

BRAND IMAGE, IMPACT OF QUALITY, AND ECO-ATTITUDES: A STUDY ON POST-INDUSTRIAL AND POST-CONSUMER PLASTICS IN SUSTAINABLE PURCHASING IN HUNGARY

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Abstract

The rising importance of sustainability has prompted companies to integrate recycled plastics into their products to enhance environmental responsibility and appeal to eco-conscious consumers. This study investigates the differences between post-industrial and post-consumer plastic recycling, with a focus on how these influence product quality and consumer perceptions in Hungary. A mixed-method approach was applied, combining a structured literature review with a quantitative survey conducted among Hungarian consumers. The study examines how environmental awareness, perceptions of recycled product quality, and brand image influence consumer attitudes and purchasing behavior. Results show that product quality and durability are the most important factors influencing consumer trust and purchase behavior, while brand image plays a less significant role. A strong positive correlation was found between eco-consciousness and the frequency of purchasing recycled products. The findings highlight the need for high-quality recycled materials and support the alignment of green branding with evolving consumer expectations.

Keywords: Recycled plastics, green consumer behavior, sustainable branding, environmental awareness, product quality perception

INTRODUCTION

Problem Statement

Environmentally conscious consumers place high importance on protecting the environment and, as a result, tend to choose products that are eco-friendly. Green consumerism represents a certain common will that supports the purchase of environmentally sustainable products, including those made fully or partially from recycled plastics (Sarkar, 2012). For this reason, finding ways to increase the green impact of products and reduce their carbon footprint has become an urgent matter for companies. Utilizing recycled materials in some extent and in certain quantities to products supports this initiative. Using green plastics contributes to a green company and brand image, helping to attract more eco-friendly consumers (Varga, 2024).

Recycled plastics undergo several processes before being reused in new products. These materials are typically made from items that have already been scrapped or have completed their full life cycle, particularly in the case of post-consumer waste (Greene, 2023; Goodship, 2007). As a result, the quality of recycled plastics can vary significantly due to impurities, mixed materials, and previous usage, which may raise concerns about the performance and reliability of products made from them (Goodship, 2007; Stock et al., 2022). But how important are the quality and brand image of sustainable products, particularly those containing recycled plastics, to consumers? How can green branding contribute to a better perception of sustainable products by customers?

Research gap

While Neese & Tariq (2023) pointed out the impacts of green claims based on recycled product content on company image and brand attitude, their study did neither explicitly focused on recycled plastic content, nor on Hungarian specific details. Further on the quality aspect and the interaction with

environmental awareness have not been discussed. Windiana et al. (2020) conducted a detailed study on the impact of green marketing on brand image and its influence on purchase intention, also focusing on recycled content of the products used. While this study revealed some relevant connections between green claims, green marketing, improved brand image and higher purchase interest resulted by the previous factors, the study concentrated exclusively on Sturbacks and regionally to Malang city (Indonesia).

A further study, conducted by Azzahra & Fachira (2022) about the influence of plastic waste reduction by the implementation of “bring back our bottle” program on brand image, brand trust, brand love and brand loyalty. The research pointed out key findings about the positive influence of such sustainable campaign on the brand itself, although the analysis focused solely onto a Customer-Social-Relationship campaign, in the beauty industry.

Research objective

The primary objective of this research is to analyze the differences in the recycling processes and challenges associated with post-industrial and post-consumer plastic waste, with a focus on evaluating the quality of each process. Furthermore, the study aims to examine how plastic recycling efforts influence the brand image of products that incorporate recycled plastics, and how green branding can support companies in their transition toward sustainability. Secondly, the research explores Hungarian consumers’ attitudes toward recycled plastic products, with particular focus on their evaluation of product quality and the role of sustainability in their purchasing decisions. Finally, the goal of this paper is to assess the relevance of green plastic products for environmentally conscious Hungarian consumers, and to investigate whether there is a relationship between eco-consciousness and the frequency of eco-friendly purchasing behavior in Hungary.

