Assessment of Recycling of General Domestic Waste at a Multinational Pharmaceutical Company's Office in Sandton

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1   ABSTRACT

Increasing waste quantities present global waste management challenges. In South Africa, landfills are nearing capacity. Inadequate baseline waste data hinders the implementation of effective waste management systems. This study investigated the potential of waste minimization strategies in a multinational pharmaceutical company's office. The company's waste management contractor was used to perform waste characterisation. The mean monthly quantity of waste measured was 2591 kg. The percentages of the different recyclable waste categories measured corresponded with other studies. However, the proportion of recyclables to total waste was low when compared - possibly due to sorting errors. A company-wide survey that assessed employees' attitudes and perceptions towards recycling and waste management was also performed. Results revealed a general positive consensus towards the requirement for responsible waste management and willingness to participate in such strategies at work. This study provides baseline data and insight to assist with the successful implementation of waste management systems.

2   INTRODUCTION

2.1   Background

South Africa generated approximately 108 million tonnes of waste in 2011 (Department of Environmental Affairs, 2012). Landfilling is a popular method employed globally and does not require sorting of waste (Foolmaun, et al., 2011; Al-Khatib, et al., 2010; Al-Jarallah & Aleisa, 2014). The waste management (WM) hierarchy places prevention as top priority, followed by materials recovery, then incineration, and finally land filling (Republic of South Africa, 2009; Nehrenheim, 2014). In practice, South Africa's hierarchy starts with landfilling (Rautenbach, 2014). Landfilling is presenting land availability issues seeing that they are not welcomed near residential areas (Lasode, et al., 2014), cause large amounts of environmental damage, restrict land use and having other negative impacts (Nehrenheim, 2014).

Significant portions of waste sent to landfills are recyclable and compostable materials (Aguilar-Virgen, et al., 2013) and can constitute close to 90 % of waste sent to landfills (Nwokedi, 2011). Other WM strategies such as reuse, recycling and incineration, have proven to drastically reduce the amount of these materials sent to landfills (Townsend, 2010; Nehrenheim, 2014). As in other developing countries, in South Africa WM infrastructure, systems, baseline statistics and waste monitoring are insufficient (Rautenbach, 2014; Department of Environmental Affairs, 2011a). Waste can only be effectively managed if its composition and source are known.

The culture of people who produce waste largely impacts the quantity of waste produced and the manner by which it is disposed (Hoornweg and Bhada-Tata, 2012; Boonrod, et al., 2015). Strategies must be identified and employed to accomplish culture change in people and to maximise buy in to responsible waste management from a population (Boonrod, et al., 2015).

Many research studies investigate the characterisation of waste and the culture of populations in waste streams such as municipal and residential waste (Amutenya, et al., 2009; Nwokedi, 2011), but no studies were found by the researcher that explore the waste streams of specific types of businesses. The type of business largely determines the quantity and composition of office waste (Alias, et al., 2014). The culture and consequent preferences of employees needs to be investigated in order for a company to minimize waste and offer improved WM (Godfrey, et al., 2012).

The aim of this study was to investigate the potential of waste minimization strategies in a multinational pharmaceutical corporate office. Consequently, the primary purpose was to determine the composition of waste at a multinational pharmaceutical corporate office and the secondary purpose was to investigate employee's perceptions towards better WM practices. This was achieved by meeting the following objectives:

1.   To ascertain the total quantity of waste produced at a multinational pharmaceutical corporate office

2. To determine the composition of waste generated at a multinational pharmaceutical corporate office
3. To investigate employees' willingness and opinions on methods to improve the office WM system.

3 LITERATURE REVIEW

3.1 Waste characterisation statistics

A study conducted among small and micro enterprises in Braamfontein, Johannesburg showed that waste removed by the city waste removal service, PikitUp, consisted of 26 % paper, 10% plastic, 5.7% glass, 2.7% metal, 20% are compostable, 21.8% waste residues and 13% are other non-recyclables (Nwokedi, 2011). This is the only study found by the researcher to detail waste characterisation of business waste in South Africa.

