

Article

Consumer Perceptions of the Use of Nondegradable Plastic Packaging and Environmental Pollution: A Review of Theories and Empirical Literature

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Abstract: Studying people's perceptions of their attitudes and behaviour toward the use and inappropriate disposal of plastics is necessary because it helps explain the meaning of sustainable environmental behaviour in the context of African countries. Formulating appropriate behavioural change interventions may lead to a shift in people's behaviour in terms of plastic consumption if they become aware of the environmental risk of plastics. Using a qualitative review of literature, relevant materials for this paper were identified using a search strategy that involved keywords and databases. Previous empirical studies employed several theoretical frameworks. However, inconsistencies in the use and definition of variables, make comparing the results of these studies difficult. Although the literature is growing, more empirical evidence is still needed to understand the drivers of people's perceptions toward unsustainable environmental behaviour in the context of African countries and to formulate appropriate behavioural change interventions. A review of the literature determined four broad drivers of people's perceptions toward unsustainable environmental behaviour. These include policy or institutional variables, product and market attributes, community variables, and individual characteristics. Additionally, we offer a consolidated conceptual framework for analysing consumer perception in relation to the use of nondegradable plastics and environmental pollution and identify the drivers of people's perceptions. Policy implications for developing countries as well as future research directions are flagged.



Citation: Mugobo, Virimai Victor, Herbert Ntuli, and Chux Gervase Iwu. 2022. Consumer Perceptions of the Use of Nondegradable Plastic Packaging and Environmental Pollution: A Review of Theories and Empirical Literature. *Journal of Risk and Financial Management* 15: 244. <https://doi.org/10.3390/jrfm15060244>

Academic Editor: Elena Horska

Received: 9 January 2022

Accepted: 18 March 2022

Published: 30 May 2022

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Keywords: consumer perceptions; attitudes; behaviour; degradable and nondegradable plastic packaging; environmental pollution

1. Introduction

The production and consumption of single-use plastic packaging have been on the increase in many developing countries in Africa (Khan et al. 2019a, 2019b; O'Brien and Thondhlana 2019; Ayeleru et al. 2020). Rapid urbanization and the growth of informal settlements due to increasing population coupled with insufficient formal refuse collection capacity has exacerbated plastic pollution with serious consequences on the social-ecological system, i.e., environmental beauty, quality of human life, health, ecological processes, terrestrial wildlife, and marine species (Heidbreder et al. 2019). The combination of illegal dumping sites and inappropriate disposal of plastics such as street littering particularly in the informal settlements has been identified as the major sources of plastic pollution in the literature (Wekesa et al. 2011; Alpizar et al. 2020; Raha et al. 2020).

One of the major pathways through which plastics move from production into the hands of consumers and finally to illegal dumping sites or on the streets is through retail

outlets (Alpizar et al. 2020). Retail outlets such as clothing shops and grocery stores play a significant role in distributing plastic packaging to consumers when they purchase goods or make bulk purchases (O'Brien and Thondhlana 2019). Wiefek et al. (2021) observed that cheap plastic packaging is displayed at the point of sale or where it is convenient to access. Often, consumers are offered plastic bags without asking for them which, in turn, facilitates the decision to purchase. Furthermore, most plastic packaging is made up of single-use plastic material rather than multiple-use packaging since the former is much cheaper than the latter. Giving the packaging away does not affect the company's profits, and the consumer is likely to make a quick decision (O'Brien and Thondhlana 2019; Wiefek et al. 2021). Based on the literature, the role of retail outlets in facilitating plastic use or consumer decisions to purchase can be viewed as a supply-side strategy or push factor rather than an attempt to satisfy consumer demand (e.g., Heidbreder et al. 2019; O'Brien and Thondhlana 2019). Therefore, an analysis of the problem of plastic consumption and pollution through the lens of the consumer is incomplete without addressing the role of retail outlets.

The search for policy options to curb plastic pollution has been on the global agenda for several decades, and Africa is no exception (Xanthos and Walker 2017; Mendenhall 2018; Nielsen et al. 2019; Alpizar et al. 2020; da Costa et al. 2020). As a result, developing a legal framework and policy instruments that target plastic production, consumption, and disposal has become a major priority in most developing countries. Due to a lack of information in developing countries, most of the policies that were fervently endorsed were based on either weak empirical evidence and limited knowledge about the African context or copied from first world countries where the waste sector has been formalized (da Costa et al. 2020). These instruments range from market-based solutions to environmental regulations. However, the potential of market-based instruments and the use of environmental legislation in most developing countries is still limited by resource constraints and the lack of institutional capacity to monitor and enforce rules and regulation, particularly at the household level. This makes the use of behavioural change interventions suitable as complementary policy options for developing countries.

It is important to study people's perceptions to understand their attitudes and behaviour toward the use and inappropriate disposal of plastics (Andereck et al. 2005; Ayeleru et al. 2020). Most behavioural change interventions seek to alter people's minds and perceptions about the use and disposal of plastics through information provisioning (Boz et al. 2020; Cavaliere et al. 2020). Thus, a shift in people's mindsets might result in a change in behaviour in terms of plastic consumption if they become aware of the environmental risk plastics cause. What drives people's perceptions toward plastic use and pollution is a 'black box' which remains unpacked. Intuitively, information could be one of these factors, but little is known about the other set of variables responsible for explaining the observed outcome in this relationship. Although the literature is growing, more empirical evidence is needed to understand the drivers of people's perceptions toward sustainable environmental behaviour in African countries and to formulate appropriate behavioural change interventions.

