ARTICLES

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ENVIRONMENTAL CONCERN AND ATTITUDE: THE MEDIATING ROLE OF ENVIRONMENTAL KNOWLEDGE

Preocupação e atitude ambiental: O papel mediador do conhecimento ambiental

Preocupación y actitud ambiental: El papel mediador del conocimiento ambiental

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ABSTRACT

This article analyzes the influence of environmental concern and environmental knowledge on environmental attitude among green beauty product consumers, considering the mediation role of environmental knowledge in the relationship between environmental concern and environmental attitude. Primary data were collected in 2023 from a sample of 500 South African consumers and analyzed using structural equation modeling. Results confirmed the positive influence of consumer-perceived ethicality and self-transcendence on environmental concerns. Findings are also positive regarding the influence of environmental concern on environmental knowledge and attitude. Environmental knowledge has positive and direct effects on environmental attitude, while it also partially mediates the relationship between environmental concern and attitude. However, green beauty product awareness and trust do not influence environmental concerns. This research provides a novel perspective on environmental attitudes among green beauty product consumers, utilizing a robust sample and analytical approach to enhance the reliability and validity of the findings.
Keywords: environmental concern, environmental attitude, environmental knowledge, green beauty products, developing country.

RESUMO

Este artigo analisa a influência da preocupação e do conhecimento ambientais na atitude ambiental entre consumidores de produtos de beleza verdes, considerando o papel mediador do conhecimento ambiental na relação entre a preocupação e a atitude ambientais. Dados primários foram recolhidos em 2023 com 500 consumidores da África do Sul, e foram conduzidos pela Modelagem por Equação Estruturais. Os resultados confirmaram a influência positiva da ética e da autotranscedência percebidas pelo consumidor nas preocupações ambientais. Os achados também são positivos no que diz respeito à influência da preocupação ambiental no conhecimento e atitude ambientais. O conhecimento ambiental tem efeitos positivos e diretos na atitude ambiental, ao mesmo tempo que também medeia parcialmente a relação entre preocupação ambiental e atitude. No entanto, a consciência e a confiança nos produtos de beleza verdes não influenciam as preocupações ambientais. Apresentou-se uma nova perspectiva sobre atitudes ambientais entre consumidoras de produtos de beleza verdes, com amostra e técnica que conferem maior robustez aos resultados.
Palavras-chave: *preocupação ambiental, atitude ambiental, conhecimento ambiental, produtos de beleza verdes, país em desenvolvimento.*

RESUMEN

Este artículo analiza la influencia de la preocupación y el conocimiento ambientales en la actitud ambiental entre los consumidores de productos de belleza sostenibles, considerando el papel mediador del conocimiento ambiental en la relación entre la preocupación ambiental y la actitud ambiental. Los datos primarios se recopilaron en 2023 de una muestra de 500 consumidores sudafricanos y se analizaron mediante modelos de ecuaciones estructurales. Los resultados confirmaron la influencia positiva de la ética y la autotrascendencia percibidas por los consumidores en las preocupaciones medioambientales. Los hallazgos también son positivos en cuanto a la influencia de la preocupación ambiental sobre el conocimiento y la actitud ambiental. El conocimiento ambiental tiene efectos positivos y directos sobre la actitud ambiental, mientras que también media parcialmente la relación entre la preocupación y la actitud ambiental. Sin embargo, la conciencia y la confianza en los productos de belleza sostenibles no influyen en las preocupaciones medioambientales. Se presentó una nueva perspectiva sobre las actitudes ambientales entre los consumidores de productos de belleza sostenibles, con una muestra y técnica que otorgan mayor robustez a los resultados.
Palabras clave: *preocupación ambiental, actitud ambiental, conocimiento ambiental, productos de belleza ecológicos, país en desarrollo.*

INTRODUCTION

Human activities have significantly degraded natural resources. Due to this, contemporary society has made considerable efforts to overcome this situation, and environmental responsibility is becoming increasingly relevant (Paço & Lavrador, 2017). In response to this shift, consumers have become more aware of the impact of their consumption choices (Nguyen et al., 2023). Sustainable lifestyles are becoming increasingly popular. As individuals align their values with sustainable practices, they prioritize animal welfare, quality of life, and environmental preservation (Biswas, 2020). Globally, consumers are transitioning from conventional products to environmentally friendly alternatives, often called green products (Lin et al., 2021).