Research questions and hypothesis

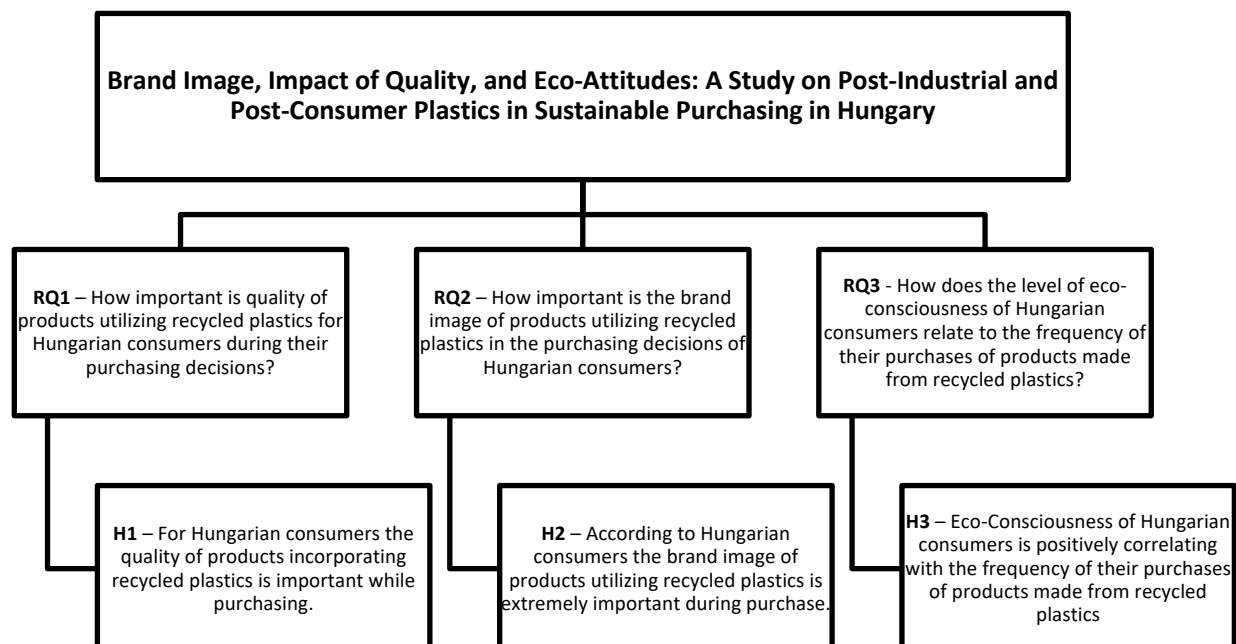


Figure 1. Research questions and corresponding hypothesis, source: own edit

Literature analysis

Plastic has been a commonly used material for many years in many areas of daily life (Atalhi, 2022). Looking at the typical household and its consumption patterns, the overuse of plastic becomes clear. Plastics are found in many everyday items, including cars, smartphones, and other electronic devices (Shukla & Kumar, 2020). The high use of plastics leads to a large amount of plastic waste, creating serious problems for current waste management systems. In 2018, global plastic use reached 385 million tons, and this created about 250t of waste - about 65% of all the plastic used. Out of this, 50t were recycled, 51t were used for energy recovery, and 72t ended up in landfills. The remaining 77t of plastic waste could not be tracked and its final destination is unknown. In 2018, Europe recycled 32% of its plastic waste. Germany had a similar recycling rate of 33%, which included 1% chemical recycling, 17% mechanical recycling within the country, and 15% mechanical recycling abroad. However, in the same year, 66% of Germany's plastic waste was burned for energy, compared to 43% across Europe (Alassali et al., 2021).