Previous empirical works (such as Cialdini et al. 1990; Andereck et al. 2005; Benyamin et al. 2018; Dalu et al. 2020) employed several theoretical frameworks resulting in inconsistencies in the use and definition of variables, which make comparing these studies difficult. As a result, there is a need for a common understanding of definitions and development of a unified theoretical framework so that study results can be compared across space and time. Based on a review of theories (for example the public goods theory, rational choice theory, social exchange theory, etc.) and empirical literature, our study develops a consolidated conceptual framework for analysing consumer perception of nondegradable plastics and environmental pollution and identifies the drivers of these perceptions. Additionally, environmental pollution research in Africa is important because: (1) Most disease burden and deaths are linked to environmental factors (Joubert et al. 2020); (2) Bad management of environmental pollution is rife in Africa (Fayiga et al. 2018) perhaps suggesting a fervent

need for more studies—empirical and conceptual—to clearly demonstrate the impact of environmental mismanagement.

This paper progresses as follows: The next section describes the methodological approach we used in putting this together. This is followed by the conceptual framing of the paper. After that is the review of the factors that drive people’s perceptions of unsustainable behaviour and the analysis of the drivers based on our consolidated theoretical framework. The last sections offer policy recommendations and future research directions, respectively.

2. Research Methods

This paper is based on a qualitative review of literature, i.e., published articles. To identify relevant studies for this paper, we used four databases (Google, Google Scholar, Scopus, and Web of Science). We found different articles by using a set of keywords (plastic, plastic pollution, plastic waste, consumer behaviour, packaging, recycling) and their combinations. This led to an initial collection of studies. An article identified in the search was considered relevant if: (a) The subject of plastic waste or pollution was addressed; (b) Attitudes, perceptions, or behaviours were examined in relation to plastic pollution. The list of studies was then extended using a snowball strategy of searching backward and forward citations (see [Wohlin 2014](#)) and again applying the above criteria. Basically, our start set involved searching for and identifying relevant papers from a much wider database, Google. Thereafter, we proceeded to the other databases where we refined the selection criteria focusing on relevance ([Noblit and Hare 1988](#); [Seers 2015](#)) (Africa/developing countries), number of citations and diversity ([Wohlin 2014](#)). The data were tabulated in an Excel file and subsequently analysed for emerging and common themes. The articles considered were published between 2004 and 2021. The final pool comprised 26 publications (see [Table 1](#)) that were included in this review.

Table 1. Final pool of publications.

#	Final Pool of Publications
1	Alpizar et al. (2020)
2	Arulnayagam (2020)
3	Ayeleru et al. (2020)
4	Babayemi et al. (2019)
5	Barnes (2019b)
6	Behuria (2021)
7	Boz et al. (2020)
8	da Costa et al. (2020)
9	Dalu et al. (2020)
10	Dikgang and Visser (2012)
11	Fayiga et al. (2018)
12	Heidbreder et al. (2019)
13	Khan et al. (2019b)
14	Khan et al. (2019a)
15	Khan et al. (2020)
16	Klaiman et al. (2016)
17	Ma et al. (2020)
18	McNicholas and Cotton (2019)
19	Nielsen et al. (2019)
20	Niyobuhungiro and Schenck (2021)

Table 1. Cont.

#	Final Pool of Publications
21	O'Brien and Thondhlana (2019)
22	Raha et al. (2020)
23	Van Rensburg et al. (2020)
24	Walker et al. (2021)
25	Wiefek et al. (2021)
26	Xanthos and Walker (2017)

3. Literature and Conceptual Framing

3.1. Definition of Important Terms and Concepts

Ares et al. (2011) define perception as the way in which something is regarded, understood, or interpreted. Perception refers to the process we use to make sense of a situation or stimuli presented to us (Brosch et al. 2010). For example, people form perceptions about the use of plastics given the benefits and costs of environmental pollution interpreted as externalities. Therefore, our perceptions are based on how we interpret different sensations and situations. The perceptual process begins with receiving stimuli from the environment and ends with our interpretation of those stimuli. An attitude is defined as a settled way of thinking or feeling about something (Pickens 2005). The feeling can be good or bad depending on how we perceive the situation. Behaviour is defined in the literature as the way in which one acts or conducts oneself, especially toward others (Altman and Wohlwill 2012). The act of buying plastic packaging is not bad in itself but buying plastics with the intention of littering the streets could be viewed as bad for society. Whether people feel good or bad when they dump garbage on the street or see plastic pollution all over depends on their experiences and knowledge of what constitutes pollution in addition to the availability of legal dump sites or refuse collection area in the community.

Pollution is defined as the presence of or introduction into the environment of material, foreign objects, or a substance which has harmful effects or which can disturb ecological properties such as aesthetics, texture, structure, production of goods and services, nutrient cycles and biological diversity (Barnes 2019a). Environmental pollution is defined as the contamination of the physical and biological components of the earth or atmosphere to such an extent that normal environmental processes are adversely affected (Holdgate 1979; Spellman 2009). An externality is a consequence that affects other parties, such as pollution affecting pollination of surrounding crops by honeybees (Ayres and Kneese 1969). Therefore, environmental pollution can be interpreted as a negative externality because individual actions affect the society as whole.

3.2. Review of Empirical Literature

The study of plastic pollution has received attention from researchers focusing on production, consumption, and disposal of plastic waste (e.g., Barnes 2019a; Khan et al. 2019a; Ayeleru et al. 2020). Essentially, there has been an increase in the study of plastic consumption by household consumers which traditionally has received very little attention especially in developing countries (Heidbreder et al. 2019; Babayemi et al. 2019; Dalu et al. 2020). It is clear that the increase in plastic consumption despite its negative impact on the environment is cause for concern for both researchers and policy makers. It is, however, still not clear if people in low socioeconomic groups care about plastic pollution and if they are willing to do something to reduce plastic pollution in their communities. This raises different questions for researchers. Are people aware of the plastic problem? What do people think about plastic pollution or how do people define pollution? Do they care about the impact of plastic pollution to the environment? Are they taking any action to address this problem? Most of these questions have been subjected to rigorous empirical investigation

through perception studies using both qualitative and quantitative approaches and in the context of both developed and developing countries, while some questions have been only partially addressed particularly in the case of developing countries.

