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Mind the Green Gap - Demographic Influences and Strategies to Close Recycled Product Intention-Behaviour Gaps in Germany and South Africa

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ABSTRACT

This study investigates the role of demographic and other factors on intention-behaviour gaps for the purchase of three recycled product types, comparing between a developed (Germany) and a developing country (South Africa). The overall objective is to identify if demographic profiles for German and South African consumers differentiate between those with large and small intention-behaviour gaps, with the ultimate goal of identifying logical target markets for recycled products, and whether such demographic profiles differ according to product type and level of economic development. A quantitative survey in each country used an online questionnaire, resulting in samples of 603 Germans and 692 South Africans. The findings showed that demographics plays a limited role in purchase behaviour for different types of recycled products in the two countries. In South Africa, only age was a significant differentiator for mobile phone intension-behaviour gaps, while in Germany only gender and age differentiated the t-shirt intension-behaviour gaps. Regarding other factors, availability was a significant predictor of t-shirt purchase behaviour, while subjective norm was significant for mobile phones. Other influencing factors were not significant predictors for any of the German target markets. Based on this we suggest measurements for the industry, for example, improving awareness of availability.

Keywords: Intention-Behaviour Gap, Demographics, Purchase Intention, Recycled Products, Germany, South Africa
JEL Classifications: M310, Q53

1. INTRODUCTION

Over the past decade sustainability has become more and more important to consumers, some of whom are taking more interest and consideration about what they are buying and where the bought products are coming from (Boström and Micheletti, 2016; Chang and Jai, 2015; Joy et al., 2012. Companies too are adopting, as a business strategy, the concept of sustainability to coordinate both environmental and social performance to the traditional economic performance (Li et al., 2014; Perry and Wood., 2018). This has become known as the triple bottom line, whereby businesses commit to responsible consumption to achieve profitable performance (the economic dimension). In addition, businesses commit to and measure social equality, workers; rights and fair trading, especially in and with developing countries (the social dimension). Finally, businesses commit to and measure their performance with regard to their impact on the planet, ensuring that their current actions leave a better, or at least not harmed, environment for future generations (the environmental dimension) (Bojonca, 2019: 7; Shen, 2014). This triple bottom line is also known as the 3Ps – people, planet, profit.

Although there is no global policy on sustainability and waste reduction, the United Nations published seventeen Sustainable

Development Goals to be achieved by 2030, and which have been adopted by many countries and integrated in the business goals and strategies of many businesses (United Nations, 2015). Goal 12 addresses sustainable consumption and production patterns, with clause 12.5 specifying "By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse" (United Nations, 2015, p. 22). This process is often called the circular economy, made up of the reduce, reuse, recycle steps, and often referred to as the 3Rs (Ghisellini et al., 2015; Grafströma and Aasma, 2021). Reduce refers to mimimising unnecessary packaging, choosing reusable products, and buying only what is needed, (Nallapaneni et al., 2023), or re-integrating scrap material into the manufacturing process instead of discarding it (Münger, 2021). Reuse refers to products that do not need to be discarded and can be used for the same purpose again, e.g., refillable water bottles or reuseable shopping bags (Nallapaneni et al., 2023) or returnable beer bottles that can be refilled (Münger, 2021). Recycle refers to processing old products, normally destined for a landfill, and turning them into new products (Nallapaneni et al., 2023).

Recycling has recently gained in importance (Schäfer, 2021) and is believed to be the most common and most sustainable of the 3R approaches (Barnett et al., 2023). Companies such as Apple, H&M, and Adidas produce products from recycled materials thus conserving resources (Lv et al., 2021; Meng and Leary 2019). Such recycled products also include new products remanufactured from used items, or used component parts, into new products (Wang and Hazen, 2016), or refurbished products (also known as upcycling) which is the reprocessing of an existing product so that it can be reused (Münger, 2021, p. 43). Thus, we define recycled products as items made from materials that have been recycled and transformed into new products (Dobbelstein and Lochner, 2023; Pearce, 2009).

Despite the increasing demand for sustainable products (Kumar et al., 2021) and the increasing intention to buy such products (Simon + Kucher and Partners, 2021), Berwyn (2025) advises that we are "still stumbling down a dangerous path after decades of warnings" about "global warming, plastic pollution and biodiversity loss". Regarding recycling there is clearly a gap between stated intention and actuality, and this is reflected in the recent literature concerning recycled products, which is fragmented, focuses on specific products (especially clothing and plastic products) and on single countries (Dobbelstein and Lochner, 2023). While clause12.c of the Sustainable Development Goals specifies "support(ing) developing countries … to move towards more sustainable patterns of consumption and production" (United Nations, 2015), most research has been conducted in developed nations (Dobbelstein and Lochner, 2023). This explains our choice of a developed nation (Germany) and a developing nation (South Africa) as the locations of our study.

Dobbelstein and Lochner (2023) based their study primarily on the work of Bigliardi et al. (2020), which did not include demographics in their theoretical framework of the factors that influence purchase intention for recycled products. As presented later in this paper, a detailed review of literature covering the investigation of demographic factors possibly influencing the purchase intention of recycled products found a paucity of such literature, with none from Africa or South Africa.

Thus, our first objective is to identify any demographic factors that influence the purchase intention for recycled products and thus which are important for their marketing.

The second objective is to develop a model including demographic factors for closing the intention-behaviour gaps in each country which would provide guidance for marketers aiming to encourage the purchase of recycled products.

2. LITERATURE REVIEW

2.1. Recycling

Recycling is defined as "the process by which a used product is broken down into consistent parts, which are converted into different products or used as raw material" (Pearce, 2009). Therefore, 'recycled products' are those new products manufactured from recycled materials (Pearce, 2009). Recycling is an integral part of the circular economy (Schäfer, 2021) and is the most common of the 3R (reduce, reuse, recycle) approaches (Barnett et al., 2023). Although the least environmentally friendly, it is preferable to throwing products away (Münger, 2021) because it reduces waste and the need for new natural resources, thus also reducing pollution (EPA, 2021).

Past research has shown that consumers respond differently to different types of products for various reasons (Hamzaoui Essoussi and Linton, 2010; Magnier et al., 2019). Such reasons include product purchase frequency, product performance expectations, expected longevity of the product, perceived symbolic value of the product and how visible the use of the product is. Taking these reasons into account, plus availability in the two countries and the type of products manufactured from recycled materials, product types for this study were selected from the categories textiles (t-shirt), durables (mobile phone) and FMCGs (toilet paper).

2.2. Purchase Intention

'Purchase intention' is an accepted predictor of a consumer's willingness to purchase a product (Namias, 1959). Purchase intention has been developed and measured via Fishbein and Ajzen's Theory of Reasoned Action (TRA) and then The Theory of Planned Behaviour (TPB), including the variables attitude, subjective norm and perceived behavioural control, which influence intention, which in turn predicts future behaviour (Ajzen, 1991). Intentions indicate how much effort a consumer will expend to perform the purchase behaviour. In other words, the greater the intention to engage in a behaviour, the more likely it will actually occur (Ajzen, 1991). This theory is still one of the best theories for predicting behaviour according to Zhuang et al. (2021), especially regarding purchase intentions for green products (Wijekoon and Fazli Sabri, 2021), within which category recycled products fall.

Most research into the purchase intention for recycled products has focused on individual factors such as the quality, image, sustainability, or safety of recycled products (Calvo-Porral and

Lévy-Mangin, 2020; Queiroz et al., 2021), on the perceived value of the potential purchase (Chi et al., 2021), or on adaptations of theories such as TRA or TPB (Sun et al., 2018).