Eco-friendly products can mitigate environmental pollution (Munerah et al., 2021). Alternative products are often considered "alternative" because they minimize adverse environmental impacts and align with sustainable development principles (Costa et al., 2021). Increasingly, scholars are paying attention to the "greening" of cosmetics, or beauty products (Suphasomboon & Vassanadumrongdee, 2022). It is noteworthy that the COVID-19 pandemic significantly influenced consumer attitudes toward adopting green products, including eco-friendly beauty items. The pandemic reshaped consumer mindsets, promoting pro-environmental behaviors (Cachero-Martinez, 2020). Lockdowns make people "rediscover" nature and environmental concerns (Canio et al., 2021). As a result of this changing landscape, the beauty industry had to reinvent itself in 2020 to meet changing market demands (Hoang & Tung, 2024).

In the last few decades, scholars' interest in consumer behaviour and decision-making has been justified by a demand in the organizational sphere to develop strategies that encourage consumers to purchase products (Zaman & Kusi-Sarpong, 2024). Considering the sustainability background, studies around sustainable consumption have also gained a great body of research in recent years, particularly focusing on understanding the factors that influence consumers to make green decisions (Lin et al., 2021; Paço et al., 2019; Shiel et al., 2020). It is argued that consumers who have the notion of sustainability are affected by other social or environmental-related variables during their purchase process (Zaman & Kusi-Sarpong, 2024). Regarding the environmental behavior scope, previous assessments have been dedicated to exploring the interplay between consumers' environmental concerns, knowledge, and attitudes regarding green brands (S. et al., 2024), green purchase intentions, and sustainable consumption (Sinha & Annamdevula, 2024), reinforcing that these variables collectively influence consumer behaviour toward environmentally friendly products in diverse sectors, including beauty.

Despite the existing body of research, significant gaps remain, necessitating further investigation into sustainable consumer behaviour due to the phenomenon's complexity (Zeng et al., 2023). For instance, Costa et al. (2021) suggested that environmental awareness and attitudes can be precursors to the experience of purchasing green products. Similarly, Canio et al. (2021) emphasize the need for more literature to explore the motivations that drive consumers to reduce the environmental impact of their shopping and consumption habits. Moreover, consumers'

preferences and prioritisation of environmental attributes depend on concern and knowledge of environmental issues (Momberg et al., 2012). These perspectives highlight the critical need to deepen our understanding, particularly within a global context where excessive consumption continues to deplete natural resources at an alarming rate (Shiel et al., 2020). This issue is especially pertinent in South Africa, where the green movement has experienced rapid growth (Yadav & Pathak, 2016). Citizens face a range of environmental challenges, including air and water pollution, biodiversity loss, climate change, and waste generation (Momberg et al., 2012).

Thus, this study aims to analyze the influence of environmental concern and environmental knowledge on environmental attitude among green beauty product consumers, considering the mediation role of environmental knowledge in the relationship between environmental concern and environmental attitude. Data from South African green beauty product consumers was analyzed using the Partial Least Squares Structural Equation Modelling (PLS-SEM) technique. Following previous literature, environmental concern, attitude, and knowledge are critical factors influencing pro-environmental behaviour in developing nations. On the one hand, these countries suffer from socioeconomic challenges related to infrastructure deficits, institutional barriers, and educational gaps that hinder Sustainable Development progress. On the other hand, they offer great opportunities for improvement in environmental topics.

Thus, this study is novel as it analyzes the interplay between green beauty products, green consumer attributes, and environmental behaviour in shaping environmental attitudes in consuming green beauty products. It also offers original insights into how these factors influence consumer behavior toward green beauty products from the South African perspective, a developing country with a strong demand for green alternatives due to its largest cosmetic market in Africa and a heightened awareness from consumers regarding the ingredients contained in beauty products and their possible effects on both personal well-being and the natural surroundings (Lupindo et al., 2024). According to the Department of Trade, Industry, and Competition (2023), there is a significant market for organic cosmetics in South Africa. Further, as per the Global Natural and Organic Market (2025), the organic skincare market in South Africa is estimated to be USD 828.60m in 2025, experiencing an annual growth rate of 4.79% from 2025 to 2030. Thus, we expect to provide theoretical and managerial contributions through our findings, especially regarding green product consumption in emerging nations, inviting policymakers to promote environmental incentives aligned with the United Nations Sustainable Development Goals (UN SDGs).