To date, our understanding of the link between consumer perceptions and unsustainable environmental behaviour such as plastic pollution is limited to studies conducted in first world countries, Asian communities, the Middle East, and Latin America that used both qualitative (Heidbreder et al. 2019; Arulnayagam 2020; Khan et al. 2020) and quantitative approaches such as regression analysis and structural equation models (Khan et al. 2019b; Barnes 2019b; McNicholas and Cotton 2019; Cavaliere et al. 2020). In contrast, most studies performed in Africa are purely qualitative (Heidbreder et al. 2019; Ayeleru et al. 2020), while very few studies have used quantitative approaches (O'Brien and Thondhlana 2019; Van Rensburg et al. 2020). In addition, the few African quantitative studies limited their analysis to descriptive statistics and simple measures of association rather than rigorous econometric methods. The former only tell us about size and magnitude of correlation between variables, while the latter gives us information about causal-effect in the relationship in addition to the direction of the variable.

The relationship between variables in most studies of this nature is affected by the endogeneity problem. The endogeneity problem emanates from omitted variables in the regression model, mismeasurement of variables or reverse causality between the dependent variable, and some of the explanatory variables (Ntuli and Muchapondwa 2021). For example, consumer perceptions are affected by policy variables such as information, while the reverse is also true, i.e., people's perceptions might also influence the type of information people want to hear or retain based on what they believe in—a concept referred to as selective retention. In the presence of endogeneity, the coefficients of the regression model are estimated with bias (Wooldridge 2015). To correct this problem, researchers use instrumental variables estimation.

3.3. Review of Theoretical Studies

The public goods theory states that goods that are collectively consumed are nonrival and nonexcludable (Samuelson 1954). Clearly, plastic pollution fits into this category since its consumption by an individual does not reduce the degree of pollution available to others, and one cannot exclude others from consuming pollution. According to the public goods theory, pollution is viewed as a public good since the consumption process is borne by an individual, while its costs are incurred by the community at large (Cornes and Sandler 1996; Victor 1972). Likewise, the costs of plastic pollution are not internalized by the individual firms and households during the production and consumption of a plastic bag. Rather than contributing to a clean environment, many prefer a free ride, hoping that others will pay, while they enjoy the comfort of their homes.

The collective action theory speaks to the conditions under which people can self-organize to deal with a societal problem such as pollution (Ostrom 2010; DeMarras and Earle 2017; Gram et al. 2019). Thus, it is important that people define pollution as a societal problem that warrants collective action, and there has to be common interest in the community to address the problem. Do all people in the community define plastic pollution in the same way? There must also be a threat to society that people see or feel which translates into fear if the problem persists. Do people in the community view plastic pollution as a threat to their health or livelihoods? The ability or inability of people to self-organize to solve a societal problem emanates from several factors such as group size, inequality, information, nature of the problem, perceived benefits, and costs associated with organizing. Some of these variables also enter the perception equation directly or indirectly.

Because plastic pollution has public good characteristics and people are not able to self-organize to solve the problem on their own, most scholars advocate for external coercion or state intervention in the form of rules and legislation coupled with punishment to curb all forms of pollution. In the presence of resource constraints, monitoring and enforcing rules and regulation becomes difficult for the state to implement. Lack of capacity to

enforce rules and regulations means the de jure situation where the government's oversight of environmental regulations eventually degenerates into a de facto situation with the community controlling what is happening (Ostrom 2010). Under these circumstances, it is better for the government to give communities power (rights) to monitor and enforce rules and regulations (Ostrom 2010). Once power is handed to communities, it is believed that people will have positive perceptions and incentive to protect the environment.

4. Theoretical Frameworks Linking Consumer Perceptions and Environmental Behaviour

The theoretical frameworks used to examine the link between perceptions and environmental behaviour borrow from neoclassical economics, e.g., the rational choice theory (RCT) and theories from psychology and sociology such as social exchange theory, theory of planned behaviour (TPB), theory of reasoned action (TRA), and human needs theory (HNT). Although these theoretical frameworks have been used differently in previous studies to understand the link between perceptions and environmental behaviour in different contexts, they have a lot in common and can be traced back to RCT as the fundamental building block. We can therefore think of these variants as augmented models to the shortcomings of RCT.

4.1. Rational Choice Theory

RCT is perhaps one of the oldest theories which provides a set of guidelines that enable the understanding of economic, social, and environmental behaviours (Ntuli and Muchapondwa 2021). The theory postulates that an individual will perform a cost-benefit analysis to determine whether an option is right for them (Perman et al. 2003). For example, starting with the decision to make the actual purchase of plastic packaging itself, customers weigh the benefits and costs of using the product before choosing whether to buy or not to buy the good in question. As the first decision scenario, if the benefit measured in terms of convenience is more than the actual costs of purchasing the product, they proceed with the action. Another scenario involves weighing the benefits of owning and using the product against the costs of disposing of plastics after use which ordinarily are not borne by the user. Assuming that both decisions are taken simultaneously at the point of purchase, the net benefits are always positive given that the costs of plastic disposal are usually assumed to be zero to the individual.