Various authors have developed theoretical frameworks to provide a more holistic understanding of purchase intention for green products, for example, Zhuang et al. (2021) (cognitive factors, consumer individual characteristics, and social factors); Wijekoon and Fazli Sabri (2021) (individual and non-individual factors, situational factors, product attributes, and demographics); and Zhang and Dong (2020) (individual factors, product attributes and marketing and social factors). However, only one author has developed a model of the factors influencing purchase intention for recycled products. Bigliardi et al. (2020) created a theoretical framework comprising three components, namely individual-related (values, beliefs, norms, and attitudes), context-related (factors influencing perception of a product), and product-related factors (constructs directly related to the product. These constructs were developed from the value belief norm (VBN) and the norm activation (NAT) theories, the ambiguity tolerance theory (ATT), the elaboration likelihood models (ELM), the theory of planned behaviour (TBP) and the prospect theory (PT) (Bigliardi et al., 2020). The construct 'perceived consumer effectiveness' was not included by Bigliardi et al. (2020) but is included in our study as it is specified as relevant by Wijekoon and Fazli Sabri (2021), Zhang and Dong (2020) and Zhuang et al. (2021). For these reasons, and because it alone has a specific focus on recycled products, we decided to use an adaptation of the Bigliardi et al. (2020) framework for our study, as discussed in the following section. This adapted framework was developed by Dobbelstein and Lochner (2023) for their research into the factors influencing purchase intention for recycled products in Germany and South Africa. A detailed derivation of the framework can you found in their paper.

2.3. Influencing Factors

2.3.1. Individual-related constructs

Perceived consumer effectiveness assesses the contribution a person believes they can make to solving environmental problems (Kinnear et al., 1974). Research into green product purchasing has shown that perceived consumer effectiveness is a key factor influencing purchase intention (Sharma and Dayal, 2016; Wijekoon and Fazli Sabri, 2021). Related to effectiveness, the more risk consumers perceive in buying a green product, the less willing they are to buy it (Zhuang et al., 2021) – for example, contamination associated with recycled products negatively impacts purchase intention (Baxter et al., 2017; Magnier et al., 2019).

A factor analysis based on the collected data showed that perceived contamination, perceived risk and consumer effectiveness are one construct.

The construct attitude described by Ajzen (1991) it as "a favourable or unfavourable evaluation or appraisal of the behaviour." Previous research has shown that attitude positively influences purchase intention of green or recycled products (Chan, 2001; Hazen et al., 2016; Mostafa, 2008), with some indicated that it is the most important factor (Rausch and Kopplin, 2020; Wang et al., 2013).

Environmental concern assesses the degree to which people worry about the state of the natural environment (Weigel and Weigel, 1978) – the greater the concern, the greater the effect on their behavior (Fransson and Gärling, 1999). Environmental concern has been shown to be a major influencing factors for green purchase intentions (Rausch and Kopplin, 2020; Wijekoon and Fazli Sabri, 2021), and specifically for recycled products (Park and Lin, 2020). Factor analysis showed attitude and environmental concern belonging to the same construct.

Perceived behavioural control is defined by Ajzen (1991) as how difficult or easy it is for a consumer to implement a specific behaviour - the greater the perceived behavioural control, the greater the intention to perform the behaviour. This was confirmed for green products by Wang, et al. (2018) and Xu et al. (2020).

The purchase intention for recycled products is strongly influenced by perceived value (Chaturvedi et al., 2020), which is influenced by perceived quality, i.e., the subjective perception of the quality of a product (Zeithaml, 1988). a recycled product is more likely to be bought if the quality is believed to be the same as that of a product manufactured from new materials (Magnier et al., 2019). Since recycled products are perceived to be of lower quality, purchase intention is reduced (Bae, 2021; Luu and Baker, 2021; Queiroz et al., 2021). The factor analysis showed perceived behavioural control, perceived value and perceived quality being one construct.

Subjective norm is the perceived social pressure to perform or to avoid the specific behaviour - the greater the subjective norm (social pressure), the greater the intention will lead to the actual behaviour (Ajzen, 1991). Previous research into recycled or remanufactured products showed the subjective norm to have a positive effect on purchase intention (Khor and Hazen, 2016; Park and Lin, 2020).

2.3.2. Product-related construct

The price construct, as specified in some research, is here considered as the actual price, rather than perceived price. According to Joshi et al. (2015), a high price reduces the willingness to buy green products, and Nguyen et al. (2018) found that price was a significant influencing factor for green purchase intentions. Thus, it can be accepted that a lower price will have a positive influence on intention to purchase a recycled product, and vice versa.

2.3.3. Context-related constructs

The promotion construct involves communications to potential consumers to increase their awareness of products and their purchase consideration (Bigliardi et al., 2020). Research by Qu et al. (2018) and Zhuang et al. (2021) stress the importance of promotions to influencing customers' attitudes and intention to purchase green and remanufactured products.

Consumers are influenced by eco-labels or certifications when considering green or recycled products (Harms and Linton, 2015; Zhang and Dong, 2020), with Riskos et al. (2021) showing that, in the purchasing of green products, attitudes and behaviour are positively influenced by eco-label credibility. The factor analysis revealed that both constructs load on the same factor.

Product availability obviously positively affects purchase intention for recycled products (Bigliardi et al., 2020). Lack of, or poor, availability, or difficult to access such products, are major barriers (Connell, 2010). Such barriers significantly influence purchase intention of green products (Walia et al., 2019; Nguyen et al., 2018).

Table 1 summarises the constructs selected for the study, noting the source of the original constructs and giving a brief explanation of the meaning of each of the constructs.

2.4. Countries

2.4.1. Germany

In Germany, 400 million tons of waste were generated in 2022 (Destatis, 2025a), with a good recycling rate of 82% (Destatis, 2025a). However, Germany ranks relatively poorly on a per capita basis, generating 606 kg per capita, which is 93kg above the EU average (Destatis, 2025b). Most German consumers (75%) pay attention to sustainability when buying new products (McKinsey and Company, 2021) and concern for the environment has led to changes in shopping behaviour. However, lack of trust in ecolabels and high prices are the main factors discouraging the purchase of sustainable products, including recycled products (Statista Global Consumer Survey [GCS], 2021). Attitudes to sustainability are generally positive, with only about 30% believing that companies are responsible for tackling climate change, and around half of thinking that their own behaviour plays a role (Statista Global Consumer Survey [GCS], 2021). Thus, there is potential in the German consumer market for a greater role for recycled products.

2.4.2. South Africa

Numerous policies, guidelines and laws have aimed to help South Africa develop into a zero-waste nation, for example the White Paper on Integrated Pollution and Waste Management for South Africa in 2000 (Department of Environmental Affairs and Tourism, 2000) and the National Waste Management Strategy (NWMS). Although the South African president called for the country to follow global developments the circular transformation (Nahman et al., 2021), and although recycling has been considerably promoted in South Africa (Godfrey and Oelofse, 2017), about 90% of South African waste still ends up in landfills (Parliamentary Monitoring Group, 2022). With increasing floods and droughts due to ongoing climate change (BBC, 2022) and the resulting environmental degradation, there is an increase in concern about the environment leading to a positive purchase intention for sustainable products, but mostly this does not result in actual purchases (Koloba, 2020). Furthermore, South Africans rarely boycott environmentally unfriendly stores or brands, nor do they encourage friends and family to buy sustainable products (Mkhize and Ellis, 2020). South Africa is said to be two to three decades behind European, which indicates a critical need for more knowledge about how to improve this situation, especially regarding recycling and recycled products.

2.4.3. Country specific differences

Little literature exists on country specific differences in purchase intention for green products, including recycled products (Testa et al., 2020; Zhang and Dong, 2020). Most green product research focuses on Asia or Europe (Testa et al., 2020). Cross-cultural studies involving both developed and developing countries have focused on countries such as the US, Germany, UK, India and China (Ali et al., 2019; de Silva et al., 2021; Muralidharan et al., 2016; Patel et al., 2020; Zhang and Dong, 2020). And more specifically for our study, no research was found that studied country differences in purchase intentions for recycled products in Africa, or specifically South Africa.

2.5. Demographics

A detailed search of the literature has identified relatively few studies investigating the influence of demographic factors on purchase intention for recycled products (other than in the construction industry). The eleven papers identified covered a range of recycled products, including clothing and fashion, furniture, FMCG products, ink cartridges and bio-based products. Their research took place in the USA, UK, Europe, the Middle East and Asia. No research into the influence of demographics on purchase intention for recycled products was found from Africa, and specifically South Africa. The following discussion thus summarises the general findings from a global perspective.

