

Consumer preferences for plastic waste recycling in retail facilities in Johannesburg: A university community perspective

Yewande Adewunmi¹, Hoosen Rameez¹, Makgoba Friedar¹ and Novotny Max¹

¹School of Construction Economics and Management, University of the Witwatersrand,
yewande.adewunmi@wits.ac.za

Abstract:

Research on global best practices in waste management showed that problems with plastic waste could be managed if systems are in place to help their return for recycling by consumers and collectors through a chain involving the retail sector and manufacturers for an incentive. The paper aimed to determine which incentives and knowledge affect the overall performance of recycling in retail facilities. An online survey was sent to staff and students of a top-rated public university in Johannesburg, South Africa. The survey was analysed using mean scores, ANOVA and regression analysis. The study found that the provision of shopping discounts at selected stores was the best incentive to be provided. Also, providing free parking to shoppers was another way of providing incentives to shoppers to engage in recycling and rewards such as discounts on plastic bottles. In addition, the study further found that knowledge and incentives promote recycling in the context of retail facilities. Some of the recommendations were that mall managers and the university community could use the findings to encourage participation in recycling.

Keywords:

Consumer preferences, incentives, plastic waste recycling, retail facilities, universities

1 Introduction

As generations evolve, consumer needs and expectations tend to also change with time. The necessity of sustainable practice is paramount. The impact of waste on the environment is growing, and recycling facilities should be understood and utilised in this age. Consumers are gradually moving to online shopping from personal use of retail centres, which plays a huge role in managing waste when most of it is generated in households (Lin et al., 2019). To effectively deal with the waste management problems faced by cities, it is of great significance to promote the sorting and recycling of municipal solid waste (Chen, Wang and Hou, 2020). Research dating from as early as 2008 shows that there has been a trend identified between the consumer and waste management. Waste management systems serve great importance as they will help reduce the amount of mismanaged waste and promote sustainable living and a healthy environment. An environmental management system is a set of processes and practices that enable a firm or one of its facilities to reduce environmental impacts and increase operating efficiency through consistent control of its operations, such as collecting waste in the facility and disposing of the waste (Stafford, 2016). Research on global best practices in waste management indicates that plastic problems, waste disposal, which forms a

bulk of the waste, can be reduced if systems help their return for recycling by consumers and collectors through a chain involving the retail sector and manufacturers for an incentive. This system has been in place for several years in the Scandinavian countries of Denmark, Sweden and Norway, which could recover 74% of its annually generated wastes as recycled materials and products or through energy generation. The rate in Poland was 76%, while the average waste recycling figure for the European continent was 47% (Bachiri and Pivovarsky, 2012).

Retail centres produce waste, a significant portion of which can be recycled, and consumers play a part in this value chain or framework. Education levels, environmental consciousness, legislation, and economic incentives are all variables which impact the level of recycling in retail centres. Waste Management in South Africa is uncoordinated and lacking funds. The key issues that have been identified are inadequate waste collection services, illegal dumping, unlicensed waste management, lack of waste minimisation and recycling initiatives, overuse of landfills, and a lack of waste information for use in legal enforcement (Muzenda et al., 2012). The central Johannesburg region in South Africa has many retail centres from which university students and lecturers make purchases and consider their ability to recycle. The recycling rates in South Africa are on the increase. The University of Witwatersrand is involved in recycling; it launched a reclaimers to its recycling by compensating those that sort waste. Other previous recycling initiatives include the environmental sustainability initiative of 2019 that requires its eateries to use biodegradable supplies instead of single-use plastic packs. Service providers also use brown bags instead of plastic (Wits, 2019).

The significance of the study is that considering preferences for plastic waste recycling from a university perspective would help create awareness of the protection of the environment at the university level. The use of incentives can also encourage recycling. Also, retailers and key players in the related industries may want to collaborate in specific recycling initiatives to encourage retailers and university's participation (Ramley and Tih, 2015). There is limited research conducted on plastic waste recycling in retail facilities from a University perspective. Therefore, the research question of this study is to determine which incentives and knowledge affect the overall performance of recycling in a retail facility from a university community perspective?