THEORETICAL FRAMEWORK AND HYPOTHESES

Green beauty products

In addition to reducing environmental impacts, green products promote green consumption (Ansu-Mensah, 2021; Nguyen et al., 2023) because they preserve and protect both the environment

(Ansu-Mensah, 2021) and human health (Ogiemwonyi, 2022), as they can be recycled or conserved. They reduce waste, energy use, packaging, and toxins and have a green life cycle (Nguyen et al., 2023). As a result, green products exert the least negative impact on the environment.

Ansu-Mensah (2021) considers that green products affect both the environment and human behavior. The author argues that as consumers become increasingly aware of green products, their green purchase intentions and subsequent behavior are likely to change (Ansu-Mensah, 2021; Li et al., 2021). A deeper environmental consciousness has been fostered among consumers as they become aware of the adverse implications of their consumption habits and choices (Costa et al., 2021). Cosmetic users play a pivotal role in contributing to or mitigating pollution (Munerah et al., 2021) through their choice and use of products. Pitakola and Widiatami (2022) attribute the rapid growth of the cosmetics industry to globalization and, in particular, the emerging environmental consciousness of the millennial generation.

Focusing on the beauty segment, from the conventional beauty products perspective, it can be affirmed that they usually contain hazardous compounds, such as plastic, non-biodegradable waste, and parabens, among other chemical additives, which can pose significant threats to the environment (Munerah et al., 2021; Suphasomboon & Vassanadumrongdee, 2022). In contrast, green beauty cosmetics or personal care products have been validated as green or certified with eco-labels (Munerah et al., 2021). They are manufactured using methods that conserve natural resources, reducing waste generation and minimizing negative environmental impacts (Costa et al., 2021). Typically, green cosmetics incorporate natural and organic ingredients (Suphasomboon & Vassanadumrongdee, 2022). Furthermore, the "greening" process extends throughout the entire production cycle, encompassing ingredient sourcing, manufacturing methods, and eco-conscious packaging practices (Pitaloka & Widiatami, 2022).

According to Costa et al. (2021), the growing demand for green products stems from consumer expectations for companies to adopt environmentally friendly production methods. This aligns with rising awareness of healthy lifestyles and the benefits of green products (AL-Haddad et al., 2020). Specifically, green beauty product awareness reflects consumers' recognition of their benefits (Yoo et al., 2000) and has been positively linked to purchase intentions and pro-environmental behaviours (AL-Haddad et al., 2020; Hoang & Tung, 2024; Sahioun et al., 2023).

In the South African context, greater consumer awareness of the harmful effects of traditional beauty products is increasing the demand for natural and sustainable alternatives (Lupindo et al., 2024). This awareness fosters sustainable behavior, ethical consumption, and a sense of environmental responsibility (Nguyen et al., 2023). By promoting practices like natural ingredients, sustainable sourcing, and eco-friendly packaging, green beauty products can drive environmental transformation in the industry (Sahioun et al., 2023). As demand rises, the sector may become more environmentally responsible, addressing key global challenges (Ogiemwonyi & Harun, 2020). Consequently, the first research hypothesis (H1) emerges:

H1: Green beauty product awareness positively influences environmental concern.

Beyond awareness, green trust has been identified as essential for building a green product market (Khan et al., 2022; Li et al., 2021). Trust reflects consumers' expectations that companies will fulfill their environmental commitments (Cachero-Martínez, 2020; Chen & Chang, 2013), influencing purchase decisions and long-term loyalty (Fatma & Rahman, 2017). In the case of beauty products, trust relates to consumers' belief in a product's environmental and health benefits (Kaur et al., 2024; Lin et al., 2021). As trust increases, so does consumers' willingness to seek information and buy green products (Lin et al., 2021). We posit that authentic sustainable practices enhance trust, while its absence may foster scepticism and reduce environmental concern (Ogiemwonyi, 2022; Ogiemwonyi & Harun, 2020; Wang et al., 2019). Thus, we formulate H2:

H2: Green beauty product trust positively influences environmental concern.