2.5.1. Gender

Although three studies (Martinho, 2021; Russo et al., 2019; Wong and Mo, 2013) indicated that gender had no impact on purchase intention for recycled products, four studies indicated a definite relationship, with three (Achabou and Dekhili, 2013; Grasso et al., 2000; Polyportis et al., 2022) finding that females are more likely

Table 1: Summary and description of constructs influencing purchase of recycled products

Construct	Explanation	Source
Availability	Lack of availability of, or excessive effort required to find, recycled products is major barrier to purchase	Nguyen et al., 2018; Walia et al., 2019
Subjective Norm	Social pressure from friends, family, etc., to purchase recycled products	Ajzen, 1991
Uncertainty	Beliefs about risks of contamination from recycled products and whether buying recycled products is effective in solving environmental problems,	Baxter et al., 2017; Magnier et al., 2019; Wijekoon and Fazli Sabri, 2021
Price	Price relative to that of a 'new' product	Nguyen et al., 2018
Promotion/Certification	Promotions/adverts that increase awareness/purchase of green/recycled products. Eco-labels certifying the credibility of products influence attitude/ behaviour	Zhuang et al., 2021; Riskos et al., 2021
Attitude/Environmental Concern	Consumer's evaluation of behaviour (buy recycled) and the extent of concern for the environment, which correlates with green and recycled product purchase.	Ajzen, 1991; Weigel and Weigel, 1978; Park and Lin, 2020
Value/Accessibility	Value/quality of recycled product same as new. Perceived ease/difficulty of purchase behaviour	Magnier et al., 2019; Ajzen, 1991

to have a positive purchase intent for recycled products and one (Alyahya et al., 2023) finding in favour of males. This later finding may be influenced by the fact that the research was conducted in Saudi Arabia, which is a more male dominated society. More general research, into purchase intent for green products, supports the finding that females are more likely to show an interest in green products, see for example Rahim et al. (2017) and Wiidegren (1998). Thus, we conclude that gender may also be a significant influencing factor of the purchase intention for recycled products.

2.5.2. Age

Three studies (Martinho, 2021; Russo et al., 2019; Wong and Mo, 2013) showed no relationship between age and purchase intention for recycled products. Four studies showed a relationship between age and intention to purchase, with four (Hamzaoui-Essoussi and Linton, 2014; Polyportis et al 2022; Russo et al., 2019; Srinivasan and Blomquist, 2009) finding younger people more likely to have a high intention to purchase. Only one study (Alyahya et al., 2023) found that older people were more likely to have a high intention to purchase – this outlier was again the study conducted in Saudi Arabia – although Russo et al. (2019) did find that older people were prepared to pay a higher price for recycled products. Research findings in the more general field of green products are uncertain with some (Namkung and Jang, 2017; Pretner et al., 2021; Wiidegren, 1998;) finding a positive, but mostly weak, relationship between age and pro-environmental interest or behaviour, while others found little or no relationship (Akehurst et al., 2012; Rahim, et al 2017). Overall, we therefore feel that age has a role to play and definitely should be considered as a factor influencing purchase intention for recycled products.

2.5.3. Income

Four studies (Grasso et al., 2000; Grigaliunait et al., 2023; Park and Lin, 2020; Wong and Mo, 2013) found a positive relationship between income and purchase intention, indicating that the higher the income, the greater the intention to purchase recycled products, although the study finding of Grasso et al. (2000) was not statistically significant. However, the work of Alyahya et al. (2023) and Srinivasan and Blomquist (2009) found the opposite relationship, with those with a lower income more likely to have a high intention to purchase recycled products. The work of Polyportis et al. (2022) found mixed results. Two studies (Rahim et al., 2017; Wiidegren, 1998), in the more general field of green products, showed no relationship between income and purchase intention. Overall, income clearly does influence purchase intention, but directionality is uncertain. It should be noted that the Saudi Arabian study was again an outlier, while the other finding for a negative relationship involved a much lower involvement product (paper towels) than the other studies.

2.5.4. Education

Very little research included education as an influencing variable. The only recycled product study to include it was the Saudi Arabian study (Alyahya et al., 2023), which found that the more highly educated were more likely to purchase recycled products. Regarding more general research into green products and the environment, Pretner et al., (2021) found a positive relationship between education and environmental interest, whereas Rahim et al. (2017) and Wiidegren (1998) found no relationship.

This brief discussion of the influence of demographics on purchase intention for recycled products indicates a probable relationship, and likely directionality, for the variables gender, age and income, but has identify a serious lack of research into the role of education. This review thus supports the need for this study.

3. METHODOLOGY

3.1. Research Design

Based on the work of Dobbelstein and Lochner (2023), and as per Cooper and Schindler's (2014) guidelines, the design classification chosen was ex post facto, descriptive, cross-sectional, statistical and under field conditions. Accordingly, quantitative data was collected from a large sample via an online survey.

3.2. Population and Sample

The target population was defined as German or South African individuals 18 years and more with internet access. The required sample size was calculated based on Heidig and Dobbelstein (2021), who suggested an estimated s^2 of 1.2 (to avoid a sample that is too small) and a 95% confidence interval as the reliability value, with a Z value of 1.96 (Z^2) and an allowed error of 0.1 (E^2) applied. Thus, a sample size of 554 per country resulted, which was increased to 600 per country to allow for any incomplete or implausible answers.

Non-probability quota sampling were used to select a representative sample (Saunders et al., 2009). For South Africa, the Living Standards Measure (LSM) was used to create quotas (South African Audience Research Foundation, 2017). LSM group 1 has the poorest living standard, while LSM group 10 has the highest living standard (Ntloedibe and Ngqinani 2020). LSM groups 7 to 10 include people with at least a school-leaving certificate, access to electricity and the TV and radio media, and own a mobile phone. In 2015, LSMs 7 to 10 covered approximately 35% of all 15 + year old South Africans, 90% of university graduates, and more than a third had monthly household incomes of 20,000 Rand (R) (Chronison, 2012). Furthermore, the South African Gini coefficient of 62 suggests a large income disparity (OECD, 2023) and so few people in the lower LSMs are likely to be able to purchase higher priced products such as a recycled mobile phone Dobbelstein et al. (2021). For the above reasons, and since literature has shown LSMs 7 to 10 selected in similar contexts (e.g. Dobbelstein and Naidoo, 2020; Dobbelstein et al., 2021), the South African sample was selected from those within LSM 7 to 10.

The German Gini coefficient of 29 reflects less income disparity (OECD, 2023) and so the majority of the German population can probably afford to buy recycled products such as mobile phones. Thus, the German quota sample was defined according to age (18 years and older), gender, and net household income was created to be representative of the German population.

The quotas were calculated from existing data as illustrated in Table 2.

3.3. Data Collection

The English (for the South African sample) and German (for the German sample) online questionnaires, developed using the UNIPARK software by Dobbelstein and Lochner (2023), were adopted for this study. In the questionnaire introduction, the purpose of the study and its anonymity were explained, as was a definition of recycled products, and then demographic data (gender, age, highest level of education and monthly net household income) were requested. Thereafter three sections included questions on individual-, context- and product-related constructs, with the final section asking questions about purchase intention and purchase behaviour. Constructs were measured with three items each, with the sequence of all questions being randomized. The response categories in the four sections were all 7-point Likert-type scales regarding agreement (1 = Strongly disagree/7 = Strongly agree) or frequency (1 = All the time/7 = Never). In all 50 questions had to be answered, with a duration of 5-7 min. To ensure the same meaning for all participants, the back-translation technique was used. The original questionnaire in English was translated into German and an English native speaker then translated the German text back into English (Saunders et al., 2009). Subsequently, the questionnaire was reviewed and corrected for any inconsistencies and then sent to three marketing experts in South Africa for checking of content and language. After a few minor language corrections, twenty South African and German consumers were sent the draft questionnaire as a pretest, using the UNIPARK pretest function. After all comments from the pretest participants were reviewed and, where necessary, implemented, the questionnaire was finalised.

The links to the online questionnaires and the respective target quotas were then sent to a commercial panel provider who was responsible for collecting the data from their pool of opt-in members.