Post-Consumer and Post-Industrial Plastics

One of the main differences in using recycled materials in products lies between post-industrial recycling (PIR) and post-consumer recycling (PCR). PIR uses post-industrial waste (PIW)—also called pre-consumer waste—which comes from production processes before a product is actually used (Schulte et al., 2023). This waste often includes different plastic composites depending on the industry, but it is usually cleaner, newer, and more uniform than post-consumer waste (Kutz, 2024). The impurities in PIW are also easier to predict, and the collection and sorting processes are less complex compared to PCR (Papaspnyrides & Kiliaris, 2014). As a result, PIR usually leads to lower material loss and higher-quality recycled plastic. PIR does not include internal reuse processes like regrinding or scrap recycling within the same production line. In contrast, PCR uses waste from products that have already been used and discarded, often by households or businesses (Schulte et al., 2023). This includes single-use items like plastic packaging, films, bags, and bottles—basically, any plastic thrown away after consumer use (Greene, 2023). These materials are often contaminated or mixed with other types of waste, making them more difficult to collect, sort, and recycle. As a result, PCR tends to produce lower-quality recycled plastic than PIR. Sometimes, PIW is considered a by-product rather than waste, especially if it still holds economic value (Schulte et al., 2023). However, the wide distribution of households adds to the economic difficulty of collecting post-consumer plastics (Kutz, 2024). High-quality mechanical recycling depends on properly sorting and separating different types of plastics, which must also meet cleanliness standards. Sorting plays a vital role in processing PCR, involving the removal of metals, residues, and other contaminants. This step is performed both before and after the plastics are shredded and is essential for successful recycling (Goodship, 2007). However, the supply of PIW is limited because companies try to reduce waste in the production process. Since PIR uses material before a product's actual use, it does not fully close the recycling loop. In contrast, PCR helps close the loop by recycling materials at the end of a product's life, making it possible to reuse materials again and again. To reduce the use of virgin plastic and the environmental damage it causes, a combination of PIR and PCR is needed. Still, the contribution of PIR to a circular economy is smaller compared to PCR (Schulte et al., 2023).

Plastic products often degrade during processing, not during use. For example, packaging made for short-term use (under a year) is usually less affected by everyday use. Contamination, on the other hand, can come from within the plastic itself - like mixing different polymers - or from outside sources, such as chemicals or leftover additives. This contamination and degradation can happen at many points during the plastic processing and recycling stages. It is still unclear how much each step of the value chain contributes to lowering material quality. To improve recycling results, it's important to separate materials by type early on. This can improve how much material is collected and its final quality. Advanced sorting technologies also help by increasing purity and sorting efficiency. To maintain quality, it is also useful to identify possible contaminants and where they come from. This helps design better recycling systems. As a result, applying circular economy principles becomes more effective - supporting both sustainability and product quality. Lastly, it's important to consider how different plastic

types and designs on the market affect recyclability and quality (Alassali et al., 2021). Most of the recycled plastic ends up being downcycled, meaning its quality is lower than that of virgin plastic. Multiple studies have confirmed that recycled plastics tend to have reduced performance properties compared to virgin materials. Industry and researchers are trying to improve the quality of recycled plastics by developing better sorting systems, more advanced recycling technologies, and promoting design for recycling. However, challenges remain due to the inconsistent quality of plastic waste, the variety of polymer types and grades, the degradation level of the material, and the increasing complexity of products (Golkaram et al, 2022)

According to D'Aniello & Donato (2025) some researches show that consumers are showing positive views on recycled materials, but there are also studies which are pointing out that consumers are being skeptic about products utilizing recycled plastics. One common concern is safety and contamination. Consumers are also being uncertain due to unclear labeling and doubts about durability. This phenomenon is the most significant in case of products which are in contact foods and beverages. If they view the packaging as low quality, they may also judge the food inside as lower quality. This presents a key challenge for using recycled plastic in food packaging. The psychological idea of contagion explains why. Contagion occurs when negative qualities are believed to transfer from one object to another through direct or indirect contact. It can strongly affect consumer judgment and behavior, despite no actual danger.