Green consumers

The concept of the "green consumer" emerged in the 1970s (Zhao et al., 2014) and has since guided marketing strategies aimed at environmental sustainability (Ansu-Mensah, 2021). Green consumers engage in behaviors that reduce environmental harm and promote long-term protection (Nguyen et al., 2023), often described as "pro-environmental" or "environmentally friendly" (Wan & Du, 2022). This behaviour reflects concern for ecological well-being and aligns with a broader shift toward sustainable lifestyles (Balaskas et al., 2023; Leonidou et al., 2010; Yen & Hoang, 2023). Green consumption is thus essential for sustainability (Paço et al., 2019) and tied to ethical decision-making (Lin et al., 2021; Suphasomboon & Vassanadumrongdee, 2022).

Consumer-perceived ethicality - how individuals view a firm's moral standards (Brunk, 2010; Tolentino et al., 2021) - plays a key role in green consumption. This includes concerns like recycling, animal welfare, social justice, and labor practices (Tolentino et al., 2021). Consumers may avoid companies with unethical practices and actively seek information on brand reputation (Fatma & Rahman, 2017). According to Social Comparison Theory, self-evaluation shapes consumer behavior (Chen & Tsai, 2021; Hogg et al., 1995), suggesting that ethical brand perceptions can influence environmental concern (Fatma & Rahman, 2017). Thus, we propose H3:

H3: Consumer perceived ethicality positively influences environmental concern.

Studies show that certain values, like self-transcendence, are strongly linked to green consumer behavior (Kim, 2011). This concept prioritizes others' well-being over self-interest and fosters prosocial actions, including environmentally responsible consumption (Guo et al., 2023). According to Self-Theory, individuals with self-transcendent values are more likely to show environmental concern (Hoang & Tung, 2024; Lian & Chen, 2024). Such individuals perceive environmental protection as essential for collective well-being and sustainability (Guo et al.,

2023). In culturally interconnected contexts — such as in parts of Asia and Africa — this sense of shared responsibility is especially prominent (Beattie, 1980; Lian & Chen, 2024). Thus:

H4: Self-transcendence positively influences environmental concern.

Environmental behavior

Growing consumer awareness of environmental sustainability has strengthened the link between consumption habits and ecological impact, encouraging green product adoption (Bulut et al., 2021). Environmental behavior reflects sensitivity to environmental concerns, encompassing actions like waste reduction and energy conservation (Leonidou et al., 2010). Since the late 1960s, ecological consciousness and related research have expanded, highlighting a shift toward minimizing human impact (Carmi et al., 2015; Leonidou et al., 2010).

A key driver of this behavior is environmental concern—individuals' awareness of and responsibility for environmental issues (Nguyen et al., 2023; Zeng et al., 2023), which motivates sustainable choices and encourages others to act (Bulut et al., 2021; Wang et al., 2022). Concern develops cognitively and emotionally, forming a core value behind pro-environmental behavior (Canio et al., 2021; Chen et al., 2022; Yen & Hoang, 2023). It varies in scope (Dangelico et al., 2022) and is influenced by information and knowledge (Yadav & Pathak, 2016; Yen & Hoang, 2023). Thus, we propose that environmental concern positively influences environmental knowledge (H5).

H5: Environmental concern positively influences environmental knowledge.

In addition to influencing knowledge, environmental concern is widely recognized as a key predictor of environmental attitudes (Li et al., 2021). Higher levels of concern tend to foster positive attitudes toward sustainable practices and green purchases (Cachero-Martínez, 2020; Yadav & Pathak, 2016; Yen & Hoang, 2023; Zeng et al., 2023), including organic food (Canio et al., 2021; Mostafa, 2007).

Environmental attitude reflects an individual's readiness to engage in pro-environmental behaviors (Biswas, 2020) and is shaped by cultural values and social learning (Cachero-Martínez, 2020; Chen et al., 2022; Yen & Hoang, 2023). The Theory of Planned Behavior (Ajzen, 1985) is often used to explain this relationship and has shown that individuals with strong environmental concern are more likely to hold positive attitudes toward green products (Hoang & Tung, 2024; Kaur et al., 2024; Ogiemwonyi & Harun, 2020; Sahioun et al., 2023).

Research confirms that positive attitudes increase the likelihood of sustainable purchasing (Balaskas et al., 2023; Costa et al., 2021; Wong & Tzeng, 2021), though attitudes can range from favorable to unfavorable (Zeng et al., 2023). Thus, positive attitudes are critical for realizing pro-

environmental behavioral intentions (Cachero-Martínez, 2020; Leonidou et al., 2010). In South Africa, concern has been identified as a clear motivator for attitudes and intentions to purchase organic personal care products (Lupindo et al., 2024). Therefore, hypothesis six (H6) is proposed:

H6: Environmental concern positively influences the environmental attitude.