Table 2: Target quota calculations

Quotas for South Africa[1]			
LSM group	**SEM % applied to LSM***	**Target quota in %**	**Target quota n**
LSM 7	9	30.00	180
LSM 8	7	23.33	140
LSM 9	6	20.00	120
LSM 10	8	26.67	160

Source: Own calculation based on The Broadcast Research Council of South Africa (2019, p. 78)

Quotas for Germany			
Age (Destatis 2022b)	**Total population**	**Target quota in %**	**Target quota n**
18-24	6,161,121	8.88%	53
25-34	10,494,027	15.12%	91
35-49	15,361,624	22.13%	133
50-64	19,122,679	27.55%	165
65+	18,271,636	26.32%	158
Total	69,411,087	100.00%	600
Income[2] (Destatis 2022c)	**Total population**	**Target quota in %**	**Target quota n**
<€ 1,250	6,209	15.36%	92
€ 1,250 to € 2,000	7,983	19.74%	119
€ 2,001 to € 3,000	9,528	23.56%	141
€ 3,001 to € 5,000	10,798	26.71%	160
€ 5,001 and more	5,914	14.63%	88
Total	40,433	100.00%	600
Gender (Destatis 2022a)	**Total population**	**Target quota in %**	**Target quota n**
Male	33,963,124	48.93%	294
Female	35,447,963	51.07%	306
Total	69,411,087	100.00%	600

Source: Own calculation based on data from Destatis

1. The Socio-Economic Measure (SEM) is another segmentation method in South Africa that is very similar to the LSM segmentation and is even expected to replace it in the near future (Bierman, 2021). Since the commercial panel provider can only segment by LSM groups, the proportions of the SEM groups are taken as a proxy for the LSM groups.
2. Monthly household net income

3.4. Data Analysis

The collected questionnaires (n = 1,306) were coded, cleaned, and transformed via Statistical Package for the Social Sciences (SPSS) version 29. Checks for completion, missing values, and plausibility of answers (Döring and Bortz, 2016) were conducted. A mandatory answer function allowed only complete questionnaires with no missing values to be entered for analysis. Plausibility checks were done, eliminating responses that were not completed seriously, e.g., the middle box for all questions answered (known as 'click through'), or had implausible answers, e.g., the questionnaire was answered too quickly (Döring and Bortz, 2016). Furthermore, to identify contradictory answers three pairs of control questions were included - responses to these questions were classified as implausible if more than one control question was answered inconsistently. Furthermore, questionnaires completed in less than half of the median processing time were classified as implausible. Finally, all questionable responses were manually screened, and eleven questionnaires were removed from the final useable sample.

3.4. Reliability and Validity

To determine reliability and validity, exploratory factor analysis with principal component analysis as extraction method and Varimax rotation (Backhaus et al., 2021) and Cronbach's alpha were applied (Hornburg and Giering, 1996). Kaiser-Meyer-Olking values (KMO value) and the Bartlett tests both presented suitable or significant results. Reliability was also acceptable with a Cronbach Alpha coefficient of 0.849. More details of the EFA and the Cronbach Alpha test can be found in Dobbelstein and Lochner (2023).

4. RESULTS AND DISCUSSION

4.1. Profile of Respondents

Table 3 reflects the demographic profile of the achieved study responses for both countries.

Comparing these results to the quotas in Table 2 it can be generally concluded that the achieved sample is sufficiently close to the required quota shown in Table 2 and thus is a reasonable representation of the study population.

4.2. Objective 1 – Identification of Demographics Important for Marketing Recycled Products

4.2.1. Intention-behaviour gap for buying recycled products, by product and demographics

To identify potential target markets for recycled products we first measured purchase intention and then measured the purchase

behaviour of those who had indicated strong purchase intention. The difference between these two constructs is defined as the purchase intention-behaviour gap. This was calculated for each product, each country (and the total) and each demographic category. To clarify analysis and increase group sizes, demographic categories were reanalysed into dichotomous groups, for example the age category was split into 18-34 years old and 50+ years old to provide a maximum variation sample which enables common patterns to "emerge out of heterogeneity" (Patton, 1987, p. 53). To be included in the intention-behaviour gap analysis, respondents must have answered both the purchase intention and purchase behaviour questions. For each intention-behaviour gap (by country/product/demographic) the Chi Square test was used to identify whether the relationship between the intention-behaviour gap and the compared groups is significant or not. Furthermore, we identified the percentage of respondents in a particular group who showed an intention-behaviour gap.

Table 3: Demographic profile of sample

Dimension	Category	South Africa		Germany	
		n	%	n	%
Age	18-24	118	17.05	90	14.93
	25-34	185	26.73	122	20.23
	35-49	227	32.80	145	24.05
	50-64	113	16.33	158	26.20
	65+	49	7.08	88	14.59
Gender	Male	231	33.38	305	50.58
	Female	460	66.47	297	49.25
	Diverse/not specified	1	0.14	1	0.17
Education	None/primary/high school	86	12.43	301	49.92
	Some higher education, e.g., diploma	191	27.60	157	26.04
	university degree or similar	415	59.97	142	23.55
Gross income	<R 8,000/<€ 1,250	159	22.83	51	8.46
	R 8,001 to 18,000/€ 1,250 to 2,000	271	39.16	91	15.09
	R 18,001 to 37,000/€ 2,001 to 3,000	196	28.32	131	21.72
	R 37,001 to 63,000/€ 3,001 to 5,000	58	8.38	167	27.69
	R 63,000 and more/€ 5,001 and more	9	1.30	163	27.03
Total		692		603	

*R=South African Rand

4.2.1.1. Total sample

The results for each product by each demographic for the total sample (South Africa and Germany combined) are shown in Table 4.

Analysing the responses for this product, we found that 345 of the younger group showed a strong purchase intention for recycled toilet paper (60.4% of that specific target group), with 180 respondents showing a weak purchase behaviour for toilet paper, that is, 31.5% of the 18 - 34 years old group bought recycled toilet paper occasionally or less frequently. In this younger group, 68 of the 345 (19.7%) with a strong purchase intention also reflected weak purchase behaviour, which indicates a purchase intention–behaviour gap of 11.9% of this target group, i.e., younger respondents.

Regarding the older group of respondents, 397 of the total sample were aged 50 or older. Of the 252 (63.5%) older respondents who had a strong purchase intention, only 31 (12.3%) showed a weak purchase behaviour for recycled toilet paper. This means that 7.8% of the older target group show a purchase intention-behaviour gap. The difference in the intention-behaviour between the younger and the older group is significant at the P<0.05 level.

Table 4: Results for total sample, i.e., both countries

Product	Demographic	Gender		Age		Education		Income**		Total
	Analysis category	M	F	18-34	50+	< uni	uni+	Low	High	
	Target group	536	757	571	397	738	557	515	408	
Toilet paper	N strong PI	331	476	345	252	432	376	321	248	808
	% strong PI of target group	61.8	62.9	60.4	63.5	58.5	67.5	62.3	60.8	
	N weak PB of target group	140	256	180	113	222	175	162	120	
	% weak PB of target group	26.1	33.8	31.5	28.5	30.1	31.4	31.5	29.4	
	N weak PB (within strong PI group)*	45	95	68	31	64	76	62	35	140
	I-B gap in %	13.6	20.0	19.7	12.3	14.8	20.2	19.3	14.1	17.3
	% within group with I-B gap	**8.4**	**12.5**	**11.9**	**7.8**	***8.7***	***13.6***	12.0	8.6	10.8
T-shirt	N strong PI	260	448	372	145	344	385	283	195	709
	% strong PI of target group	49.0	59.0	65.0	37.0	47.0	69.0	55.0	48.0	
	N weak PB of target group	243	267	206	249	377	233	237	210	
	% weak PB of target group	45.3	35.3	36.1	62.7	51.1	41.8	46.0	51.5	
	N weak PB (within strong PI group)*	85	165	116	62	126	124	97	68	250
	I-B gap in %	32.7	36.8	31.2	42.8	36.6	32.2	34.3	34.9	35.3
	% within group with I-B gap	**15.9**	**21.8**	20.3	15.6	**17.1**	**22.3**	18.8	16.7	19.3
Mobile phone	N strong PI	209	274	237	107	240	244	194	130	484
	% strong PI of target group	39.0	36.0	42.0	27.0	33.0	44.0	38.0	32.0	
	N weak PB of target group	320	545	335	309	508	359	344	291	
	% weak PB of target group	59.7	72.0	58.7	77.8	68.8	64.5	66.8	71.3	
	N weak PB (within strong PI group)*	94	143	105	58	123	115	94	67	238
	I-B gap in %	45.0	52.2	44.3	54.2	51.3	47.1	48.5	51.5	49.2
	% within group with I-B gap	17.5	18.9	18.4	14.6	16.7	20.6	18.3	16.4	18.4