Another study found that higher income countries had a waste composition of 28 % organic waste, 31 % paper, 11 % plastic, 7 % glass, 6 % metal and 17 % other waste (Hoornweg and Bhada-Tata, 2012). The same study also found that waste composition of low income countries in East Asia and the pacific region comprised of 64 % organic waste, 5 % paper, 8 % plastic, 3 % glass, 3 % metal and 17 % other waste which were similar percentages acquired in a study by Al-Khatib, et al., (2010) in a low income region of Palestine as well as in a study by Yay, (2015) in Turkey. These studies indicate that a minimum expectation of 40 % of waste currently ending up at landfills could be avoided by sorting and recycling.

In terms of total waste, Sweden produces the least amount of waste in the world. Less than 1 % of its waste is sent to landfills (des Ligneris, 2013), compared to 69 % in the United States of America and 80 % in South Africa (Department of Environmental Affairs, 2014)

South Africa offers one of the lowest commercial waste recycling rates globally. A mere 6 % of commercial waste is recycled in Cape Town (des Ligneris, 2013). It is most cost effective for businesses to only pay for general waste removal. The benefits of waste minimization and motivation to move towards a zero waste culture in businesses needs to be outlined for numerous businesses.

3.2 Regulations

There is a lack of enforcement of regulations in South Africa (SA) to hold businesses and corporations accountable for the quantity of non-hazardous waste they produce or the methods used for disposal of their waste (Worku & Muchie, 2012). The National Environmental Management Act, 1998 (Act No. 107 of 1998) and the National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) specify regulations regarding waste minimization, and recycling, yet they are not strongly enforced by municipalities and do not consist of stringent regulations for business waste. The WM system in SA is not sustainable (Nwokedi, 2011). One of the main factors that limits the amount of recycling that can be done is the lack of infrastructure to support recycling activities (Department of Environmental Affairs, 2011a). Government strategies have moved from looking to better manage waste disposal to rather reducing the quantity of waste produced.

3.3 Landfills and waste minimisation

While many countries are adopting other better WM methods, landfilling remains the preferred choice in South Africa (Thompson-Smeddle, 2011). The majority of unsorted general waste that commercial corporate companies produce in SA is removed from the site and taken to landfills (Bhagwandin, 2013). Landfilling is not sustainable in SA as landfills are fast reaching capacity (Garner, 2009) none of which have more than 10 years capacity left (des Ligneris, 2013) and the country is running out of space for the creation of new landfills (Brebbia, 2012). Many landfills in SA, especially the older ones, were constructed without a lining and often lie in a clay layer that restricts permeability, but does not inhibit it (Thompson-Smeddle, 2011), allowing toxic substances to leach into the surrounds (Nehrenheim, 2014).

The rate of recycling is extremely low in South Africa. Ten percent of waste was recycled in 2011 (Department of Environmental Affairs, 2012). Besides for a few large recycling plants, small buy-back centres and voluntary recycling are undertaken (Thompson-Smeddle, 2011), but are mostly successful only when a convenient, easy to use system exists (Swami, et al., 2011; Crociata, et al., 2015). The use of methane from landfills and waste to energy (Karagiannidis, 2012) is also being utilised. Recycling is a proactive measure that reduces waste going to landfill, whereas waste to energy is a more reactive strategy that is useful for handling waste that has already been taken to landfills.

3.4   Culture and education

Typically, South African local municipalities are responsible for WM (Department: National Treasury, 2011) and the general public and businesses are largely exempt from such activities (Lasode, et al., 2014). Studies have found that the waste culture is largely dependent on the education of people regarding waste (Boonrod, et al., 2015; Yin, et al., 2014; Saphores, et al., 2012). Other South African studies found that even though people may have the intention to recycle, other factors such as education and convenient recycling methods results in a significant non-incentivised behaviour change (Godfrey, et al., 2012). Awareness campaigns exist in SA (Thompson-Smeddle, 2011).