Environmental knowledge is a key driver of positive environmental attitudes (Paço & Lavrador, 2017; Yadav & Pathak, 2016; Zhao et al., 2014). Defined as accurate and retained information about ecology, it also involves understanding systems and shared responsibilities for sustainability (Carmi et al., 2015; Martínez-Martínez et al., 2019; Mostafa, 2007). It includes recognizing environmental concepts and behaviours (Zeng et al., 2023). People with greater knowledge tend to be more sensitive to environmental issues (Zhao et al., 2014) and more favorable toward green products as their understanding deepens (Kaur et al., 2024). Numerous studies confirm that higher environmental knowledge correlates with stronger environmental attitudes (Biswas, 2020; Mostafa, 2007; Wang et al., 2019; Zeng et al., 2023). Therefore, it is hypothesised:

H7: Environmental knowledge positively influences the environmental attitude.

Environmental knowledge has long been linked to pro-environmental behavior and interest in eco-friendly products (Simanjuntak et al., 2023; Tanner & Kast, 2003). Often termed "eco-literacy," it reflects individuals' familiarity with ecological issues (Kaur et al., 2024). While concern shows awareness, knowledge provides the understanding needed to shape consistent, positive environmental attitudes (Carmi et al., 2015; Leonidou et al., 2010; Yadav & Pathak, 2016). It acts as a bridge between concern and action (Simanjuntak et al., 2023). In South Africa, knowledgeable consumers associate organic products with environmental benefits (Lupindo et al., 2024). Thus, we propose that environmental knowledge mediates the link between concern and attitude, supporting hypothesis H8:

H8: Environmental knowledge mediates the relationship between environmental concern and environmental attitude.

METHODOLOGY

This study adopts a quantitative approach and employs a descriptive research design with cross-sectional data collection. Data were analyzed using PLS-SEM, a technique suitable for estimating complex models and conducting mediation analysis, making it ideal for a causal-predictive approach (Hair et al., 2022).

Data were obtained from IPSOS, a renowned global market research firm with a panel of 40,000 participants in South Africa. Given the firm's extensive database, researchers often reach desired sample sizes. Data collection began in early 2023 through a questionnaire targeting South African residents.

G*Power software was used to assess sample adequacy and statistical power. With a maximum of four predictors per construct, the minimum required sample size was 85; the final sample of 500 respondents was deemed appropriate for PLS-SEM.

IPSOS employed its FastFacts system for data retrieval. Measurement constructs were adapted from prior validated studies: Green Beauty Product Awareness (Yoo et al., 2000), Green Beauty Product Trust, Consumer Perceived Ethicality (Brunk, 2010), Self-Transcendence (Kim, 2011), Environmental Concern (Yadav & Pathak, 2016), and Environmental Knowledge (Mostafa, 2007). The dependent variable, Environmental Attitude, was adapted from Leonidou et al. (2010). Responses were collected on a six-point Likert scale (1 = strongly disagree; 6 = strongly agree).

RESULTS

Initially, the sample profile was analyzed, as in Table 1. As found in previous studies, there is a predominance of women's usage of green beauty products (AL-Haddad et al., 2020). In the second step, we applied the Exploratory Factor Analysis (EFA) for research model consistency through the IBM SPSS Statistics 2.1 software. Table 2 presents the results from the EFA considering the rotation of factors. The Kaiser-Meyer-Olkin (KMO) coefficient reached 0.943, satisfying the condition $0.5 \leq KMO \leq 1$, showing that factor analysis is suitable for the research data set. The significance value of Bartlett's test is equal to $0.000 < 0.05$, showing that the observed variables in the factor are correlated with each other and the factor analysis is statistically significant. Furthermore, we had a variance of 75.62% (satisfying the condition of being greater than 50%). At the end of EFA, we obtained seven factors, all communality values were greater than 0.6, and no variable needed to be excluded.