However, RCT assumes that all costs and benefits are borne by the consumer, and if we relax this assumption, the theory breaks down which warrants the use of other theories. In real life people do not have perfect information about a situation and often make decisions with limited information. As will be noted later, several variables enter the benefit-cost function of the customer, some of which are observable while others are not (Ntuli and Muchapondwa 2021). Because of these differences, some benefits and costs are perceived by the customers rather than realized as tangible benefits. These benefits and costs are difficult to measure and require qualitative interviews that go beyond the monetary value of a product. Because of the shortcomings of the RCT in handling the scenario where benefits and costs are not observable, other theories are necessary to fill in this gap.

4.2. Social Exchange Theory

The SET has been widely used to examine the link between individual and community members' perceptions or attitudes and environmental behaviour (Homans 1961; Teye et al. 2002; Andereck et al. 2005). This theoretical framework assumes that the perception of potential beneficial outcomes will create positive attitudes toward sustainable behaviour (Teye et al. 2002). Similar to the rational choice theory in neoclassical economics, individuals perceiving net benefits from an exchange are likely to view it positively, and those perceiving net costs are likely to view it negatively (Andereck et al. 2005). Evidence shows that consumers who perceive plastic packaging as offering net personal benefit, tend to view its impacts less negatively than others (Cavaliere et al. 2020).

4.3. Theory of Planned Behaviour

The TPB which started as the TRA in the 1980s was developed to predict an individual's intention to engage in a behaviour at a specific time and place (Fishbein 1979; Fishbein and Ajzen 1985; Godin and Kok 1996). The theory was intended to explain all behaviours over which people can exert self-control such as the decision to purchase and dispose of plastic packaging. Disposal mechanisms are important because the decision to purchase could be linked to the way people think about disposing of the product after use in a planned way. The theory of planned behaviour is a psychological theory that links beliefs to behaviour (Fishbein 1979). The theory maintains that three core components, namely, attitude, subjective norms, and perceived behavioural control, together shape an individual's behavioural intentions.

4.4. The Human Needs Theory (HNT)

Khan et al. (2019a) argue that plastics are increasingly becoming part of 'human necessities', and it is hard to imagine a world without them. According to HNT and its proponents, an individual's basic needs such as food and shelter come first before higher needs such as the environment are considered (Emptaz-Collomb 2009). Since the food that people consume comes in different packaging including plastics, people are likely to view plastics as part of everyday necessities since they also bring convenience (Walker et al. 2021). Because of poverty, households are also likely to choose the cheapest and most convenient method among the different packaging available on the market that give them the highest utility (Snyman 2014). They are equally very sensitive to slight differences in the costs of packaging material (Dikgang and Visser 2012; Khan et al. 2019a, 2019b). Intuitively, it might be correct to believe that people with lower household incomes are often more supportive of plastic use since they are cheaper and convenient even though they might have a negative effect on the environment if not disposed of properly (Cavaliere et al. 2020).

The implication of the HNT is that people's perceptions of plastic packaging are a function of poverty and as a result poverty might enter the framework earlier than previously thought via the perception equation (Khan et al. 2019a). Earlier proponents focused mainly on the direct link between poverty and environmental behaviour (e.g., Snyman 2014), while little attention was given to indirect linkages by means of people's perceptions. The behaviour of indigent households toward the environment is essentially linked to their perception of system benefits and costs (Ntuli et al. 2019). Therefore, the relationship between poverty and perceptions is best understood in the context of a switching function, in which poverty-stricken people are assumed not to care about the environment if they have positive net costs, while the opposite is true for affluent people.

4.5. Consolidated Theory Linking Perceptions and Environmental Behaviour

Theorists argue that people form perceptions about a situation based first on information and their experiences, and these perceptions translate into attitudes that finally shape their behaviour (Song and Ko 2017). Intuitively, behaviour such as consumption and inappropriate disposal of plastics is closely linked to psychological processes which govern the formation of perceptions and attitudes. Furthermore, the distinction between perception and attitudes is not clear since they are cognitive processes. Figure 1 demonstrates the link between consumer perceptions about plastic packaging, attitudes, and behaviour (i.e., actual disposal of plastics) and the factors that are likely to affect these variables.

As alluded to earlier, it is possible to integrate all the theoretical frameworks into a unified framework. The consolidated framework focuses on the behaviour of consumers (use and disposal of plastic packaging) based on the theory of perceived net benefits. The theory assumes that consumers use all the available variables (information) to plan the outcome. If customers have access to good information, then they are less likely to make bad decisions (Perman et al. 2003; Ntuli and Muchapondwa 2021).

Figure 2 presents the consolidated conceptual framework showing how consumer perceptions can be linked to environmental behaviour. Our theoretical framework supports

the different theoretical frameworks presented earlier in many ways. First, the consolidated framework augments RCT in that it considers both observable and latent variables in the analysis. Second, it supports SET in that it involves the purchase of a private good whose benefits and costs are borne by the consumer, while the society incurs extra costs after its disposal which are not felt by the consumer since they do not enter his or her utility function. The later activity can also be viewed as an exchange of a public good which does not have a market. Even if the plastic packaging is offered free of charge, it is still considered a market exchange assuming that its costs are embedded in the total costs of buying the product. The TPB or TRA are captured in our model given that consumers make joint decisions about the use and disposal of a product before and during purchase. Finally, the consolidated framework speaks to HNT in that plastic consumption can be viewed as satisfying a need in the lives of poor and affluent consumers, that is, attached to a basic need such as food. It is difficult to separate plastics as a packaging material from the product itself and sometimes a tool for consuming the product (Heidbreder et al. 2019; O’Brien and Thondhlana 2019; Ntuli and Muchapondwa 2021).