People working at companies are influenced by the behaviours and perceptions of others in the company, especially those they deem as important figures (Gupta, et al., 2011; Huffman, et al., 2014). These behavioural influences can be positive or negative. One reason that corporations may promote a zero waste or recycling culture is where its own financial benefit exists as an incentive (Boonrod, et al., 2015; Gupta, et al., 2011).

4   RESEARCH METHODOLOGY

4.1   Research Design

This study followed a mixed methods research design. Quantitative methods were utilized for the waste characterisation branch, whereas a combination of quantitative and qualitative methods were exercised for the survey branch as it consisted of both open-ended and closed-ended questions.

Data was collected concurrently, in a parallel fashion, using a convergent design as one set of data did not depend on the outcome of the other (Harrison, 2013) and both data sets were of equal importance (Anderson, 2006).

4.2   Waste characterisation Methodology

This study solely focused on general domestic waste produced on site. All the waste produced over the three months was sorted for characterisation. Chemical, medicinal, confidential documentation waste and gardening trimmings waste were not included in this study and followed their own specialised disposal processes.

Figure 1 550 L bags for sorting recyclable waste categories with labels above each bag in the waste storage and on-site sorting area in the basement of the pharmaceutical office

The pharmaceutical company's WM contractor performed sorting, collections and final disposal of waste. The following recyclables categories were used: paper (cardboard (K4), White (HL1) and Common Mixed Paper), plastic bottles (High Density (HD) and polyethylene terephthalate (PET)), plastic film (Low Density (LD) Colour) and scrap metal cans (mixed). E-waste and glass were also categories that waste was sorted into, however the quantities of these types of waste were too small during the study period and were not processed by the WM contractor.

The WM process during the data collection period remained the same as the usual day-to-day WM. All general waste on the business premises ended up in 240 L Otto plastic bins at the waste storage and on-site sorting area in the basement parking of the building (refer to Figure 1). The mixed waste was sorted directly out of the Otto plastic bins and all recyclables were sorted into 550 L bags. Clear labels existed above each bag that identified the waste category held by the bag. The sorters had acquired adequate training on sorting of different materials as well as health and safety aspects while sorting. Relevant personal protective equipment was worn by sorters.

Once 550 L bags reached capacity, the recyclables buy back centre company would collect the bags, meanwhile, when 240 L bins reached capacity of non-recyclable waste, a separate company would collect these bins to landfill. Off-site weighing of each bin was performed by the contracted WM contractor on a calibrated weigh bridge. The weight of the bins was subtracted from the total weight of materials. Waste was first sorted into categories which were individually weighed and then all the weights were added together to get the total amount. All measurement data was subsequently made available to the pharmaceutical company via a secured online website.

4.3   Survey Methodology

Consent to conduct the research study at the pharmaceutical company was acquired from the CEO of the pharmaceutical company. The Inquisite survey creation tool was used as the company held a corporate account for this program. The electronic survey was pre-tested on eight employees. The survey contained 31 questions that were split into categories that focused on employee attitudes, perceptions, influencing factors, awareness of employees and environmental knowledge (Yin, et al., 2014).

The survey was administered for one week from 6 to 13 August 2015. The survey included a consent letter stating that by submitting the survey respondents would be providing consent for their data to be used. A printed hard copy of the survey could be completed in the canteen for employees who did not have computer access.

Non-probability voluntary sampling of the employee population took place as it promises better commitment by volunteers to complete the survey; and reduces the time and cost involved with other sampling methods. Bias of respondents who volunteer commonly being those who take interest in the topic of the survey was not a major concern seeing that the researcher was an employee at the company and greater volunteer rates were acquired by the company's survey tool requesting employees to complete the survey.

4.4   Study Area

The study took place at a large, multinational pharmaceutical company located in central Sandton, the financial hub of Johannesburg. The companies' office is a country office that supports activities for importation of medicines from numerous manufacturing sites around the world. On average, the building was occupied by approximately 176 employees. All contract workers on site were included such as cleaners, gardeners and canteen staff.