*Only of those with strong PI. **Income: Lower = < R18000/€2000; Higher = > R37000/€3000. PI: Purchase intention, PB: Purchase behaviour, I-B gap: Intention-behaviour gap, <uni: Less than university degree, uni+: Undergrad university degree or higher. Significance: *bold+italic=Highly significant,* bold=Significant; regular=No significant difference

In other words, there is a significant difference in the purchase intention-behaviour gap between the younger and older target groups. Although both groups had a similar purchase intention proportion (60.4% vs 63.5%), the younger group had a significantly weaker purchase behaviour than the older group (31.5% vs 12.3%), resulting in a larger intention-behaviour gap for the younger group (11.9%) than the older group (7.8%). This implies that a younger market segment may be a better grouping for recycled toilet paper manufacturers to target, since they have a larger proportion of "low hanging fruit", and so more rapid market gains may be achieved than by targeting older consumers.

Using the same analysis logic as above, we found that gender and education also played a significant role in the intention-behaviour gap for recycled toilet paper, but income did not. Females had a greater intention-behaviour gap (12.5%) than males (8.4%), significant at P<0.05, and those with a higher education had a higher intention-behaviour gap (13.6%) than the lesser educated (8.7%), highly significant at P<0.01. Summarising these findings, it can be concluded that a favourable target market for recycled toilet paper might be younger females with a university or higher education.

Regarding the other two products, Table 4 shows no significant differences according to any of the demographic characteristics for recycled mobile phones. For recycled t-shirts, however, females (21.8%) showed a greater intention-behaviour gap than males (15.9%), and the higher educated (22.3%) had a slightly higher intention-behaviour gap than the lower educated group (17.1%). Age and income played no role in differentiation. From this analysis it is concluded that better educated females may be the logical target market for recycled t-shirts. Unfortunately, the analysis provides no guidance on a preferred target market for recycled mobile phones, in the two countries together.

4.2.1.2. South African sample

For the South African sample only, the results for each product by each demographic group are shown in Table 5.

In South Africa there is only one demographic that reflects a significant (P<0.05) influence on only one product, namely age and mobile phones. The intention-behaviour gap is significantly lower for younger people than for the older 50+ group. Within the younger target group 22.8% show an intention-behaviour gap with nearly half (49.2%) of the respondents who had a strong purchase intention showing weak purchase behaviour. Within the older 50+ group, 35.8% show an intention-behaviour gap of 66.7% of people with strong buying intention who also show a weak purchase behaviour. Although over half of this group (54%) reflected a strong intention to purchase a recycled phone, three quarters (74.6%) of them did not, reflecting weak purchase behaviour. This indicates that the older demographic may be a good target market for recycled mobile phones.

With regard to the other two products (toilet paper and t-shirts), Table 5 shows no significant differences according to any of the influence of any of the demographic characteristics.

4.2.1.3. German sample

For the German sample only, the results for each product by each demographic group are shown in Table 6.

Table 5: Results for South African sample

Product	Demographic / Analysis category	Gender		Age		Education		Income**		Total
		M	F	18-34	50+	<uni	uni+	Low	High	
	Target group	**231**	**460**	**429**	**67**	**277**	**415**	**303**	**162**	
Toilet paper	N strong PI	165	297	273	52	180	283	203	101	463
	% strong PI of target group	71.0	65.0	64.0	78.0	65.0	68.0	67.0	62.0	
	N weak PB of target group	75	185	159	23	107	153	107	65	
	% weak PB of target group	32.5	40.2	37.1	34.3	38.6	36.9	35.3	40.1	
	N weak PB (within strong PI group)*	34	80	63	12	42	72	47	26	114
	I-B gap in %	20.6	26.9	23.1	23.1	23.3	25.4	23.2	25.7	24.6
	% within group with I-B gap	14.7	17.4	14.7	17.9	15.2	17.3	15.5	16.0	16.5
T-shirt	N strong PI	162	335	313	43	189	309	213	113	498
	% strong PI of target group	70.0	73.0	73.0	64.0	68.0	74.0	70.0	70.0	
	N weak PB of target group	105	210	175	38	141	174	131	84	
	% weak PB of target group	45.5	45.7	40.8	56.7	50.9	41.9	43.2	51.9	
	N weak PB (within strong PI group)*	69	131	113	23	86	114	78	52	200
	I-B gap in %	42.6	39.1	36.1	53.5	45.5	36.9	36.6	46.0	40.2
	% within group with I-B gap	29.9	28.5	26.3	34.3	31.0	27.5	27.5	32.1	28.9
Mobile phone	N strong PI	131	201	199	36	129	204	142	77	333
	% strong PI of target group	57.0	44.0	46.0	54.0	47.0	49.0	47.0	48.0	
	N weak PB of target group	133	325	277	50	196	263	204	110	
	% weak PB of target group	57.6	70.7	64.6	74.6	70.8	63.4	67.3	67.9	
	N weak PB (within strong PI group)*	68	110	98	24	79	100	76	40	179
	I-B gap in %	51.9	54.7	49.2	66.7	61.2	49.0	53.5	51.9	53.8
	% within group with I-B gap	29.4	23.9	**22.8**	**35.8**	28.5	24.1	25.1	24.7	25.9

*Only of those with strong PI. **Income: Lower = < R18000/€2000; Higher = > R37000/€3000. PI: Purchase intention, PB: Purchase behaviour, I-B gap: Intention-behaviour gap.
Significance: *bold+italic=Highly significant;* bold=Significant; regular=No significant difference

For the German sample the only significant difference was for t-shirts, specifically for the gender and age demographics. Women showed a larger intention-behaviour gap (11.4%) than males (5.2%). Females showed a higher purchase intention (38%) than men (32%). Within those reflecting a strong purchase intention, 30.1% of women showed weak purchase behaviour, whereas men showed only a 16.3% weak purchase behaviour. These findings were significant at P<0.05. This implies that there may be considerable potential for marketing recycled t-shirts to women.

Regarding the age demographic, the younger group has a very low within group intention-behaviour gap of 2.1%, with a relatively high purchase intention (42%) and a relatively low weak purchase behaviour (21.8%), indicating that there is probably not much potential for marketing to this demographic. Regarding the older, 50+ group, however, the significantly higher intention-behaviour gap (11.8%), brought about mainly by a very high weak purchase behaviour of 63.9%, indicates considerable potential for marketing recycled t-shirts to the over 50s. This finding was highly significant with P<0.01.

4.2.2. Demographic target groups and suggested marketing actions by product by country

Based on the analyses outlined in Section 4.2.1 we have identified the demographic sectors that have the most potential for increasing adoption of recycled products. We based this on a two by two matrix as illustrated in Table 7, and used the Lavidge-Steiner (1961) hierarchy of effects model to identify applicable marketing actions.

A situation of strong purchase behaviour and weak purchase intention (cell A in Table 7) probably does not make sense and probably does not exist. If it does it probably includes consumers who buy purely on price and probable covers poor quality recycled products, which are not relevant in this paper.