2 Literature Review and Theoretical Framework

2.1 Recyclable materials and waste categories in retail facilities

Understanding the nature and the quantity of waste generated within a society is crucial in designing the appropriate waste disposal programme (Oyekale, 2017). Lacking an understanding of the types of materials disposed of in retail facilities will introduce inappropriate waste programmes that will fail to achieve the overall sustainability goal. Waste reduction in retail is a fundamental problem for sustainability (Sakoda, Takayasu and Takayasu, 2019), as most waste is generated there. Retail facilities cater to many people from different backgrounds and age groups; the facility offers various services, meaning the waste consumed and disposed of has different categories (Imasuen and Omorogieva, 2015).

Retail facilities produce and distribute waste as consumers purchase goods within the facility and take them to their households. The different waste categories generated in retail spaces are food waste, paper, cardboard, plastic, glass, and metals. Food waste was accountable for the most significant percentage of the waste produced. Having an insight into the type of waste the consumer and facility generate frameworks and mechanisms can be developed to promote more sustainable relationships between the retail facility and its consumer. Solid waste needs to be characterised by sources, generation rate, types of waste, and composition to monitor and control the prevailing waste management system while improving the existing system". Solid waste is divided into two categories: rubbish and garbage. "Rubbish is the parts of refuse that are not putrescible (non-biodegradable); they could be combustible or non-combustible" (Imasuen and Omorogieva, 2015). The cardboard and paper stream consists of photocopy paper and old newspapers, and these types of wastes can be sorted by hand to remove the corrugated materials and mixed papers. These materials allow them to be baled or loose loaded and sent to the paper mills (Imasuen and Omorogieva, 2015).

2.2 Motivations and incentives for consumers to practice recycling

Every year, global waste continues to rise. The visible economic successes in recent years have improved peoples' standard of living but, at the same time, have had a heavy negative impact on the environment (Depata, 2020). According to the Food and Agriculture Organisation (FAO), an estimated 1.3 billion tonnes of food gets wasted annually around the globe. Other materials that can be recycled, such as plastic, cardboard and paper, are responsible for about 13% of materials that are wasted and not recycled. Landfills could pose a solution for disregarding waste, but this is not feasible in the long run and would have detrimental environmental effects on our planet. In this study, the focus is mainly on understanding the behavioural techniques of consumers regarding the recycling of products and what motivates and creates incentives for consumers to partake in recycling.

2.2.1 Lack of motivation to participate in recycling

Motivations are antecedents to the cognitive dimension of attitudes. (Ertz et al., 2017). Motivations ultimately contribute to a significant amount of influence on consumer willingness to participate in recycling (De Ferran and Robinot, 2020). Key motivations such as convenience, provision of incentives, environmental motives, internal motivators, and external motivators play a vital role in convincing a consumer to participate in recycling or not. Internal motivators would include a person's individual beliefs, attitudes, and morals about contributing to recycling and a more sustainable environment. External motivation is due to reasons outside of a person's beliefs (John, 2018). For example, monetary incentives, community pressure or laws and regulations. According to Elhoushy (2020), several studies have shown that consumers may experience motivational imbalance or lack motivation when practising sustainable behaviour. Therefore, suggesting low participation rates in consumer recycling is because there is a lack of motivation amongst consumers to do so.

2.2.2 Social Influence as a motivation

Social influence is one of the most vital factors in promoting sustainable consumer behaviour. Many consumers in the present day are influenced by behaviours, expectations, and the presence of others. Social influence is further broken down into social norms, social identities, and social desirability. These can all shift and change consumer behaviour to be more

sustainable and partake in recycling. Social norms act as people's beliefs and are ultimate what is socially acceptable (White, Habib and Hardisty, 2019). These have a significant impact on the performance of sustainable consumer behaviour. A few examples of social norms which could affect consumer participation in recycling include conservation of energy, eco-friendly transport, and daily recycling. We then have a social identity. Social identity is a person's sense of who they are, based on their group involvements or group memberships. The more time spent with a particular group of people, the more of their habits and identities adopted; thus, social interaction with people who are more "green" and practice recycling often would ultimately increase your participation as an individual (consumer) in recycling (White, Habib and Hardisty, 2019). Social desirability acts as the final influence under social influences. In the modern-day era, consumers tend to want to be accepted and recognised by society. Thus, selecting "green" and sustainable recycling is usually positively impacting society. A positive impression of society acts as a massive motivation for consumers to partake in recycling (Bahl, 2016).