Table 1. Sample Profile

Characteristics		%
Gender	Male	48.60
	Female	50.80
	Non-binary	0.60
Age	Mean	36 years old
	Min.	18 years old
	Max.	65 years old
Residential area	Urban	87.40
	Rural	12.60

Continue

Table 1. Sample Profile

Concludes

Characteristics		%
Province of residence	Eastern Cape	7.00
	Free State	2.80
	Gauteng	41.60
	KwaZulu-Natal	17.20
	Limpopo	5.20
	Mpumalanga	4.60
	Northern Cape	0.80
	North-West	2.00
	Western Cape	18.80
Beauty product usage behaviour	Skincare products	84.80
	Haircare products	77.40
	Colour (make-up)	36.20
	Fragrances	76.60
	Toiletries	87.70

Table 2. Exploratory Factor Analysis

	GBPA	GBPT	CPE	ST	EA	EC	EK	Communality
GBPA1	0.801							0.721
GBPA2	0.867							0.817
GBPA3	0.881							0.864
GBPA4	0.777							0.732
GBPT1		0.757						0.835
GBPT2		0.786						0.881
GBPT3		0.797						0.878
GBPT4		0.717						0.817
CPE1			0.601					0.716
CPE2			0.771					0.802
CPE3			0.74					0.765
CPE4			0.773					0.767
CPE5			0.769					0.787

Continue

Table 2. Exploratory Factor Analysis

Concludes

	GBPA	GBPT	CPE	ST	EA	EC	EK	Communality
ST1				0.797				0.752
ST2				0.804				0.783
ST3				0.601				0.721
ST4				0.821				0.770
EA1					0.519			0.705
EA2					0.634			0.698
EA3					0.748			0.694
EA4					0.644			0.668
EC1						0.693		0.639
EC2						0.848		0.754
EC3						0.769		0.738
EC4						0.792		0.739
EK1							0.674	0.651
EK2							0.761	0.722
EK3							0.776	0.772
EK4							0.756	0.742
EK5							0.785	0.756

KMO value	0.943
Significance of Barlett's test	0.000
Total variance explained	75.62
Number of variables to be excluded	0

In the third step, the PLS-SEM estimation was conducted using the SmartPLS 3.0 software, as outlined by Ringle et al. (2015). Beyond the EFA, an examination of the measurement model was undertaken through Confirmatory Factor Analysis (CFA), given that the indicators of the constructs were drawn from various sources. In this CFA, all factor loadings exhibited values exceeding 0.70, as indicated by Hair et al. (2022). Notably, no indicators required exclusion from the analysis, similarly to the EFA results. Detailed CFA results and the corresponding questionnaire indicators are presented in Table 3.

Table 3. Confirmatory Factor Analysis

Questions	Factor loading	Mean	Std. dev.	T-value	P-value
Green Beauty Product Awareness					
(GBPA1) I can recognize green beauty products among other competing beauty products	0.846	0.845	0.019	44.677	0.000
(GBPA2) I am aware of green beauty products	0.880	0.880	0.015	59.350	0.000
(GBPA3) I am familiar with green beauty products	0.926	0.926	0.007	127.351	0.000
(GBPA4) I can list a number of green beauty products	0.859	0.859	0.015	57.302	0.000
Trust in Green Beauty Products					
(GBPT1) The environmental reputation of green beauty products is generally trustworthy	0.914	0.914	0.010	87.845	0.000
(GBPT2) The environmental claims from green beauty products are generally trustworthy	0.940	0.940	0.007	135.833	0.000
(GBPT3) The environmental statements made by green beauty products are generally reliable	0.935	0.935	0.008	121.578	0.000
(GBPT4) Green beauty products keep promises and commitments for environmental protection	0.911	0.911	0.012	77.924	0.000
Consumer Perceived Ethicality					
(CPE1) Green beauty products respect moral norms	0.859	0.859	0.015	56.585	0.000
(CPE2) Green beauty products always adhere to the law	0.891	0.891	0.012	73.773	0.000
(CPE3) Green beauty products are socially responsible	0.874	0.873	0.015	58.717	0.000
(CPE4) Green beauty products avoid damaging behavior at all costs	0.855	0.854	0.023	37.158	0.000
(CPE5) Green beauty products are produced by good companies	0.878	0.877	0.015	57.593	0.000

