There is a general lack of information on waste minimisation and recycling initiatives in WLM resulting in low community involvement.

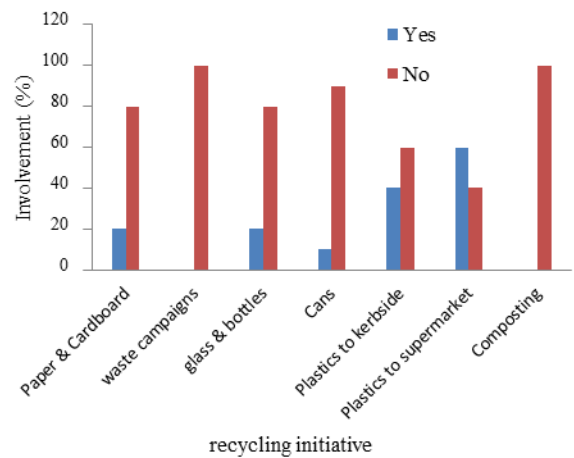


Fig. 7 Mogale City LM personnel recycling involvement

III. AWARENESS CAMPAIGNS

Awareness and education campaigns play an important role in the success of any reduce, re-use and recycling initiative. The socio-economic conditions prevailing in a specific municipality must be taken into account when establishing waste management programmes. Incentives, together with awareness have the potential to change consumer behavior. Incentives for minimising waste can include Pay-As-You-Throw charges. Participation in separation at source of recyclables without any significant financial benefit can be challenging as it is time consuming. Incentives, for example a cost saving on the monthly disposal charges, would encourage businesses to participate in separation at source. Buy-back centres are more viable in low income areas where participants are rewarded for their efforts. Awareness is the foundation upon which all waste management programmes should be based. Sustainable waste services and good waste management practices require the active involvement of all stakeholders. Fig. 8 shows that 90% of Mogale CLM and WLM participants strongly agree and support community involvement in waste management.

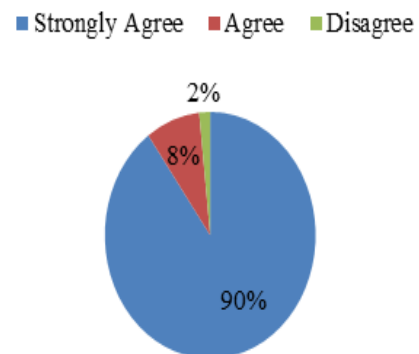


Fig. 8 Community involvement in waste management

Willingness to pay for waste services will also improve with

increased awareness. 75% of Mogale CLM and WLM personnel do not agree with payment for waste related services while 8 and 17% strongly agree and agrees respectively. These responses are closely related to the community income levels.

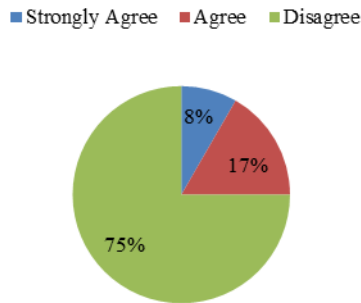


Fig. 9 Willingness to pay for waste related services

All stakeholders are important for the provision of effective and sustainable waste management services and awareness campaigns. A combination of numerous methods maybe used to achieve effective awareness on the importance of a clean environment and recycling. Communication material and methods must be appropriate for the target audience, and examples include slogans, billboards, Fig. 10, exhibitions, flyers, booklets, personal visits, campaigns, and education on site.



Fig. 10 Waste recycling billboard [5]

The main purpose of awareness campaigns in communities is to change people's attitudes and behavior towards cleaner environments. While various current initiatives have lead to cleaner areas, they do not encourage sustainable practices that reduce littering and illegal dumping in the long run. More emphasis is required on awareness that focus on the implementation of the waste hierarchy. As such, waste minimisation and separation at source should be encouraged to enhance reuse and recycling initiatives. Municipalities are

responsible for all the environmental awareness and educational programmes such as (i) Clean-up campaigns in schools Fig. 11 (ii) Pamphlets on various topics; (iii) Waste messages in the municipal newsletters (iv) Celebration of environmental days/events (v) Training and workshops for traditional leaders, food handlers etc (vi) An hour slot per month on the local radio station to discuss different environmental issues (viii) Door to door education. This involves the deployment of trained community members. The door to door initiative has two benefits. People are reached in the comfort of their own homes and get clarity on all issues especially illegal dumping and jobs are created for educators who are paid a stipend of R80.00/15 houses visited. This is important as calling community members for meetings or workshops does not work because of poor attendance.



Fig. 11 Clean-up campaigns in schools [5]

IV. ILLEGAL DUMPING

Illegal dumping is one of the most common problems in Mogale CLM and WLM. Illegal dumping can contaminate land and pollute water bodies. Communities are more likely to dispose their waste illegally if they lack appropriate waste disposal and recycling facilities. In addition, establishing such facilities can be an expensive and long process for municipalities as they require appropriate infrastructure and relevant permits. In many cases, communities use wheel barrows or use children to take waste to central collection points. The skips that are normally used at these points are not easily accessible, as they are too high to hoist over heavy loads from wheelbarrows or to be accessed by children. This results in most of the waste being dumped next to the skip, Fig. 12.



Fig. 12 Illegally dumped waste next to the skip [5]

If an area is already strewn with litter or illegally dumped waste, people are likely to continue to litter and dump on that site. Municipalities must take preventative actions such as beautifying the area, providing waste bins at strategic locations and implementing projects that can discourage people from illegally dumping such (i) creating parks and playgrounds for children (ii) initiating community gardens and (iii) establishing car washes to provide employment for the youth in the area. The choice of a project will be influenced by conditions in the particular area and community needs.

Conventional ways of dealing with illegal dumping such as clean-up by municipalities are not effective. Cleaning of illegal dumps is costly and counterproductive as it dilutes the available funding and resources for waste management or other municipal services. Furthermore, by cleaning illegal dumping and littering without other punitive and or deterrent measures sends out the message that it is not wrong to litter and dump. Besides having the potential, legislation and an enabling environment do not prevent illegal dumping practices. An enabling environment include the strategic provision of waste bins, waste collection services to all communities, alternative management options for specific waste streams, and the enforcement of updated by-laws including the ability to issue spot fines for illegal dumping.

V. MUNICIPAL SYSTEMS ACT

The Municipal Systems Act (No. 32 of 2000) describes the core principles, mechanisms, and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of communities and ensure access to services that are affordable to all. Its focus is primarily on the internal systems and administration of the municipality. The Act enables the process of decentralization of functions through assigning powers of general competence to Local Government. Municipal By-Laws are regulated to achieve harmony with national and provincial legislation. As service authorities, municipalities remain responsible for the effective delivery of services and must provide an appropriate policy and regulatory framework. This can be achieved

through the most appropriate service provider, ranging from internal departmental delivery to corporatization, joint ventures to private sector delivery options. Performance management systems are to be developed to measure and evaluate performance in priority areas which will be reported annually to citizens and other spheres of government.

VI. CONCLUSION

Mogale CLM and WLM are both faced with similar waste challenges. The main findings of this study were that (i) Illegal dumping a common problem in Mogale CLM and WLM (ii) Awareness and educational campaigns are absent (iii) Stakeholders do not understand the importance of waste management (iv) Waste management is generally given a low priority by local governments (v) Enforcement of waste legislation is very minimum (vi) Limited municipality budgets compromise waste initiatives.

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