2.2.3 Incentives

The recycling of products is seldom considered an exciting task and would often not attract the interest of consumers. Therefore, incentives could motivate consumers to partake more often in recycling goods. Incentives offered to consumers could include moral, remuneration, natural or coercive (Johansson, 2016). Moral incentives are interpreted as doing the right thing or choosing the right path when a particular decision is made. Remunerative incentives include monetary payments for participating in recycling. Some examples of remunerative payments include discounts, cash and free parking at selected retail stores. Natural incentives include that curiosity, mental state and a sense of fulfilling social and environmental contribution to society. Lastly, coercive incentives include risks of penalties and punishments regarding laws and regulations regarding the recycling of waste. The main incentive that seems to play a more significant role in the participation of consumers regarding recycling is that of monetary incentives, as consumers are bound to be more attracted by payments and monetary value (Johansson, 2016).

Studies on preferences for plastic waste recycling in retail facilities from a university perspective are limited. For example, in Malaysia, Ramli and Tih (2015) examined the adoption of plastic bag recycling in retail facilities by consumers generally. Other studies, such as Clay (2005), focused on recycling in a university setting and not retail recycling; Lu and Wang (2022) in China did not focus on motivation for recycling in retail facilities.

Two theories were used in this study to form the theoretical framework. They include *the rational explanation theory*- This theory emphasises the economics of sustainable consumption and how consumers weigh up the functional benefits. (Zafirovski, 2018). The motivations or incentives for recycling were determined using variables in Table 3. *The psychological explanation theory*- This theory suggests that three essential sets of attitudes influence consumers' willingness to participate in sustainable behaviour, and those attitudes are personal relevance, social responsibility, and trust. (Jung, 2019). This relates to the knowledge and perception about recycling. This theory emphasises consumers' attitudes and beliefs regarding recycling and variables on knowledge from no to high knowledge were used in this research. The test hypothesis determined the influence of knowledge and incentives on

recycling in retail centres from a University community perspective. The theories are relevant in explaining consumer behaviour and form a basis for their actions. This formed the basis of the research questions and hypothesis of this paper.

3 Methodology

Data collection was done using online questionnaires given to students and staff of the University of the Witwatersrand, a public and top-rated university in Johannesburg, South Africa. The university had an estimated population of over 38000 (Wits Today, 2020). The addition of staff accessible through the same survey format increased this population figure to approximately 40 000 when the survey was done. The university is involved in recycling; it recently launched a reclaimers to its recycling by compensating those that sort waste. The recycling rates in South Africa are now on the increase. Other previous recycling initiatives include the environmental sustainability initiative of 2019 that requires its eateries to use biodegradable supplies instead of single-use plastic packs. Service providers also use brown bags instead of plastic. This study is also a step further to see what incentives the university community needs to improve recycling if they want to work with retail malls or retail facilities on campus. The university has buildings that accommodate eateries and shops, and guest centres. Also, many retail malls close to campus formed the scope of malls that the university community visits. These malls can provide a place where the incentives can be disbursed to staff and students to encourage recycling (Wits, 2019; Ramli and Tih, 2015). The study covers Region B of Johannesburg, Rosebank, Northcliff, Parktown and Sandton. The university is located in this region.