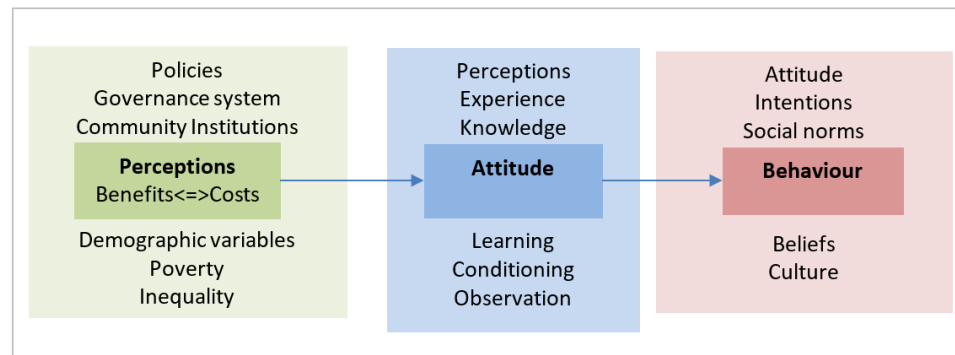


Figure 1. The link between perceptions, attitudes, and behaviour. Source: Adapted from Ntuli and Muchapondwa (2021).

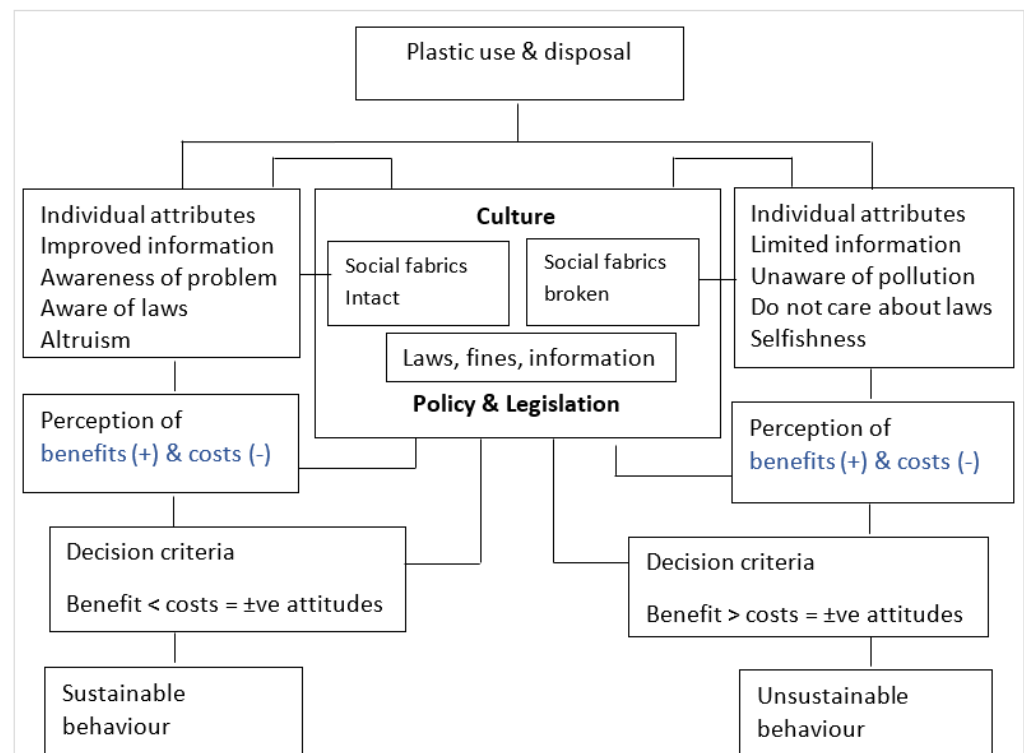


Figure 2. Consolidated theoretical framework linking consumer perceptions with behaviour. Source: Authors.

5. Results and Discussion

In this section, we discuss the results of our review primarily from the perspective of what drives consumer perception of environmental behaviour.

5.1. The Drivers of Consumer Perceptions

Whether an individual or a community views plastic production, consumption, and disposal as a problem depends on several factors some of which are within their control, while others are not. According to the public goods theory for instance, pollution is a public good deserving self-organisation to keep the community clean. As a result, some of the factors that are outside of the individual or community’s control may require external coercion.

In this study, we considered studies completed in both first world and developing countries. Since most of the studies were in the former category of countries, policy implications are drawn for developing countries based on what works in the first world countries.

One way to understand different types of environmental behaviours such as plastic pollution is to look at consumer perceptions of all the activities linked to it and the drivers of their perceptions. For example, to understand the causes and perceptions of plastic pollution from the consumer side, we need to consider the whole process from the time an individual decides to purchase a plastic bag to the actual disposal process. However, this process is assumed to be a single decision that the consumer makes at the time of purchase in this analysis to simplify reality. This assumption makes sense in the context of developing countries because the behaviour of the consumer is not constrained after the purchase due to inefficient monitoring and enforcement (Ayeleru et al. 2020). This is consistent with the literature modelling illegal behaviour where individuals or communities are assumed to have a myopic behaviour (Clark 1974).

From the literature, we can classify the drivers of consumer perceptions into four categories as follows: policy or institutional variables, product and market attributes, community variables, and individual characteristics as shown in Table 2 below. This classification is convenient for the analysis as it permits the identification of areas of intervention at each level.

Table 2. The drivers of consumer perceptions of environmental behaviour.