Daga (2019) pointed out that product quality has a significant and positive impact on both customer value and customer satisfaction when it comes to recycled products. Customers in Makassar who perceive recycled products as being of high quality - meaning they are durable, well-designed, and functional - tend to also assign higher value to these products. This perceived value is important because it directly influences how satisfied they feel after purchasing and using the product. The results of his study indicate that improving the quality of recycled products is essential for businesses aiming to build trust, meet customer expectations, and encourage repeat purchases. Recycled products that match or exceed consumer expectations in terms of usability, appearance, and performance are more likely to create a positive customer experience.

To summarize, the quality of plastics plays a critical role in their recyclability and final application. Plastics are widely used due to their flexibility, affordability, and diverse mechanical properties, which make them suitable for mass production across various industries (Crawford & Martin, 2020). Post-industrial plastic waste typically offers higher quality material, as it is cleaner, more homogeneous, and free from contamination due to its generation during controlled manufacturing processes (Kutz, 2024; Papaspyrides & Kiliaris, 2014). In contrast, post-consumer plastic waste often contains mixed materials, adhesives, and impurities, which negatively affect its quality and make the recycling process more complex (Goodship, 2007; Greene, 2023). As a result, the quality of recycled plastics - particularly those from post-consumer sources - can vary significantly, raising questions about the performance and reliability of products made from them. As Eriksen et al. (2018) stated in their study to improve quality and moving towards more sufficient circular economy, it is important to reduce impurities and material loss by improving product design, using better technology, and managing plastic waste more effectively.

Influence on brand image

Sustainable marketing focuses on aligning environmental responsibility with economic goals by rethinking how products and systems are designed. It involves the strategic development, pricing, promotion, and distribution of goods in a way that fulfills three essential goals: satisfying consumer needs, achieving business objectives, and maintaining ecological balance (Fuller, 1999). Branding plays a key role not only in product identity but also in shaping the overall image of a company. It helps build a positive impression among consumers and sets businesses apart from their competitors (Williams & Williams, 2017). The concept of brand image, originally borrowed from psychology in the mid-1900s, refers to the overall mental impression a consumer holds about a brand (Franzen & Moriarty, 2015).

As climate change accelerates and natural resources become increasingly limited, green consumer behavior is gaining importance. Also known as green consumerism, it includes actions like purchasing

energy-saving devices, selecting organic items, reducing electricity use, and conserving water. Economically, green purchasing allows individuals to influence businesses and policy by showing preference for sustainable products - essentially “voting with their wallet” (Sachdeva et al., 2015). Eco-conscious consumers, often seen as early adopters, strongly influence market trends. Public figures and influencers actively promote environmental causes, increasing awareness and support. Although environmental awareness began with the Baby Boomer generation in the 1960s, younger generations like Gen X, Millennials (Gen Y), and Gen Z - especially through digital engagement - are driving change with even greater potential. Once considered a niche group, environmentally conscious consumers now represent a broad majority. According to Ottman (2017), 83% of consumers from all age groups show some level of eco-awareness. As a result, businesses are increasingly expected to demonstrate sustainable practices. This has led to a rise in corporate sustainability initiatives, including targeted marketing campaigns, transparency through reporting, and partnerships with organizations that help communicate their environmental commitments to the public.