As necessitated by the research objective and limitations of the study, a more specific sample out of the population may be selected; in this regard, the sampling plan was to gather data on retail centres based in Johannesburg and those near the University campus. A non-random convenience sampling technique was used since data collection must be based on a set of conditions (Mukherjee, 2020); i.e. the participating population must use local retail centres, and those that do not cannot provide the necessary data, a similar study by Ramli and Tih (2015) this type of sampling. The appropriate sample size was 380; the sample size was calculated using sample table (Krejcie and Morgan, 1970); however, the questionnaire distributed was about 1,000 bearing the COVID restrictions, but surprisingly, the number of questionnaires returned was 664, which was more than the sample required. The survey was done in September 2020. The questions asked were on the consumer participation in recycling, knowledge of recycling, the prevalence of types of waste for recycling, and the most preferred forms of incentives for recycling. The questions were measured using a scale of 1-5, where 1= very low, 3=moderate and 5=very high. Analysis was conducted using SPSS version 20 software. The descriptive analysis was run on all the demographic data, frequency and count analysis were performed on the relevant survey questions, and mean and regression analyses were done to test for significance between different variables. The reliability test used was the Cronbach's Alpha test based on standardised items to determine whether the research instrument was reliable. An Alpha of 0.6 and 0.7 is an acceptable reliability level; a value of 0.8 is an excellent level of reliability (Bonett and Wright, 2014). The test conducted above showed that the instruments used were reliable for the study. The scores ranged from 0.70 to 0.82.

4 Findings and Discussion

Most of the respondents were females at 66,1%, with male respondents making up 33,6% and others at 0,3%. The participants' ages ranged from 18 to over 60, with the majority being between 18 and 21 (47%), followed by age groups 22-30 at 36,3%, 31-40 at 8,8%, 41-50 at 5%, 51-60 at 2,7%, and 61 and above at 0,2%. The population consisted of students and staff/lecturers, but the bulk of the respondents were students at 98,6%, and staff members only made up 1,4%. The majority of the respondents reported that they stay with their parents (59,3%), and the Black ethnicity had the most respondents at 54.2%. The most frequented shopping centre is Rosebank Mall which 335 say they visit. This can be attributed to Rosebank Mall being the most popular shopping centre amongst Wits University students. Sandton City Mall is the second most frequented shopping centre, with 174 respondents saying they go there regularly, and the least frequented shopping centre is Killarney.

Table 1 shows that plastic carrier bags are the primary type of plastic waste generated by individuals in the particular population used in the survey. Most of the respondents indicated that they generated plastic carrier bags moderately, and food wrappers were the second most generated plastic waste by the respondents in the survey. Plastic cutlery, plastic cups, plastic straws, transparent plastic packs, PET bottles for soft drinks, and PET bottles for water and food containers were low-level plastic wastes. In the study conducted by (Imasuen and Omorgovie,2015), it was found that the most common waste categories in retail facilities were food waste, paper, cardboard, plastic, glass and metals. These results vary from previous studies as the survey concentrated more on the type of plastic materials generated than the types of waste categories. This enables this study to be more accurate rather than providing a broad definition of waste. Plastic cutlery, plastic cups, plastic straws, transparent plastic packs, PET bottles for soft drinks, and PET bottles for water and food containers are directly related to the "food waste" category found in the study conducted by (Imasuen and Omorgovieva, 2015). Plastic cutlery, plastic cups, plastic straws, transparent plastic packs, PET bottles for soft drinks, and PET bottles for water and food containers were low-level plastic wastes.

Table 1: Types of plastic waste generated by respondents

Type of waste	Frequency					Mean
	1	2	3	4	5	
Plastic carrier bags	98	123	170	135	138	3.14
Plastic cutlery	384	134	100	25	21	1.74
Plastic cups	356	155	94	37	22	1.82
Plastic straws	258	161	136	63	46	2.21
Food wrappers	113	114	180	161	96	3.02
Transparent plastic packs	164	135	166	131	68	2.70
PET bottles for soft drinks	193	134	154	104	79	2.61
PET bottles for water	180	138	136	106	104	2.72
Food containers	117	131	181	132	103	2.96

The study revealed that 11 (1.7%) respondents did not know about plastic recycling, and 329(49.5%) had a fair knowledge of plastic recycling. In comparison, 324 (48.8%) had good knowledge of recycling plastic waste. The survey indicated that most respondents had a fair knowledge of plastic waste recycling. In the literature review, the knowledge of recycling is stated in frameworks such as segregation and stakeholder theory. Due to the sample population being University students and lecturers, the findings are not surprising and seemingly educated individuals are more likely to be knowledgeable about recycling than the average population. This shows that consumers' behaviour is that of an environmentally friendly one. In a study conducted by (Zhang et al., 2019), part of the consumers' roles was to provide a cooperative collection of waste; our survey responses have shown that this is a valid role consumers have in the recycling framework, and they willingly cooperate in collection and recycling of waste materials.