Where there is a strong purchase intention and a strong purchase behaviour (cell A in Table 7), there is probably little opportunity for new business, as most of those likely to buy are already buying. However, they may still be a valid segment for repurchase or replacing previous products. Therefore, reminder or reinforcement type advertising would be applicable (Kotler and Keller, 2009)

Table 6: Results for German sample

Product	Demographic	Gender		Age		Education		Income**		Total
	Analysis category	M	F	18-34	50+	<uni	uni+	Low	High	
	Target group	305	297	142	330	461	142	212	246	
Toilet paper	N strong PI	166	179	72	200	252	93	118	147	345
	% strong PI of target group	54.0	60.0	51.0	61.0	55.0	65.0	56.0	60.0	
	N weak PB of target group	65	71	21	90	115	22	55	55	
	% weak PB of target group	21.3	23.9	14.8	27.3	24.9	15.5	25.9	22.4	
	N weak PB (within strong PI group)*	11	15	5	19	22	4	15	9	26
	I-B gap in %	6.6	8.4	6.9	9.5	8.7	4.3	12.7	6.1	7.5
	% within group with I-B gap	3.6	5.1	3.5	5.8	4.8	2.8	7.1	3.7	4.3
T-shirt	N strong PI	98	113	59	102	155	56	70	82	211
	% strong PI of target group	32.0	38.0	42.0	31.0	34.0	39.0	33.0	33.0	
	N weak PB of target group	138	157	31	211	236	59	106	126	
	% weak PB of target group	45.2	52.9	21.8	63.9	51.2	41.5	50.0	51.2	
	N weak PB (within strong PI group)*	16	34	3	39	40	10	19	16	50
	I-B gap in %	16.3	30.1	5.1	38.2	25.8	17.9	27.1	19.5	23.7
	% within group with I-B gap	**5.2**	**11.4**	***2.1***	***11.8***	8.7	7.0	9.0	6.5	8.3
Mobile phone	N strong PI	78	73	38	71	111	40	52	53	151
	% strong PI of target group	26	25	27	22	24	28	25	22	
	N weak PB of target group	187	220	58	259	312	96	140	181	
	% weak PB of target group	61.3	74.1	40.8	78.5	67.7	67.6	66.0	73.6	
	N weak PB (within strong PI group)*	26.0	33.0	7.0	34.0	44.0	15.0	18.0	27.0	59.0
	I-B gap in %	33.3	45.2	18.4	47.9	39.6	37.5	34.6	50.9	39.1
	% within group with I-B gap	8.5	11.1	4.9	10.3	9.5	10.6	8.5	11.0	9.8

*Only of those with strong PI. **Income: Lower = < R18000/€2000; Higher = > R37000/€3000. PI: Purchase intention, PB: Purchase behaviour, I-B gap: Intention-behaviour gap.
Significance: *bold+italic: Highly significant,* bold: Significant; regular=No significant difference

Table 7: Purchase intention-behaviour matrix

Nature of purchase behaviour and intention	Weak purchase behaviour	Strong purchase behaviour
Weak purchase intention		
Consumer status	**D** Consumers lack knowledge	**A** Probably only bought by those who can't afford better
Marketing/promotion action	**Action**: Awareness, knowledge, liking, preference, conviction	**Action**: Target lowest incomes with purchase actions like low price or more likely ignore this segment
Strong purchase intention		
Consumer status	**C** Best opportunity to ease and facilitate buying	**B** Low opportunity as most of interested market already buying recycled
Marketing/promotion action	**Action:** Conviction, trial, purchase	**Action**: Reminder/reinforcement marketing

in order to support the consumer's decision to buy a recycled product or to stimulate them to again buy a recycled product when a replacement is necessary.

Where purchase intention and purchase behaviour are both weak (cell A in Table 7), considerable marketing effort and cost would be required. This would probably involve all steps in the hierarchy of effects model, including awareness, knowledge, liking, preference, conviction, and ultimately purchase. This may be too much for individual recycling brands and certainly should not be attempted until all other options have been exhausted. An interesting sub-set of this target group are those customers who are prone to impulse shopping. If they do not purchase recycled products because of lack of awareness it is possible that point of sale promotional material might encourage spontaneous purchase of recycled products. We assume that the most effective tactics would be to aim for "low hanging fruit", namely where there is a strong purchase intention and a weak purchase behaviour, i.e., cell C in Table 7. Here consumers are aware of and have knowledge about the recycled product, meaning the cognitive stage of advertising is not necessary. Furthermore, the consumer may also be positive about the recycled product, with some degree of liking and preference, and even maybe conviction, i.e., the affective stage of advertising is less necessary. What is necessary is action to encourage the behaviour stage of advertising to encourage consumer actions like trial and purchase.

We will now briefly summarise the suggested actions for each of the products in each of the countries that were found to show significant demographic differences.

4.2.2.1. South African sample

In the analysis in Section 4.2.1.2. the older, 50+, demographic group was found to be a good potential target market for recycled mobile phones. A third of this group showed a very high intention-behaviour gap (66,7%) with over half having a strong intention to purchase a recycled phone, but only a quarter reflecting strong purchase behaviour. This group therefore is a very important target market for recycled mobile phones. They clearly know about and like the concept of a recycled phone, and may also have positive attitudes towards buying a recycled product for environmental and sustainability reasons. What is required is advice on such issues as how and where such products can be purchased, at what price and with what guarantees. Such actions could involve provision of references from satisfied customers, product trials, easy in-shop or on-line purchase, various payment options, clearly defined repair or replacement policies, and simple to understand guarantee statements.

4.2.2.2. German sample

In the analysis Section 4.2.1.3 it is shown that women have potential as a target market for recycled t-shirts. Of this target group 38% showed a strong purchase intention, but only about half showed a strong purchase behaviour. Furthermore, the older grouping also showed a big intention-behaviour gap. Thus, it can be concluded that older women are the target group with the greatest potential for increased sales of recycled t-shirts. Therefore, promotions for this group (older females) should also be focussed on the behaviour stage of the hierarchy-of-effects model, namely purchase and possibly also some aspects of the affective stage, such as preference and conviction. Emphasis in the advertisements can be placed on the environmental and sustainable benefits of buying recycled products, including the conservation of natural resources, reduced pollution and landfill waste, reduced water usage, reduced greenhouse gas emissions, saving money and thus the overall benefits of buying recycled t-shirts. Furthermore, advertisements and product labelling should clearly identify products as recycled and list the above benefits. The advertising messages, in addition to the above, should stress quality and also could suggest possible uses of recycled t-shirts, such as gifts for younger relations or friends. This is suggested as the younger cohort have a quite strong purchase intention with a very low weak purchase behaviour, i.e., they already are used to buying and using recycled products and so may appreciate the thought behind a recycled product as a gift.

To summarise the overall findings of this objective, Table 8 shows the intention-behaviour gaps for all products by all demographics, for each country, with those gaps that are statistically significant being bold and/or italic.

The intention-behaviour gaps for Germany are so low that there is not much opportunity for improvement. For those marketers who want to try, emphasis should be placed on mobile phones and t-shirts. If they want to focus of a specific demographic, the best opportunity is older females as this is the only significant difference in demographic characteristics. That means for Germany the marketing strategy may not focus on reducing the intention-behaviour gap but more on increasing the intention to

Table 8: Proportions of intention-behaviour gaps by country, product and demographic

Country	Product	Gender		Age		Education		Income	
		M	F	Young	Older	Lower	Higher	Low	High
Germany	Mobile phone	8.5	11.1	4.9	10.3	9.5	10.6	8.5	11.0
	t-shirt	**5.2**	**11.4**	**2.1**	**11.8**	8.7	7.0	9.0	6.5
	Toilet paper	3.6	5.1	*3.5*	*5.8*	4.8	2.8	7.1	3.7
South Africa	Mobile phone	29.4	23.9	**22.8**	**35.8**	28.5	24.1	25.1	24.7
	t-shirt	29.9	28.5	26.3	34.3	31.0	27.5	27.5	32.1
	Toilet paper	14.7	17.4	14.7	17.9	15.2	17.3	15.5	16.0
Total sample	Mobile phone	17.5	18.9	18.4	14.6	16.7	20.6	18.3	16.4
	t-shirt	**15.9**	**21.8**	20.3	15.6	**17.1**	**22.3**	18.8	16.7
	Toilet paper	**8.4**	**12.5**	**11.9**	**7.8**	***8.7***	***13.6***	12.0	8.6

Statistical significance. Bold=At 0.05 level. *Bold and italic*=At the 0.01 level. Shaded are areas of greatest opportu nity

buy recycled products and, at the same time, ensuring that the intention-behaviour gap does not increase.

For South Africa, definite opportunities exist regardless of demographic characteristics, mostly in mobile phones and t-shirts, but also in toilet paper (but to a lesser extent). The only significant difference regarding demographic characteristics is between young and old for mobile phones, with the biggest opportunity being for older people.