Using plastic granules made from recycled materials is an important move for companies aiming to operate more sustainably. In today’s market, consumers are increasingly aware of the environmental impact of their purchases. By incorporating recycled plastic into their production processes, businesses can significantly lower their carbon footprint and show a strong commitment to sustainability. This not only aligns with the expectations of environmentally conscious consumers but also strengthens a company’s brand image. Shoppers are more likely to support brands that actively work to reduce environmental harm (Varga, 2024). More and more businesses are looking for ways to reduce their environmental impact and operate responsibly. It is essential for companies to understand that sustainability is no longer just a trend—it is a long-term responsibility to future generations. Even small and medium-sized enterprises can make a difference by reassessing their goals and adapting their practices. By integrating sustainability into their core strategies, companies not only contribute to a healthier planet but also improve their long-term success. This balanced approach allows businesses to consider environmental and social factors while still achieving financial growth (Turi & Lekhi, 2024). Green marketing, or environmental marketing, refers to all efforts aimed at satisfying customer needs while reducing harm to the environment. Unlike traditional marketing, which focuses mainly on value exchange between buyer and seller, green marketing also includes protecting the natural world (Stanton & Futrell, 1987). It ensures that both business goals and environmental concerns are addressed. While not all environmental damage can be avoided, the goal of green marketing is to minimize harm as much as possible. Companies making green claims should be clear and honest - saying that their products are “less environmentally harmful” is more accurate than calling them “environmentally friendly” (Gupta et al., 2008).

Sustainability has become a key focus in today’s business environment. A sustainable brand is one that includes environmental, social, and economic values in its everyday operations. Sustainable branding means applying the broader ideas of sustainability and corporate social responsibility to how a brand is managed and communicated (Foroudi & Palazzo, 2021). According to study, informing consumers that recycled parts or materials are used in a product can create more positive opinions about both the brand and the manufacturer. This effect is even stronger when the company clearly explains which parts of the product are made from recycled materials (Neese & Tariq, 2023).

METHODOLOGY

Research Design

This study applies a mixed-method approach, combining both secondary and primary research. For the secondary research, a detailed literature review was done. Relevant keywords were used to search academic databases such as Google Scholar and PubMed. The selected sources were then reviewed and summarized to present key findings from previous studies and to support the current research. The primary research is based on a quantitative study, carried out through a standardized online questionnaire in Hungary. The aim was to collect data about Hungarian consumers’ trust in brands and how this influences their choices when buying sustainable products made with recycled plastics.

Empirical research design, data collection and analysis

The primary research was carried out using a standardized online questionnaire in Hungarian, aimed at a sample of 250–300 Hungarian residents living in Hungary. The survey questions were created based on relevant literature, the research objectives, and the proposed hypotheses. The questionnaire included a total of 19 questions: 6 demographic questions using nominal scales, and 13 questions focused on consumer behavior and knowledge, measured with both interval scales (ranging from 1 to 6, from “least” to “most”) and nominal scales. Before the final launch, a pre-test was conducted in two phases. In the first phase, face and content validity were checked through expert review. This involved four professionals, including both subject-matter experts and language specialists. In the second phase, a pilot test was carried out with 19 participants to ensure that the questions were understood properly and the constructs were measured accurately. The pilot also included initial checks for normality and internal consistency using Cronbach’s Alpha. In the final stage, the survey was validated using Exploratory Factor Analysis (EFA). EFA and all other data analyses were performed using IBM SPSS Statistics version 29.0.2.0. The survey was distributed through various social media channels, groups, and online forums to collect responses.

RESULTS

Descriptive statistics

The sample included 258 participants, the majority of whom identified as residents of Hungary ($M = 1.01$, $SD = 0.088$), based on a scale where 1 = Yes and 2 = No. Participants’ net monthly income ranged from “no income” (1) to “excellent income” (5), with an average score of 3.12 ($SD = 1.014$), indicating that most respondents reported an average income level. Education levels ranged from “elementary school” (1) to “university degree or higher” (5), with a mean of 3.75 ($SD = 1.220$), suggesting that most participants had at least a secondary or higher education, often including some college or university. In terms of place of residence, participants were categorized into capital city (1), cities (2), and villages (3). Among them, 30.5% ($n = 79$) lived in the capital, 30.9% ($n = 80$) in cities, and 38.5% ($n = 98$) in villages. The distribution across these categories was relatively even, with a slight majority residing in villages. The average residency score was 2.08 ($SD = 0.829$), indicating that participants, on average, lived in cities or villages, with a slight tendency toward rural areas.