Table 2 shows the number of respondents who did not participate in plastic recycling and provides different reasons. The main reasons for lack of participation in plastic recycling were lack of incentives to recycle, the lack of motivation to do so and lack of time to recycle. According to a study conducted by (Johanson, 2016), it was found that the introduction of incentives could motivate consumers to partake in recycling, with the lack of incentives being one of the main reasons for the lack of participation in recycling. This relates to this study as one of the main reasons for consumers not partaking in recycling. Another study by De Ferran and Robinot (2020) found that motivation ultimately contributes to a significant influence on consumer willingness to participate in recycling. This is another factor that relates to this study on the “reasons for not participating in recycling” that found that “there was no motivation to recycle” had the highest mean of 2.82, which ultimately shows that this was the main reason for consumers not partaking in recycling. Strydom (2018) found that people tend to perceive that recycling is time-consuming, especially when consumers have to drop their wastes off at the drop off points physically. This relates to this study as one of the “reasons for not participating in recycling”. It was found that the "lack of time to recycle" had a mean of 2,74, which is also one of the main reasons for consumers not participating in recycling.

Table 2: Reasons for not participating in recycling

	Frequency					Mean
	1	2	3	4	5	
There are no incentives provided to do so	52	18	29	21	31	2.74
There is a lack of knowledge about recycling	40	30	42	18	22	2.68
There is no motivation to recycle	41	21	41	23	26	2.82
Lack of time to recycle	34	34	42	21	21	2.74
I am not interested in recycling	95	21	18	10	8	1.78

From the available data, 434(66.1%) of the total number of respondents indicated that they do participate in recycling in shopping centres. In comparison, 223(33.9%) stated they do not participate in recycling in the shopping centres. The use of reusable carrier bags for shopping was the most identified recycling type undertaken by the respondents, followed by disposing of waste in designated recycling bins. A minimal number of respondents indicated their participation in returning waste materials to the manufacturers or product sellers.

For the respondents who do not participate in recycling, the majority indicated that they do not know if they will recycle in the future. There were 9(3.9%) of the total number of respondents who have not participated in recycling but are willing to participate in the future, 42(18.3%) indicated their desire to recycle if there are incentives, 4(1.7%) indicated that they were not willing to recycle. In comparison, 174(76%) indicated that they do not know if they will recycle in the future.

In order for people to participate fully in recycling, it may become necessary to provide some incentives to encourage them. Results from the survey (Table 3) suggest that the provision of shopping discounts at selected stores with a mean of 4.24 was the best incentive to be provided. Also, providing free parking to shoppers was another way of providing incentives to shoppers to engage in recycling and rewards such as discounts on plastic bottles. There were 305(47.4%) of the total number of respondents who indicated that rewards in discounts on plastic bottles would greatly encourage them to recycle, with 139(21.6%) indicating it would encourage them. 85.2% of the respondents indicated that rewards such as offering discounts on plastics encourage them to recycle in retail centres. Also, 88.7% of the respondents indicated that shopping discounts at selected stores would encourage them to participate in recycling in retail centres. 366(57%) indicated discounts would greatly encourage them, and 141 (22.0%) will be encouraged. In comparison, 82(12.8%) might be encouraged to participate in recycling when discounts are offered at selected stores in the retail centres.

Table 3: Incentives for recycling

	Frequency					Mean
	1	2	3	4	5	
Rewards such as offering discounts on plastic bottles	44	34	122	139	305	3.97
Fines on not recycling recyclable waste materials	95	67	120	120	237	3.53
Increased fees on plastic bags in stores	83	56	117	129	253	3.65
Cash	72	62	125	99	274	3.70
Free parking	47	42	98	105	344	4.03
Shopping discounts at selected stores	22	31	82	141	366	4.24

According to Johansson (2016), it was found that when incentives are provided, mainly monetary incentives, then it will result in consumers being more motivated to participate in recycling. The findings from this literature suggest a correlation between the findings from our data collection as the data collected in the table above, "Incentives for recycling", depicts that consumers will participate more in recycling when provided with incentives. It was found that the best monetary incentive that will increase consumer participation in recycling was "shopping discounts at selected stores", with the highest mean of 4.24. Other incentives such as free cash and free parking were among the highest incentives selected. This again correlates to the findings from the literature study (Johansson, 2016), which stated that monetary incentives would increase consumer participation in recycling.