4.3. Objective 2 – Develop Model for Closing the Intention-Behaviour Gaps in Each Country

We initially set out to build a model for the three products in the two countries together with the seven influencing factors as per Dobbelstein and Lochner (2023). Because of the large number of regression combinations and the resultant low numbers for each demographic/product/country target group, regression analysis was not feasible.

As shown in Section 4.2, there are very few significant differences between the various demographic target groups in each country (only age for mobile phones in South Africa and only age and gender for t-shirts in Germany). Since differences between the demographic target groups are negligible, we decided to focus on all people in a specific product group. As shown in the final columns of Tables 4 and 5, the intention-behaviour gaps for Germany (toilet paper = 4.3%; t-shirts = 8.3%; mobile phones = 9.8%) are much smaller than for South Africa (toilet paper – 16.5%; t-shirts = 28.9%; mobile phones = 25.9%). Because of the intention-behaviour gap in Germany is so small as to be relatively unimportant (those intending to buy recycled products actually do), and because of the low numbers of respondents reflecting an intention-behaviour gap were too small for regression analysis, it was decided to just focus on building a model for reducing the South African intention-behaviour gap.

As previously mentioned, only age for mobile phones was significant in South Africa, so the following analysis is per product group does not differentiate between demographic target groups. Therefore, we set out to answer the question "what criteria influence the actual purchase behaviour of those respondents who reflected a strong intention to purchase but weak purchase behaviour for the three recycled product groups in South Africa?" To answer this question we conducted regression analyses, with the question "In the past, how often have you bought a (relevant recycled product) made of recycled materials instead of new/ conventional materials?" as the dependent variable, and, as the independent variables, the criteria identified by Dobbelstein and Lochner (2023), namely, Uncertainty, Attitude/Environmental Concern, Promotion/Certification, Value/Accessibility, Subjective Norm, Price, and Availability.

4.3.1. Closing the intention-behaviour gap for toilet paper in South Africa

This analysis was of a target group of 114 South African people with an intention-behaviour gap for toilet paper. This regression analysis overall was not significant (0.276) nor were the influences of any of the independent variables significant in influencing the buying behaviour of toilet paper. Thus, this regression showed no significant influence of the independent variables on the buying behaviour for toilet paper.

4.3.2. Closing the intention-behaviour gap for t-shirts in South Africa

This analysis was of a target group of 200 South African people with an intention-behaviour gap for t-shirts. The results of this analysis are presented in Table 9. The requirements for regression were fulfilled, with Durban-Watson (2.086) showing no autocorrelation, all tolerance values being > 0,1 (so no multicollinearity), and normally distributed residual plots showing no serious sign of homoscedasticity.

Table 9: Regression analysis for closing t-shirt intention-behaviour gap in South Africa

Model Summary							
R	**R Square**	**Adjusted R Square**	**Std. Err of Est**	**Durbin-Watson**			
0.313	0.098	0.065	0.725	2.086			
ANOVA							
	Sum of square	**df**	**Mean square**	**F**	**Sig.**		
Regression	10,977	7	1.568	2.980	0.005		
Residual	101,023	192	0.526				
Total	112,000	199					
Coefficients							
Model	**Unstandard coefficient**		**Standard coefficient**	**t**	**Sig.**	**Collinearity stats**	
	B	**Standard error**	**Beta**			**Tolerance**	**VIF**
(Constant)	6.192	0.668		9.264	0.000		
Uncertainty	−0.067	0.060	−0.086	−1.121	0.264	0.799	1,251
Attitude/environ. concern	0.106	0.113	0.085	0.944	0.346	0.579	1,728
Promotion/certification	−0.054	0.085	−0.057	−0.634	0.527	0.574	1,741
Value/accessibility	−0.118	0.080	−0.139	−1.474	0.142	0.526	1,900
Subjective norm	−0.049	0.053	−0.078	−0.930	0.353	0.668	1,498
Price	−0.033	0.045	−0.053	−0.730	0.467	0.892	1,121
Availability	0.113	0.043	0.196	2.625	0.009	0.842	1,188

a. Dependent Variable: *Purchase behaviour*: In the past, how often have you bought a t-shirt made of recycled materials instead of new/conventional materials?
Predictors: (Constant), *Availability* (1=Positive (easily available)/7=Negative), *Subjective Norm* (1=Negative/7=Positive), *Uncertainty* (1=Positive (low uncertainty)/7=Negative (high uncertainty), *Price* (1=Negative/7=positive), *Promotion/Certification* (1=Negative (little promotion/little help)/7=Positive), *Attitude/Environmental Concern* (1=Negative (little concern, less purchase)/7=positive), *Value/Accessibility* (1=Negative/7=Positive)

As shown in Table 9 the multiple regression for t-shirts overall is highly significant (P = 0.005). However, the independent variables explain only 9.8% of the actual purchase behaviour for recycled t-shirts. The only (highly) significant factor (p=0.009) is availability, which also has the highest beta value (0,196), confirming its important influence on the purchase of recycled t-shirts. Clearly, making recycled t-shirts visibly and easily available in South Africa is key. Consumers are willing and ready to support the recycling movement, provided price is reasonable, but suppliers have to let them know, through better promotions, advertising, labelling and displays, of the availability of these products.

4.3.3. Closing the Intention-behaviour gap for mobile phones in South Africa

This analysis was of a target group of 179 South Africans with an intention-behaviour gap for recycled mobile phones. The results of this analysis are presented in Table 10. The requirements for regression were fulfilled, with Durban-Watson (2.051) showing no autocorrelation, all tolerance values being >0,1 (so no multicollinearity), and normally distributed residual plots showing no serious sign of homoscedasticity.

As shown in Table 10 the multiple regression for mobile phones overall is significant (P = 0.012). However, the independent variables explain only 9.8% of the actual purchase behaviour for recycled mobile phones. The only significant factor (P = 0.011) influencing purchase behaviour is the subjective norm, which also has the highest beta value (0.215), confirming its important influence on the purchase of recycled mobile phones. Mobile phones are considered to be high involvement products (Ugalde et al., 2024), requiring a careful purchase decision making process, considerable cost and are highly personal. Furthermore, they are highly visible, often used in public, before friends, family and work colleagues. It is no surprise therefore that subjective norm was identified as a very important construct that influences mobile phone purchase behaviour, and especially the purchase and use of a recycled phone because of the current attitudes towards sustainability, waste and 'green' behaviour. This conclusion is supported by the means (on a scale of 1 to 7) achieved for the three questions comprising this construct, namely People I care about think I should buy recycled products (5.17), People I care about would want me to buy recycled products (5.34) and People whose opinions I value would appreciate me buying recycled products (5.57). This furthermore reinforces the likelihood that the more the consumers believe that other people think they should buy recycled products, the more likely they are to actually buy recycled products.

To summarise the findings related to Objective 2, Table 11 shows the findings grouped similarly to the matrix provided in Table 7 (weak/strong/Purchase Intention/Purchase Behaviour), indicating which demographic, for which product, falls into the matrix cells developed in Table 7.

In developing Table 11, we assumed that the best opportunity for marketers is where there is high intention but low behaviour. Thus, cell C is the area upon which marketers should focus, using the guide for marketing actions from Table 7. For Germany, it is males and females for t-shirts and mobile phones, while for South Africa, it is older, less educated consumers, but with higher income, for t-shirts, and older males for mobile phones. An additional, different strategy would be to not focus on closing the intention-behaviour gap but to increase the purchase intention while keeping the intention-behaviour gap low. This would be cell D in Table 11, specifically t-shirts and mobile phones for older people with lower education and lower income.