Table 3. Confirmatory Factor Analysis

Questions	Factor loading	Mean	Std. dev.	T-value	P-value
Self-Transcendence					
(ST1) Honesty is an important value to me	0.833	0.829	0.029	28.614	0.000
(ST2) Being helpful to others is important to me	0.866	0.865	0.024	35.451	0.000
(ST3) Protecting the environment is an important part of my everyday life	0.833	0.833	0.015	54.408	0.000
(ST4) Being considerate of other people is important to me	0.849	0.848	0.022	37.853	0.000
Environmental Concern					
(EC1) The balance of nature is very delicate and can be easily upset	0.823	0.823	0.022	36.706	0.000
(EC2) Human beings are severely abusing the environment	0.816	0.814	0.028	28.640	0.000
(EC3) Human beings must maintain the balance with nature in order to survive	0.869	0.868	0.018	47.513	0.000
(EC4) Human interferences with nature often produce disastrous consequences	0.858	0.858	0.018	48.093	0.000
Environmental Knowledge					
(EK1) I know that I purchase products and packages that are environmentally safe	0.812	0.812	0.019	43.305	0.000
(EK2) I know more about recycling than the average person	0.830	0.830	0.017	47.974	0.000
(EK3) I know how to select products and packages that reduce the amount of waste ending up in landfills	0.879	0.878	0.014	62.384	0.000
(EK4)I understand the environmental phrases and symbols on product packages	0.864	0.863	0.016	54.837	0.000
(EK5) I know a lot about environmental issues	0.861	0.861	0.015	57.362	0.000
Environmental Attitude					
(EA1) I am concerned about the environment	0.840	0.840	0.019	45.388	0.000
(EA2) I would be willing to reduce my consumption to help protect the environment	0.841	0.840	0.024	34.955	0.000
(EA3) I would donate part of my own money to help protect wild animals	0.755	0.754	0.027	27.598	0.000
(EA4) I have asked my family to recycle some of the things we use	0.799	0.799	0.022	36.163	0.000

Subsequently, the PLS-SEM analysis was conducted, starting with an examination of the measurement model. Given that all constructs within the model are reflexive in nature, the assessment encompassed three key aspects: (i) convergent validity, (ii) discriminant validity, and (iii) reliability, as delineated by Hair et al. (2022). Convergent validity was assessed via the Average Variance Extracted (AVE), which necessitated values exceeding 0.50. Additionally, it was imperative to evaluate whether the factor loadings of the indicators exceeded 0.70. To evaluate discriminant validity, the square root of AVE was compared to the correlations between constructs. Furthermore, an assessment was made to ensure that the factor loadings of the indicators surpassed the cross-factor loadings, as per the criteria advocated by Hair et al. (2022). Finally, for evaluating reliability, indicators such as Cronbach's alpha, rho_A, and composite reliability were employed, each of which needed to exceed the threshold of 0.70, in accordance with the recommendations of Hair et al. (2022). The results, as presented in Table 4, align with the established criteria outlined by Hair et al. (2022).

Table 4. Analysis of the Measurement Model

Construct	CPE	EA	EC	EK	GBPA	GBPT	ST
CPE	*0.871*						
EA	0.482	*0.809*					
EC	0.393	0.654	*0.842*				
EK	0.643	0.562	0.378	*0.849*			
GBPA	0.412	0.332	0.195	0.440	*0.875*		
GBPT	0.751	0.443	0.332	0.584	0.492	*0.925*	
ST	0.412	0.603	0.569	0.426	0.199	0.417	*0.847*
Cronbach's alpha	0.921	0.824	0.863	0.903	0.901	0.944	0.868
rho_A	0.922	0.834	0.869	0.904	0.940	0.945	0.868
Composite reliability	0.940	0.883	0.907	0.928	0.929	0.960	0.910
AVE	0.759	0.655	0.709	0.721	0.766	0.856	0.717

Note: The diagonal values mentioned in italics represent the square root of AVE.

To validate the structural model, the initial stage involved the evaluation of the Variance Inflation Factor (VIF), with all values found to be below 5, as per the criteria outlined by Hair et al. (2022). Subsequently, we assessed the indicators' significance by applying the bootstrapping technique and effect sizes measured by f^2 and R^2. The results from the Student's t-test indicated that all relationships were statistically significant, except for the association between green beauty product awareness and trust and environmental concern.