4.5   Data analysis procedures

The software programmes Minitab and Microsoft Excel were used for statistical analyses. Descriptive statistics were used to analyse the quantitative data from the waste characterisation branch of the study, for example, mean quantities of waste types (Rautenbach, 2014).

A 90% confidence level was used with $\rho = 0.10$ for statistical analyses relating to the survey on perceptions of WM. The Pearson correlation test was used to determine if correlations existed between demographics and other questions which had Lickert scale response options. Chi squared test of independence was implemented to explore the discrete variable characteristics between participants such as age, gender and level of education and reasons for recycling or actions of colleagues and other characteristics (Byrne & O'Regan, 2014).

5   RESULTS AND DISCUSSION

5.1   Waste characterisation study

Note: Percentages are frequently used to represent waste as a whole for comparative reasons with other studies.

Scrap metal cans were not measured in July 2015 as they did not reach the minimum quantity for the WM contractor to collect and weigh them. This could have resulted in a falsely inflated value in August 2015.
July 2015 experienced the largest quantity of waste (refer to table 1) which could be explained by the fact that July sees increased production activities to make up for decreased activities in August since the company's head office and many manufacturing sites are located in the Northern hemisphere which experiences summer holidays in August. This results in concurrent increased workload at the South African office in July. In keeping with this explanation, the lowest waste quantities occurred in August 2015 when there were decreased workloads.

Table 1. Waste characterisation results over the 3-month study period

Total waste	Jun-15		Jul-15		Aug-15		Averages	
Waste Category	Quantity (kg)	%	Quantity (kg)	%	Quantity (kg)	%	Quantity (kg)	%
NON-Recyclable	2153	85	2653	87	2100	90	2302	87
Recyclable	379	15	400	13	230	10	336	13
Total Weight	2532	100	3053	100	2330	100	2638	100
Recycleables								
Paper-Cardboard (K4)	241	64	160	40	49	21	150	45
Paper-Common Mixed Paper (CMW)	68	18	163	41	100	43	110	33
Paper-White (HL1)	23	6	31	8	45	20	33	10
Plastic-Bottles HD	11	3	12	3	17	7	13	4
Plastic-Bottles PET	8	2	12	3	3	1	8	2
Plastic-Film LD Colour	21	6	22	6	5	2	16	5
Scrap Metal Cans - Mixed	7	2	-	0	11	5	6	2
Total recycleables	379	100	400	100	230	100	336	100

Seeing that documentation and courier deliveries are main operations at the pharmaceutical office, it was expected that the paper categories form a large proportion of recyclables. Plastic film was expected to be the smallest of the plastics category due to its light weight. Scrap metal and cans are also light weight regardless of their volume and were mostly contributed in the form of drinking cans.

The mean proportions of recyclables to each other were in agreement with Al-Khatib et al. (2010) and Townsend (2010) with cardboard and other paper waste forming the majority of recyclables, followed by plastic bottles and other plastics and then cans. However, the very low mean weight of recyclables in proportion to non-recyclables did not agree with these studies. All studies found compostibles to make up the largest portion of waste which were not measured in this study.

The total amount of waste generated over the three-month study period came to 7922 kg of which 1016 kg was recyclable materials. The mean quantities over the three-month study period were as follows: all waste 2591 kg, recyclables were 339 kg and non-recyclables was 2252 kg. Further explained, a monthly mean of 87% of waste generated by the company is sent to landfills. A compostable waste category was not included in this study, although a significant proportion of compostable waste was expected in the waste stream from the on-site canteen. The recyclables categories were limited to those paid for by the pharmaceutical company which could be a source of error. Another potential source of error is that the sorters from the WM contractor could possess differing employee morale and sorting abilities.

5.2   Survey: Employees perceptions and attitudes towards recycling and WM

The survey was sent out to 179 office based staff to complete. 172 employees received an electronic link to the survey in an email, whereas the other 7 employees received a hard copy version of the survey to complete. A total of 112 (62.5%) respondents completed the survey.