Reliability analysis

The Cronbach’s Alpha for the 12 interval-scale items was $\alpha = .908$, indicating excellent internal consistency. This result suggests that the survey items are highly reliable for measuring the intended concept.

Test of normalities

Normality was tested for 12 variables using both the Kolmogorov-Smirnov and Shapiro-Wilk tests. The results showed that for all variables, the significance values (p-values) in both tests were below .001, indicating that the data distributions significantly differ from a normal distribution. For instance, the variable “To what extent are environmental aspects important to you during purchase?” showed a Kolmogorov-Smirnov statistic of .189 ($df = 256$, $p < .001$) and a Shapiro-Wilk statistic of .919 ($df = 256$, $p < .001$), confirming non-normality.

Exploratory Factor Analysis (EFA)

An exploratory factor analysis (EFA) was conducted using principal axis factoring with Varimax rotation to explore the underlying structure of six survey items related to environmental values, recycled product perception, brand importance, and purchasing behavior. The Kaiser-Meyer-Olkin (KMO)

measure of sampling adequacy was .814, which indicates very good suitability of the data for factor analysis. Bartlett's test of sphericity was significant, $\chi^2(15) = 533.72$, $p < .001$, confirming that the correlations between items were sufficiently large for EFA. Two factors were extracted based on eigenvalues greater than 1, together explaining 53.55% of the total variance. The first factor explained 42.24% of the variance, and the second factor explained 11.32%.

Table 1. Identified Factors through EFA with corresponding variables and with factor loadings

Variable	Factor 1: Environmental Awareness & Behavior	Factor 2: Brand importance
How important are environmental aspects for you when purchasing products?	.821	
How often do you purchase products made from recycled plastic?	.767	
How do you rate the quality of products made from recycled plastics?	.765	
To what extent do you think recycled plastic products help protect the environment?	.734	
How important is brand reputation when purchasing recycled plastic products?	.382	.717
How likely are you to buy recycled plastic products only from well-known brands?	.333	

Source: own edit

Testing of Hypothesis

H1 – For Hungarian consumers the quality of products incorporating recycled plastics is important while purchasing.

To measure the responses, participants had to make 3 choices from an ordinal scale. These three choices are resulting three categorical variables (choice 1, 2 and 3). So non-parametric Chi-Square tests were conducted for all three categorical variables to assess whether the observed frequencies for the most important factors contributing to trust increase of Hungarian consumers for sustainable products utilizing recycled plastics differs significantly from expected frequencies, the results are presented in *Table 2*.

Table 2. Results of Non-Parametric Chi-Square tests

Categorical variable	Degrees of freedom	Sample size (N)	Chi-square value χ^2	Sig.
1.	13	262	564	< .001
2.	14	259	251.99	< .001
3.	14	255	285.10	< .001

Source: own edit

This explains that certain factors are more frequently considered important by consumers than others.

Based on the frequency analysis considering combined choices, the most important factor while purchasing sustainable products utilizing recycled plastics is “Product quality” by 14,2% of participants ($n = 110$). “Long lifetime” followed closely by 13,8% of participants ($n = 107$).

Therefore, the findings of the research support the first hypothesis.

H2 – According to Hungarian consumers the brand image of products utilizing recycled plastics is extremely important during purchase.

A one-sample t-test was conducted to compare the importance of a brand image for Hungarian consumers while purchasing sustainable products utilizing recycled plastics against a test value of 5 on a 6-point interval scale (where 1 represents “absolutely not important” and 6 represents “extremely important”). Mean value of at least 5 has been defined as lowest limit of the level “extremely important”. The results revealed a statistically significant difference, $t(263) = -17.01$, $p < .001$, with a mean difference of -1.281 (95% CI: -1.43, -1.13). This indicates that the importance of brand image during purchases for Hungarian consumers is significantly lower than the defined test value of 5.

Out of this reason, the hypothesis must be rejected.