Levels	Variables	References
Policy/institutional	Rules, legislation, fines Information about plastics, their effects, alternatives Awareness of pollution, consequences, rules, and regulations Provision of educational material (documentaries, pamphlets)	Mendenhall (2018); Nielsen et al. (2019); Babayemi et al. (2019); da Costa et al. (2020); Ayeleru et al. (2020); Alpizar et al. (2020); Behuria (2021); Iwu et al. (2021)
Plastics and market attributes	Use (price, offered free, convenience, attractiveness, branding) Disposability (degradable, nondegradable, reuse, recyclable)	Dikgang and Visser (2012); Snyman (2014); Xanthos and Walker (2017); Khan et al. (2019a, 2019b)
Community variables	Culture (norms, morals, customs, beliefs, behaviour of others) Local institutions (collective action, responsibility, group sizesocial pressure, external costs, heterogeneity, community-based organization, representation, access to dumping sites, private, public actors) Welfare measures (health, income, poverty, and inequality) Residential area (high, medium, and low-density area)	Ostrom (2010); DeMarrais and Earle (2017); Gram et al. (2019) Dalu et al. (2020); Heidbreder et al. (2019); Ayeleru et al. (2020); Iwu et al. (2021); Haidt and Graham (2007)
Individual characteristics	Demographic (age, gender, education level, income) Individual traits (principles, habits, individual beliefs, attitudes, environmental concern, experiences, knowledge)	Wekesa et al. (2011); Barnes (2019b); Cavaliere et al. (2020)

Source: Authors. Drawn from various referenced sources.

Regarding policy and institutional level, there are policies and laws that govern the disposal of different types of plastic packaging. The law stipulates the rules and regulations that come with different sanctioning mechanisms such as a fine attached to illegal dumping of waste. However, some of the rules and regulations may be difficult to implement in

developing countries due to a lack of capacity by the local authorities to monitor and enforce the rule of law (Babayemi et al. 2019; da Costa et al. 2020). Furthermore, the likelihood that consumers will follow the rules and regulations depend on their perceptions of the law which also depends on awareness of these rules and regulations (Heidbreder et al. 2019; Cavaliere et al. 2020). Unlike consumers from first world countries, it is highly unlikely that most indigent household consumers in most developing countries are aware of the laws governing waste disposal and street littering although they might be aware of illegal dumping sites (Van Rensburg et al. 2020).

In a meta study involving first world and developing countries, Babayemi et al. (2019) argue that consumer perceptions are driven by awareness of the problem or consequences of inappropriate disposal of plastic packaging. However, it is still not clear how household consumers from impoverished communities define plastic pollution or feel about the problem of plastic pollution in the community (O'Brien and Thondhlana 2019). As a result, it is debatable whether the behaviour that leads to plastic pollution is due to awareness of the problem or lack of it on the environment since consumers experience it in their communities (Heidbreder et al. 2019). Unlike in developing countries where some segments of the society are ill-informed, consumers in the developed world have information about the consequences of plastic pollution (Cavaliere et al. 2020).

Considering the product and market attributes, consumer perceptions are also shaped by the price of plastic bags, whether they are offered for free, the availability of alternatives, the advantages or convenience associated with using plastic bags, the branding of the packaging material, and whether they are degradable, nondegradable, recyclable, or can be reused. Generally, the price of plastic bags is low in both developed and developing countries, and at times plastic bags are given for free after a purchase (Dikgang and Visser 2012; O'Brien and Thondhlana 2019). According to rational choice theory and human needs theory, the demand for plastic bags is dependent on the price and consumer perceptions if the buyer has information about the effects of plastics on the environment. However, in the absence of proper information, the demand depends on price only (Klaiman et al. 2016; Cavaliere et al. 2020). Similarly, the choice of alternative packaging material does not only depend on the price, but also on the information that consumers have about the type of material (i.e., whether it is degradable or nondegradable) and its effect on the environment (Boz et al. 2020; Ma et al. 2020). Evidence shows that people in low socioeconomic groups are very sensitive to small price changes, and as a result they are less likely to choose an alternative or multiuse packaging material even if the price differs by a margin (Dikgang and Visser 2012).

When consumers decide to buy a plastic bag, they do not know that they are buying convenience and pollution since the product might eventually end up on the street. The cost of plastic bags can signal the importance that consumers attach to the product and whether they can throw it away after use or reuse it for shopping or other purposes (O'Brien and Thondhlana 2019). At times the consumer is offered a plastic bag at the point of purchase even if he or she could have made the decision not to purchase it. The fact that they are offered a plastic bag during purchase influences the demand or uptake of plastics even if they would have avoided the purchase since the cost is negligible relative to the groceries or clothes bought (Dikgang and Visser 2012; O'Brien and Thondhlana 2019).

Consumer perceptions are also influenced by community variables such as culture, availability of sound local institutions, access or distance to the community's refuse collection centre, and its social status (Heidbreder et al. 2019). The norms, morals, and beliefs that people have as part of their culture shape their perceptions about plastic use and definition of plastic pollution. In the developed world where institutions and culture are intact, consumers are constrained to behave in the interest of everyone in the community (Hargreaves 2011). For example, if the community believes in a clean environment that is free from pollution, then every member of the community shares the same belief, and they are less likely to litter the streets with plastics. Morality guides people to respect institutions and culture through observing right or wrong (Haidt and Graham 2007).

In the case of nonaffluent communities in developing countries, both institutions and culture are breaking down due to rapid urbanization and a huge influx of immigrants from other countries (Heidbreder et al. 2019). Living in a community where the streets are littered with plastics, illegal dumping sites are incessant, and members are not ashamed to throw garbage on the streets, consumers may see no problem with this behaviour (Ayeleru et al. 2020). Morally, people living in disadvantaged communities may not have the ability to separate right or wrong when it comes to the use of illegal dumping sites and street littering since these activities have become part of their life. Furthermore, lack of capacity by authorities to enforce rules and regulations means that local people have control over the activity irrespective of whether they view the behaviour as acceptable. The emergence of new institutions is therefore inevitable to compensate for the slow evolution of culture (Heidbreder et al. 2019).