5.2.1   Demographics of respondents

As can be seen in table 2, the gender proportions of respondents were 25% males and 75% females. Managers or supervisors made up the largest proportion of respondents after which came Administrative employees closely followed by General staff and then Senior management, External service contractors and Consultants. A large amount of respondents presented with tertiary levels of education of having a diploma or higher qualification which was expected due to the technical nature of the company. It must be noted that

the four demographics attained did not seem to play a main role to affect any other sections of the survey which agreed with the findings of Huffman, et al. (2014) and Byrne & O'Regan (2014). The researcher expects that the culture of the working class at the pharmaceutical office could be a fundamental factor contributing to it, since most of the respondents' attitudes were largely in agreement, as will be detailed below.

Table 2. Demographics

24. Gender				
Male	Female			
25	75			
25. Age group				
20 to 29 years	30 to 39 years	40 to 49 years	50 years and older	
15	38	34	13	
26. Level of employment				
Senior management	Manager or supervisor	Consultant	Administrative employee	General staff
13	38	5	19	18
27. Highest level of education				
Grade 12 or below	Degree / diploma	Honours degree	Masters degree	
13	49	20	18	

5.2.2   Employee attitudes and perceptions

Recognition of the importance of responsible WM and that WM responsibility lies with the generator of waste was observed from responses to questions (Q's) 1 and 2 (see table 3). All specified answers of those who selected "Other (Please specify)" in Q2 wrote statements such as "both employee and company". This was supported by the large majority of respondents who for Q3 felt at least partially responsible for the waste they generate at work. These results are consistent with those in other studies by Huffman, et al. (2014) and Swami, et al. (2011).

All WM strategies presented in Q5 were acceptable by large proportions of respondents, although the strategy in Q5d was found to be the most preferred. Through Q6 it was shown that time and inconvenience were the most common reasons that employees would not partake in efficient WM strategies. The 13% that selected the "other" option all indicated that they would always partake in WM strategies with statements such as "No objection at all". Byrne & O'Regan (2014) found similar results with 41% opting for inconvenience.

Question 7 generated responses indicating that all respondents were aware of such activities and saw them in a negative light, no respondents opted that they are disinterested in improper practices. The extent of the responses was unexpected since there are many areas in South Africa where it is evident that these practices occur. The researcher suggests upbringing, education or culture as possible reasons for this majority response.

Responses to Q's 8 -10 inferred that the large majority of respondents perceived that improper waste management impacted negatively on humans and the environment and that there existed a general school of thought that recycling is an activity that is necessary and everyone should play their part. Byrne & O'Regan (2014) achieved agreeing results for both statements in Q9 and Q10. The Pearson correlation coefficients for Q9 with the acquired demographics were 0,144; -0,286; 0,095 and -0,171, respectively, whereas the coefficients for Q10 were 0,043; -0,222; 0,124; and -0,131, respectively. Further the two statements did not show significant correlations with each other as the Pearson correlation coefficient was 0,389.

Table 3. Responses to questions about employee attitudes and perceptions

1. Do you think recycling and reducing waste generated is important?

Yes, everyone should do their part	Yes, but not my responsibility. Other departments take care of it		
96	4		

2. Who is responsible for waste generated by the company?

Individual employees	The company	Other (Please specify)	
49	43	8	

3. Do you feel responsible for the waste that you generate at work?

Yes	Partially	No	Sometimes
63	35	2	1

4. In general, do you feel there is a need for greater awareness and education about waste management and the role that employees can play?