Table 10: Regression analysis: Closing mobile phone intention-behaviour gap - South Africa

Model summary							
R	R square	Adjusted R square	Standard error of Est	Durbin-Watson			
0.313	0.098	0.061	0.763	2.051			
ANOVA							
	Sum of square	df	Mean square	F	Sig.		
Regression	10,840	7	1.549	2.658	0.012		
Residual	99,641	171	0.583				
Total	110,480	178					
Coefficients							
Model	Unstandard coefficient		Standard coefficient	t	Sig	Collinearity stats	
	B	Standard error	Beta			Tolerance	VIF
(Constant)	6.832	0.803		8.506	0.000		
Uncertainty	−0.091	0.071	−0.112	−1.276	0.204	0.679	1.473
Attitude/environ. concern	0.129	0.119	0.105	1.083	0.281	0.564	1.774
Promotion/Certification	0.108	0.099	0.104	1.083	0.280	0.573	1.747
Value/Accessibility	−0.120	0.089	−0.124	−1.340	0.182	0.619	1.615
Subjective Norm	0.147	0.057	0.215	2.561	0.011	0.748	1.338
Price	−0.023	0.054	−0.035	−0.427	0.670	0.768	1.302
Availability	−0.048	0.050	-0.079	-0.964	0.336	0.788	1.269

Dependent Variable: *Purchase behaviour*: In the past, how often have you bought a mobile phone made of recycled materials instead of new/conventional materials?
a. Predictors: (Constant), *Availability* (1=Positive (easily available)/7=Negative), *Subjective Norm* (1=Negative/7=Positive), *Uncertainty* (1=Positive (low uncertainty)/7=Negative (high uncertainty), *Price* (1=Negative/7=Positive), *Promotion/Certification* (1=Negative (little promotion/little help)/7=Positive), *Attitude/Environmental Concern* (1=Negative (little concern, less purchase)/7=Positive), *Value/Accessibility* (1=Negative/7=Positive)

Table 11: Classifying products/demographics by purchase intention and behaviour

PB	Country	Weak purchase behaviour		Strong purchase behaviour	
PI		Germany	South Africa	Germany	South Africa
Weak purchase intention	Germany	***TS*** – O, <U, L ***MP*** – O, <U, U+, L, H	D	***TS*** – Y, U+, H ***MP*** – Y	A
	South Africa		***MP*** – F, Y, <U, U+, L, H		
Strong purchase intention	Germany	***TS*** – M, F ***MP*** – M, F	C	***TP*** – M, F, Y, O, <U, U+, L, H	B
	South Africa		***TS*** – O, <U, H ***MP*** – M, O		***TP*** – M, F, Y, O, <U, U+, L, H ***TS*** – M, F, Y, U+, L

Key: Weak = 20-50%; strong = 51-80% (from "% PI and PB of target groups" from Tables 4 and 5). Products: TP = toilet paper; TS = t-shirt; MP = mobile phone. Demographic: M = male; F = female; Y = younger; O = older; <U = less than university education; U+ = university education; L = lower income; H = higher income

5. CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

This research was based on two objectives, namely (1) the identification of demographics important for marketing recycled products in two countries, i.e., Germany and South Africa, and (2) to develop a model for closing the intention-behaviour gaps in each of these countries.

With regard to Objective 1, the analyses showed that demographics does play a limited role in purchase behaviour for different types of recycled products in the two countries. When combining the data from the two countries, the findings showed that toilet paper and t-shirts reflected statistically significant variations according to demographics, but mobile phones did not. In this total sample, the younger respondents, females, and the more highly educated showed strong purchase intentions for recycled toilet paper but had greater intention-behaviour gaps. This suggests that, although being environmentally aware and in favour of purchasing recycled products, these potential buyers are not converting their positive attitudes into actual purchases and so can be considered as susceptible appropriately designed marketing interventions.

To identify differences between German and South African consumers, country-specific analyses were conducted. Only the age criterion for mobile phones was significant for the South African respondents: more specifically, older respondents (50+) showed both high purchase intention and a large intention-behaviour gap. This result indicates a potential demand that is not being satisfied and which appropriate marketing activities could fulfil. Such activities could include providing proof of social acceptance, influencer endorsements, or community-led campaigns for recycled goods which show similar consumers satisfactorily using such recycled products. With regard to the German respondents, females and older adults presented as the best potential target markets for t-shirts, both of which demographic categories showed statistically significant intention-behaviour gaps. To market effectively to these two target markets, it is suggested that promotional activities focussing on sustainability, practical applications and quality assurances should be emphasised, as explained under the German sample heading of the Objective 1 section.

To achieve the second objective, namely the development of a model to reduce the intention – behaviour gaps, it was only possible to conduct regression analyses for the South African respondents, because the intention – behaviour gaps for the German respondents were not big enough to allow for meaningful modelling. The South African regression for t-shirts identified availability as the only significant predictor of purchase behaviour, which suggests that marketing activities such as improved distribution, high shelf visibility, and promotional labelling could have a positive impact on sales of recycled t-shirts. This finding is consistent with literature that stresses ease of purchase (Wang et al., 2018; Xu et al., 2020) and visibility (Ugalde et al., 2024) as factors that encourage purchase of sustainable products.

Regarding the purchase of recycled mobile phones in South Africa, only the subjective norm was a statistically significant influencing factor. Unsurprisingly, perceived social pressure to purchase, or not purchase, is important for highly visible and socially desirable products like mobile phones (Bae, 2021; Luu and Baker, 2021; Queiroz et al., 2021). This finding thus suggests that marketing messages that provide proof of social acceptance, influencer endorsements, or community-led campaigns could be effective in driving purchase behaviour for mobile phones in South Africa. It is interesting to note that factors such as environmental attitudes (Park and Lin, 2020; Rausch and Kopplin, 2020; Wijekoon & Fazli Sabri, 2021), price (Joshi et al., 2015; Nguyen et al., 2018), or product uncertainty (Magnier et al., 2019; Wijekoon and Fazli Sabri, 2021) which have been found to be significant in other studies, were not significant predictors in any of our product categories in South Africa. This stresses the importance of context-specific marketing interventions for clearly and precisely defined target market segments, rather than applying the more broadly defined activities often suggested for customers with positive attitudes to sustainability and environmental, or green, issues.

To summarise, our study makes two main contributions. First, it clearly defines the demographic segments with the highest potential that should be targeted when marketing recycled products such as toilet paper, t-shirts and mobile phones. Second, it suggest a data-driven approach when attempting to reduce the gap between what consumers intend to do and what they actually do, that is, the intention – behaviour gap. Our findings suggest that the key to converting intention into action is not to attempt to change

attitudes, which are already mostly positive, but to remove any barriers to purchase behaviour, such as:

- Poor availability, or lack of awareness of availability as shown by the literature (see for example, Wang, et al., 2018 and Xu et al., 2020), especially for t-shirts as indicated in Table 9, by increased advertising, promotions, and point of sale and labelling visibility
- Risk of perceptions of low social acceptance, as hinted at by the importance of social norm for mobile phones (Table 10) and in the literature (Bae, 2021; Luu and Baker, 2021; Queiroz et al., 2021), this can be achieved by using influencer endorsements and highlighting the socially and environmentally positive perceptions of buying recycled products
- Negative attitudes towards recycled products (Park and Kim, 2024; Zhuang et al., 2021), which can be countered by warranties or guarantees, as well as by the endorsements of socially admired influencers.

Despite actions taken to maximise accuracy and rigor, there are, as in most research, some limitations that readers should take note of, especially if attempting replication research.

First, the research was conducted solely in Germany and South Africa, and so any attempt at extrapolation from these results to other countries should done with care.

Second, the South African sample excluded the lower income levels (LSMs 1-6). Most consumers in these categories probably purchase mostly essential, utilitarian products, and do not have the purchasing power required for recycled products, which often are more expensive than totally new products, so it is unlikely that excluding these LSM categories significantly biased results. However, increasing urbanisation and education are leading to more aspirational purchase behaviour with lower LSMs' purchase behaviour becoming more characteristic of that of higher LSMs. Therefore, future research in this area should include some of the lower LSM categories.

Third, although we based our selection of constructs on the literature, other possible constructs or factors that could influence purchase intention may be as important, so a qualitative study is suggested to more deeply explore the issue and to identify any other such factors.

Fourth, a deeper understanding of the constructs would be worthwhile, such as a better understanding of the antecedents of the constructs. For example, many Germans harbour dubious opinions about eco-labels, so it could be important to better understand this scepticism in order to generate marketing actions to counter it.

Fifth, only three product categories with one product in each were selected, which makes generalisation from these results inappropriate. Therefore, similar research into more categories with more products in each category is required. Furthermore, such future research could include issues such as high versus low involvement, new versus recycled packaging, or branded versus non-branded products.

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