Availability of a refuse collection centre or street bins and efficiency of the refuse collection system can also affect how people view waste management in general but particularly how they perceive illegal dumping sites and street littering. Since illegal dumping sites and street littering occurs mostly in disadvantaged communities, social status could also be linked to the way consumers perceive the environment and their definition of pollution (O'Brien and Thondhlana 2019). Alpizar et al. (2020) found that uninformed consumers in informal settlements care about plastic pollution, but they do not have means to deal with the problem.

Finally, the consumer perceptions about plastic use and pollution are influenced by individual traits (e.g., principles, individual belief, environmental concerns, habits, knowledge, and experiences) and demographic variables (e.g., age, gender, income, and educational level). In general, evidence reveal that nonaffluent people do not care about the environment, and environmental concerns increase as individual income increases (Barnes 2019b). This is evident in most developing countries, particularly in informal settlements where community members use illegal dumping sites and litter the streets without showing any remorse or being ashamed of their behaviour.

Even if the community may have its own beliefs about the environment, an individual may have beliefs that differ from those of the community (Heidbreder et al. 2019). Depending on the information available, experiences, level of education, age, gender and context, individual beliefs are likely to influence people's perceptions about street littering and use of illegal dumping sites (Cavaliere et al. 2020). The authors argue that people also have principles that are guided by individual beliefs, and these principles could be linked to their perceptions and behaviour such as littering and use of illegal dumping sites. Street littering is a habit that is difficult to stop or control through external coercion due to resource constraints on the part of local authorities. This calls for community-based approaches and policing since it is much cheaper for the community to do if it is in their interest (Ostrom 2010; Ntuli and Muchapondwa 2021). Furthermore, government programmes meant to create employment such as the extended public works programme in South Africa and food for work programme in Zimbabwe can be used to incentivise community members to clean the streets.

5.2. Consumer Perceptions and Sustainability Implications

In this section, we consider how consumer perceptions can be linked to sustainable behaviour. In Figure 3, we forward a simple framework for analysing perceptions and environmental behaviour. In quadrant A we have individuals in a community with positive perceptions of the environment and thus behave in a sustainable manner. This quadrant is attainable if the following conditions are present: culture is still intact; community members are able to self-organize; they can act collectively to deal with the problem of plastic pollution based on aesthetic reasons, environmental concerns, common beliefs and vision; they show altruistic behaviour by caring about how other community members feel; the community has a bequeath motive to leave a clean environment to the future generation, and minimal force is required to maintain the condition in this space.

<p>Unavailability of bins</p> <p>Inefficient refuse collection</p> <p>Marginalized</p> <p>Protest behaviour</p> <p>Service delivery difficult</p> <p>Unsustainable</p>	<p>Positive</p>	<p>Culture is still intact</p> <p>Ability to self-organize</p> <p>Collection action</p> <p>Bequeath motive</p> <p>Minimal external coercion</p> <p>A</p> <p style="text-align: right;">Sustainable</p>
<p>Degradation of culture</p> <p>Total institutional collapse</p> <p>Lack of capacity to enforce rules</p> <p>Lack of respect for the rule of law</p> <p>Criminality</p> <p>Lack of infrastructure</p>	<p>Negative</p>	<p>D</p> <p>Use of excessive force</p> <p>Culture is still intact</p> <p>Ability to self-organize</p> <p>Collective Action</p>

Figure 3. (A–D) A framework for analysing perceptions and environmental behaviour. Source: Authors.

The conditions in quadrant A depict cities in most first world countries and medium–high income areas (medium to low density area) in developing world cities. In addition to the factors highlighted earlier, the incentives to maintain the conditions in quadrant A also come from the high prices of properties because of a well-maintained environment (Khan et al. 2019b). However, this does not rule out possible unsustainable behaviour, but the conditions in this space ensure that the behaviour is kept at a level that is consistent with sustainability.

Moving to quadrant B, we have a community where members are not happy because of the system. Even if they might have positive perceptions about the environment, they still act in an unsustainable manner by littering the streets and using illegal dump sites. This situation occurs when there is an inefficient refuse collection system, absence of street bins, many people feel marginalised, and they live in an area deprived of service delivery. This may also lead to frequent protests and sometimes violent protests. The use of illegal dumping sites and street littering can be interpreted as protest behaviour as well (Pellow 2004). The situation is made even worse by the lack of capacity to enforce rules and regulations by the city authorities. High density (low income) areas fall in this category.

The conditions in quadrant C depict a desperate situation characterising many illegal informal settlements in African cities without proper planning and which are severely underdeveloped. Service delivery is also absent because of a lack of infrastructure to support it. The culture and institutions are completely degraded due to a huge influx of foreign immigrants (Ndinda and Ndhlovu 2016). The situation is made even worse by the total absence of law enforcement coupled with a lack of respect for the rule of law and elements of criminality in the community that make it difficult to penetrate (Wekesa

et al. 2011). Protests are often violent, and efforts to install service delivery infrastructure such as street bins are hampered by theft and destruction (Niyobuhungiro and Schenck 2021). Households in this category also suffer from insecurity because quite often they are targeted by government clean-up operations and conflict of ownership rights (Pellow 2004). Formalization through registration of properties and allocation of property rights could help to improve security and incentivise consumers from these areas to behave in a responsible and sustainable manner.

The last quadrant D contains situations where the behaviour is sustainable even if community members are not incentivized or do not care about the environment. These conditions are attainable through excessive use of force, where the culture is still intact, and the community can self-organize to solve the problem of plastic pollution. Collective action is seen as a key ingredient in maintaining the conditions in this quadrant even if local authorities may not have adequate capacity to enforce rules and regulations. This calls for the emergence of robust local institutions so that community policing is made possible to complement effort by city authorities.