Yes	No	Not sure	
97	1	2	

5. Indicate your willingness to use each of the following WM strategies if they were implemented in your company
a) Double sided printing

Most definitely	Maybe	No	
84	13	3	

b) Reusable glass/plastic cups instead of polystyrene or paper cups

Most definitely	Maybe	No	
74	16	10	

c) Water in a jug instead of bottled water for meetings

Most definitely	Maybe	No	
68	16	16	

d) Bins with separate sections for recyclables situated in offices or around floors

Most definitely	Maybe	No	
92	7	1	

e) Repair and maintenance of items instead of buying new

Most definitely	Maybe	No	
49	48	3	

6. What would be the main reasons that you would not partake in any waste management strategy?

Time	Inconvenience	Other (Please specify)	
49	38	13	

7. What do you think of improper waste management practices e.g.burning of waste, littering and illegal dumping?

Problematic.I wouldn't do them	They occur, not my responsibility		
87	13		

8. Do you think such practices impact negatively on the health and well-being of humans and the environment?

Most definitely	Yes, but the effect is negligible	Maybe	
95	3	2	

9. Recycling is just a fad introduced by the Greens, it will pass

Strongly Agree	Somewhat agree	Not sure	Somewhat disagree	Strongly Disagree
2	3	6	10	79

10. Recycling is for people who have a lot of time to spare

Somewhat agree	Not sure	Somewhat disagree	Strongly Disagree	
8	5	21	66	

5.2.3   Influencing factors

Table 4. Responses to questions about factors that influence employee participation in WM strategies

11. Would the participation of top management encourage you to use waste management strategies?				
Yes	Partially	No	Not sure	
57	28	13	3	

12. Which other colleagues would affect your decision to use the strategies?				
My department colleagues	Department managers	Colleagues in other departments	Other (Please specify)	
40	22	13	24	

13. Do you feel that your company is doing anything to make employees aware of environmental issues?				
Yes, they are doing a lot	Yes, I see a few awareness efforts	Not sure	No, I do not see any awareness efforts	No, they go against the green environmental concepts
13	29	15	41	3

14. Would you like to see your company raising employees' awareness about environmental issues?			
Most definitely	Yes, but only a little	Maybe	No
79	13	7	1

15. Will increased awareness regarding the benefits of waste recycling encourage you to start to implement it at work?		
Yes	No	Maybe
85	4	11

16. Will increased awareness regarding the benefits of waste recycling encourage you to start to implement it at home?		
Yes	No	Maybe
81	6	13

17. If you were provided with information and advice that would help you to implement simple lifestyle changes at work to recycle waste, would you consider doing this		
Yes	No	Maybe
93	2	5

In table 4, responses to Q11 and Q12 revealed that buy in from especially top management as well as other colleagues could be a large determining factor for successful implementation of a WM strategy. The participation of other people in the vicinity of a person largely affecting that person's actions to use a WM strategy was shown by Huffman, et al. (2014). It was also pointed out that the social aspect could create a sense of fun when recycling.
The results from Q13 and Q14 suggest that the company has not been a main determinant factor in responsible WM perceptions that have been observed in results of the survey so far. Godfrey, et al., (2012) found that education plays a fundamental role in predicting recycling behaviour.

Findings by Crociata, et al., (2015), Godfrey, et al. (2012) and Huffman, et al. (2014) agreed with the results from Q15 and Q16 which showed that people behave differently at work and at home. The willingness to recycle without complete knowledge regarding the benefits of the action has been exhibited in this survey and is a behaviour also found by Byrne & O'Regan (2014). Considering this point, WM strategies that require small activities that are easy for the employees to use at work could aid in implementation of efficient WM strategies at the company.

5.2.4   Awareness and knowledge

As discovered in the waste characterisation branch of this study, the correct answer to Q18 was 1001 – 5000 kg.

Evidently, knowledge regarding the average generation of company waste is, in part, lacking.

As seen in table 5, it seems probable to derive interpretation from Q's 19 - 22 that most respondents had negative perceptions regarding landfills and were aware of potential detrimental environmental effects from them, yet a substantial proportion were unaware that they were contributing to landfills with the waste they produce (Q19 and Q20 results).
Education or awareness efforts surrounding the quantity of waste generated and what happens to non-recycled waste could motivate people to use efficient WM strategies at work according to Godfrey, et al. (2012). Despite a substantial proportion of respondents not knowing what happens to non-recycled waste, cross tabulations revealed that all such respondents said they would not live or work next to a landfill.