The adjusted R-square for the model is 0.076, indicating that plastic recycling knowledge and incentives account for 7.6% of the variability in performance or participation in recycling. The Durbin Watson value of 1.987 indicates that there is no issue of autocorrelation.

According to the data, knowledge and incentives have a weak impact on performance, and the findings may be linked to the seemingly standard presence of the variables. Almost all respondents are knowledgeable about recycling and considerate of incentives; therefore, the impact on performance is likely to correlate more to other variables.

Table 4: Model summary

Model	R	R Square	Adjusted Square	R	Std. The error in the Estimate	Durbin-Watson
1	.282 ^a	.079	.076		.746	1.987

The ANOVA results revealed that the variation is explained by knowledge and incentives about participation in plastic recycling is highly significant ($F=27.747$, $P\text{-value}=0.000$). This indicates that the model is robust and can be used for prediction. The variance inflation factor (VIF) for the predictor variables is well below 5 (1.093), indicating less collinearity among the predictor variables. The results from the regression indicate that knowledge and incentives of plastic recycling have a significant effect on participation in plastic recycling. Thus, the recycling levels will increase when a more significant amount of incentives are provided. There seems to be no observable pattern from the scatter plot as the points are scattered, indicating that the error term has constant variance. There is homoscedasticity.

5 Conclusion and Further Research

This research is set out to explore consumer preferences regarding recycling plastic waste in retail centres. The study set out to understand what makes a university community participate more in recycling frameworks, the type of motives, the level of knowledge, and incentives. Statistical findings in the above discussion showed that there was indeed an influence between the two variables. In South Africa, research on recycling practice and performance in retail centres is scarce, in particular research that looks at the different types of incentives that can motivate the university community to work with retail centres to promote recycling. The study included data that was only collected from the University of Witwatersrand population and may therefore not depict consumer preferences for recycling as a whole but only consumers at the University of Witwatersrand. The sample population of this study were university students and lecturers, as users of a few retail centres as part of the data analysis. As end-user, they must be aware of their decisions and behaviours regarding recycling and take responsibility for their actions. Knowledge and incentives are proven to increase recycling performance. As a stakeholder on the opposite end of the scale, facilities managers may use these findings to improve awareness initiatives in retail centres and, thus, the knowledge of their consumers. By providing incentives, building managers of retail centres can improve recycling and reduce hazards for the benefit of their centres. Further research should be conducted on a larger population, as our study was limited to a university community.

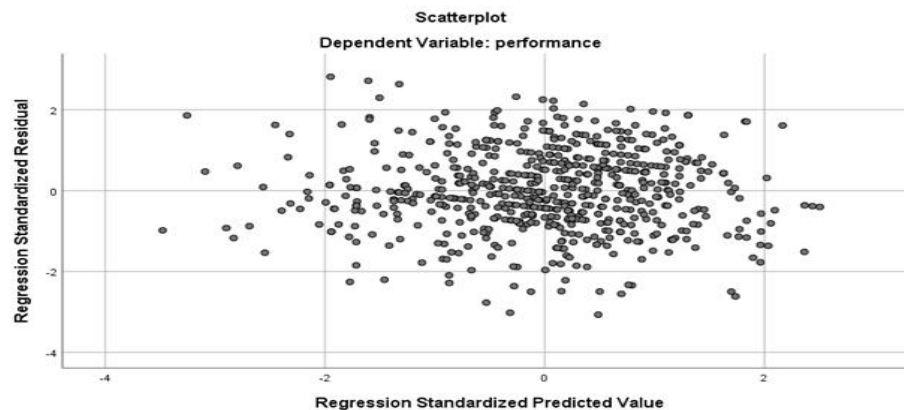


Figure 1: Scatter plot

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