6. Policy Interventions for Sustainable Environmental Behaviour

In this section we discuss the most common and potential solutions for addressing the problem of environmental pollution borrowing ideas from both first world and third world countries captured in Table 3. The analysis of policy interventions and solutions follows the categorization of the drivers of consumer perceptions developed earlier. At the helm of it all, we have the legal and policy environment which speaks to rules and regulations, plastics ban and levies, allocation of property rights, and clean-up operations funded by the state. Given resource constraints in developing countries, monitoring and enforcing rules and regulations is very difficult at the household level. Plastics bans and levies are also criticised by many researchers as they create unemployment in the plastic industry and further marginalize indigent consumers since they are very sensitive to slight changes in prices (Iwu et al. 2021). Kenya was the first African country before Uganda and Rwanda to implement plastics ban and has received international recognition for its robust policies and legislation on plastics (Behuria 2021).

Table 3. Classification of solutions.

Category	Solutions
Policy instruments	Regulatory and economic policy instruments to reduce plastic use. Rules and regulation for plastic disposal Bans, plastic levies Property rights Clean-up operations funded via expanded works programme
Market-based solutions	Price, recycling, reuse, provision of alternative packaging, other type of economic incentives
Community-based approaches	Community-based policing, community volunteers to clean the streets
Psychological interventions	Awareness (information) campaigns, education, reuse, multiuse plastic packaging, use alternative packaging, participation in recycling schemes

Unlike in developing countries, market-based solutions work well in the developed countries where the infrastructure and private sector participation in the waste market are well-developed (Xanthos and Walker 2017). In developing countries, the private sector lacks incentives due to legal and resource constraints (Babayemi et al. 2019; Ayeleru et al. 2020; Alpizar et al. 2020). The potential for solutions such as recycling, and production of alternative packaging still depends on the update or demand by the consumers. In the absence of appropriate incentives, recycling schemes fail to produce the desired outcome. In first world countries, recycling is incentivised using various means thus encouraging participation in the waste value chain (Barnes 2019b). In developing countries, recycling schemes struggle because they depend mostly on the participation of garbage collectors

and chain stores, excluding consumer households where most of the plastic waste that ends up on the street is generated.

Thus, the only feasible solutions in developing countries are community-based approaches and psychological interventions which may be cheap to implement. Although community volunteers and businesses through their social response programmes sometimes engage in cleaning the streets, there has been very little experimenting with community-based policing approaches in the waste sector (Ayeleru et al. 2020). Community-based policies depend mostly on the ability of the community to self-organize and sometimes on resource mobilization from the private sector. Sometimes there is need for NGOs to sensitize the community to self-organize so that they can deal with waste and pollution.

Psychological or behavioural interventions usually involve the provision of information to change the behaviour of actors in a situation. This information comes in many different forms. For example, awareness of the problem allows communities to define pollution in their own terms as do awareness of the consequences of plastic pollution and awareness of the solutions to the problem (Heidbreder et al. 2019). Other behavioural interventions also come in the form of educational programmes to equip communities with the knowledge of the consequences of plastic pollution (Dalu et al. 2020). Education can come in the form of short courses for community leaders, pamphlets, videos, and documentaries distributed through the television and mobile-based platforms. Social media platforms such as Facebook and WhatsApp groups can be effective channels to target poverty-stricken households since most of them do not have access to TV or spend little time watching TV (Wekesa et al. 2011). Equally, social media celebrities can be used for such campaigns (Byrne et al. 2017; Kostygina et al. 2020). Basically, there is a need to know the right type of information to communicate to different audiences based on the categorization developed earlier and the appropriate communication channels.

7. Conclusions, Limitations and Future Research

The consumption of single-use plastic packaging has been on the increase worldwide, and developing countries are not an exception to this phenomenon. This has exacerbated environmental pollution with serious consequences on human health, terrestrial wildlife, and marine species. Plastic pollution is increasingly becoming a cause for concern for policy makers in developing countries where the capacity to deal with the problem is limited. The combination of illegal dumping sites and inappropriate disposal of plastics in informal settlements has been identified as the major source of plastic pollution in the literature. As a result, the development of a legal framework and policy instruments targeting production, consumption, and disposal processes to deal with the plastic problem has been a major priority in most developing countries.

Most of the studies on consumer perceptions in this regard have focused on first world countries, while little has been done in the developing countries where the plastic littering problem is increasing due to urbanization. As a result, most of the solutions developed are based on empirical evidence from studies done in first world countries only. These solutions range from market-based to psychological interventions. However, the potential of market-based instruments and the use of environmental legislation is still limited by resource constraints and lack institutional capacity to monitor and enforce rules and regulations, particularly at the household level. This makes the use of behavioural change interventions suitable as complementary policy tools for developing countries. Another area that has received very little attention in the waste sector is the use of community-based approaches such as community policing.

By way of suggesting future research endeavours on the subject matter, we believe that studying people's perceptions can help elucidate their attitudes and behaviour. Although the literature is growing in developing countries, more empirical evidence is still needed to understand the drivers of people's perceptions toward unsustainable environmental behaviour regarding African countries and to formulate appropriate behavioural change interventions. Furthermore, previous empirical works employed several theoretical frame-

works, however, there are inconsistencies in the use and definition of variables, which makes comparison of the results of these studies difficult. There is therefore the need for harmonising these theoretical frameworks. Based on a review of theories and empirical literature, our study develops a consolidated conceptual framework for analysing consumer perceptions in relation to the use of nondegradable plastics and environmental pollution and identifies the drivers of people's perceptions.

Author Contributions: Conceptualization: V.V.M., H.N.; Methodology: V.V.M., H.N., C.G.I.; Formal analysis: V.V.M., H.N., C.G.I.; Original draft preparation: V.V.M., H.N.; Project administration: V.V.M., H.N., C.G.I.; Writing, review & editing: V.V.M., H.N., C.G.I. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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