Table 5. Responses to questions about factors that influence employee participation in WM strategies

18. How much general solid waste do you think the company produces per month?			
500 - 1000 kg	1001 - 5000 kg	>5000kg	
25	46	29	
19. What do you think happens to general waste that is not recycled?			
It is taken to a licensed landfill	It is taken to unofficial dumping ground	I don't know	
56	10	34	
20. What do you think happens to YOUR COMPANY'S waste?			
It is recycled or taken to a licensed landfill	It is taken to unofficial dumping ground	I don't know	
79	2	19	
21. Would you be willing to live or work in an area next to a landfill?			
Yes	No	Maybe	
2	95	3	
22. Landfills contain toxic substances that can enter the air as well as the soil and groundwater and thus causes damage to the environment and to humans.			
Strongly Agree	Somewhat agree	Not sure	Somewhat disagree
67	18	12	3
23. In bins with separate compartments for different recyclables I have a clear understanding of what belongs where and exactly what I can recycle.			
Strongly Agree	Somewhat agree	Not sure	Strongly Disagree
72	21	5	2

Pearson correlation performed for Q23 against demographics data of Q's 24 - 27 revealed the following coefficient values, respectively, which did not offer any significant correlation: 0,258; -0,108; 0,153 and -0,158. Mrema (2008) and Godfrey, et al. (2012) have found that perceived knowledge is partially inaccurate and that up to half of all respondents who think they are sorting correctly, in fact are not.

A general recognition of the requirement for responsible WM and a high level of willingness to partake in responsible WM strategies were observed. Respondents would like to see their company taking more environmentally responsible measures and creating more awareness at work. There is room for education and increasing the knowledge of respondents regarding the waste disposal process and the benefits of responsible WM and the disadvantages of irresponsible WM. A possible source of error is that some respondents could have answered what they thought was the right answer and not necessarily what they personally felt.

6   CONCLUSION

This study set out to explore the potential of waste minimization strategies in a multinational pharmaceutical corporate office. To accomplish this, waste characterisation of all waste produced over a three-month period from June 2015 to August 2015 at a multinational pharmaceutical corporate office was carried out and a company-wide survey was performed to assess the perceptions and attitudes of employees towards recycling and WM. General domestic solid waste was the sole focus. The main company operations included large amounts of documentation as well as canteen food services and the receipt of numerous packaged goods such as marketing media.

Waste characterisation found that an average of 2591 kg of waste was produced per month of which 87% was non-recyclables sent to landfills. The low proportion of recyclables did not agree with previous studies and could be due to the specialised office operations or sorting inefficiencies. Cardboard was the largest recyclable category followed by common mixed paper, white paper, HD plastic, PET plastic, plastic film and lastly scrap metal cans.

It is recommended to consider incentives or personal interest of sorters in future waste characterisation studies.

The survey consisted of sections that focused on demographics, employee attitudes and perceptions; influencing factors; and awareness and knowledge. A response rate of 64% was achieved. The demographics data suggested a corresponding spread of respondent characteristics according to the actual population.

The survey revealed a positive culture towards responsible WM and enthusiasm to take part in more efficient WM strategies if implemented at work. There is room for a future study to be performed at the same company to test the use of implementing the mentioned WM strategies to assess the difference between intentions and behaviours. Even though intentions might not precisely match behaviours Huffman, et al. (2014), high usage of the most preferred strategies would still be expected as Pakpour, et al. (2014) suggests a moral obligation along with intention produce more behavioural actions. It was also found that

employee awareness regarding what happens to non-recycled waste was significantly lacking. The researcher expects that with increased awareness and educational efforts, together with the positive attitudes displayed, implementation of the WM strategies mentioned in the survey would be successful and make a noteworthy difference to the quantity of waste being sent to landfill by a company of similar size and operations as the pharmaceutical company used for this study.

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