H3 – Eco-Consciousness of Hungarian consumers is positively correlating with the frequency of their purchases of products made from recycled plastics

A Pearson correlation was conducted to examine the relationship between consumers’ eco-consciousness and the frequency of purchasing products made from recycled plastics. The analysis revealed a strong, positive correlation, $r(263) = .66$, $p < .001$. This result indicates that participants who place greater importance on environmental aspects are significantly more likely to purchase recycled plastic products more frequently. Due to this fact, this hypothesis is supported by the results of this analysis.

According to the primary research conducted in this study, Hungarian consumers consider product quality and durability to be the most important factors when purchasing products that incorporate recycled plastics. This finding aligns well with the studies of D’Aniello and Donato (2025) and Daga (2019). D’Aniello and Donato (2025) highlight that consumers often have concerns about the quality of products made with recycled plastics, particularly regarding potential contamination and durability. These concerns can negatively affect overall product perception. In line with that, Daga (2019) emphasized that product quality has a significant impact on customer satisfaction and perceived value. This means that if recycled plastic products meet consumer expectations in terms of quality, they can help build brand trust and lead to repeat purchases.

Turi and Lekhi (2024) pointed out that green consumers are particularly cautious about the products they choose and tend to prefer brands with a strong environmental presence. This supports Ottman’s (2017) finding that green consumers prioritize sustainability and they are often driven by the desire to protect their own health and that of their families. They tend to examine products closely, including their packaging and ingredients, and consider the manufacturer’s reputation for environmental and social responsibility.

The primary research also highlighting that in Hungary, eco-conscious consumers are significantly more likely to purchase sustainable products than those who are less environmentally aware. This outcome supports conclusions drawn from the secondary literature and highlights the importance of aligning sustainable branding strategies with evolving consumer values.

While Varga (2024) highlights that incorporating recycled plastics into products can support an environmentally friendly brand image, align with the values of green consumers, and build brand trust, the results of the second hypothesis test show that brand image is not considered a highly important factor for Hungarian consumers choosing products made from recycled plastics. During the Exploratory Factor Analysis, two factors were identified: Environmental Awareness & Behavior (Factor 1) and Brand Importance (Factor 2). A Pearson correlation analysis was conducted to assess the relationship between these two factors. The analysis revealed a weak, positive correlation that was not statistically significant, $r(261) = .11$, $p = .091$. This suggests that participants’ environmental attitudes and purchasing behaviors were not strongly associated with the perceived importance of brand reputation in

the context of recycled plastic products. These results further indicate that product quality and durability are key drivers in building consumer trust and enhancing brand reputation. However, the reverse is not necessarily true - brand image alone does not guarantee consumer trust if the product fails to meet quality expectations.

DISCUSSION AND CONCLUSION

Maintaining consistently high quality in recycled plastics remains a challenging, costly, and complex task. However, quality has been proven to be a crucial factor—influencing not only the perceived value and overall performance of the final product, but also impacting brand trust, repeat purchases, and brand image. While the integration of recycled plastics into products can support a company's green initiatives, strengthen its sustainable brand image, and appeal to environmentally conscious consumers, quality and durability remain the most important purchase criteria for Hungarian consumers. This insight is particularly relevant for marketers and manufacturers, as it highlights the need to source high-quality recycled plastic granules as raw material, without compromising on product standards.

Although the study aimed to address key aspects of consumer perception and branding, certain limitations must be acknowledged. The quantitative primary research was based on a non-representative sample for Hungary. The online survey was conducted over a three-month period - from May to August 2024 - which may have limited the reach to certain demographics, particularly older age groups who are less active online. Given the growing importance of sustainability, the circular economy, and green branding, future research should aim to conduct a longer-term and more representative quantitative study. Additionally, qualitative methods, such as expert interviews, could enrich the findings by offering deeper insights into the perceived quality and industrial acceptance of recycled plastics. This would help build a more comprehensive understanding of both consumer expectations and corporate perspectives regarding recycled materials.

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