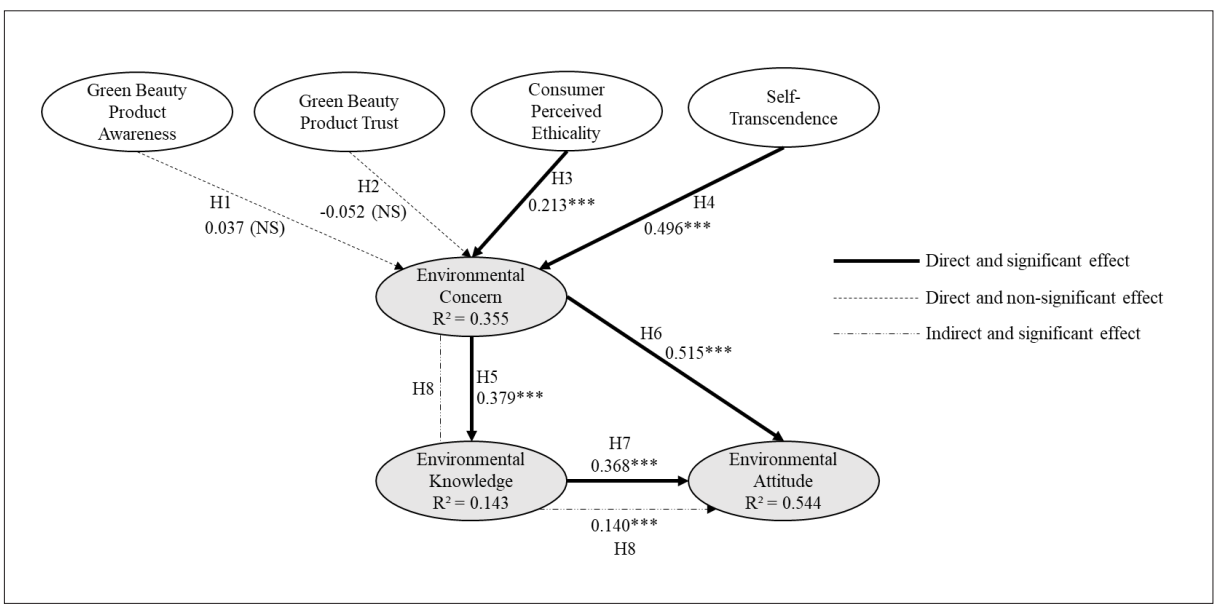
To further examine the relationship between constructs, the mediation analysis of the indirect effect proceeded with the bootstrapping procedure using 5,000 subsamples. Thus, the mediating effect between environmental knowledge and the relationship between environmental concern and environmental attitude is partial and positive. To evaluate the outcomes of the structural model, the coefficient of determination (R^2) was used, where values of 0.35, 0.14, and 0.54 can be considered moderate, weak, and substantial, respectively (Cohen, 1998).

The Root Mean Square Error (RMSE) outcomes produced by the PLS-SEM were observed to be lower than those obtained from a linear reference model. Additionally, all dependent variables exhibited Q^2 prediction values greater than zero. These findings collectively suggest that the PLS path model possesses a strong predictive capacity for environmental attitudes. The relevant indicators are presented in Table 5, while the comprehensive empirical model is illustrated in Figure 1.

Table 5. Analysis of the Structural Model

Hypothesis		Path coefficient	T-value	P-value	Significant at 5%?
Total effects					
H1	GBPA → EC	0.037	0.824	0.410	No
H2	GBPT → EC	-0.052	0.820	0.412	No
H3	CPE → EC	0.213	3.513	0.000	Yes
H4	ST → EC	0.496	9.192	0.000	Yes
H5	EC → EK	0.379	7.132	0.000	Yes
H6	EC → EA	0.515	12.293	0.000	Yes
H7	EK → EA	0.368	8.870	0.000	Yes
Specific indirect effects					
H8	EC → EK → EA	0.140	5.610	0.000	Yes

Figure 1. Complete Empirical Model



Note: NS = Not significant; * = significant at 5%; ** = significant at 1%; *** = significant at 0.1%.

DISCUSSION

This study sought to analyze the influence of environmental concern and environmental knowledge on environmental attitude among South African green beauty product consumers, considering the mediating role of environmental knowledge in the relationship between environmental concern and environmental attitude. We tested eight hypotheses to find antecedents of environmental attitude.

Empirical findings regarding green beauty product attributes demonstrated that product awareness (H1) and trust (H2) are not antecedents of environmental concern ($p > 0.05$), rejecting both hypotheses. These results contradict previous research. While in the traditional literature, awareness and trust are critical determinants in green product marketing strategies and can significantly influence consumer behavior (Khan et al., 2022; Li et al., 2021; Sahioun et al., 2023; Sinha & Annamdevula, 2024; Wang et al., 2019), in this study awareness and trust are not antecedents of environmental concerns. It is worth mentioning that in Wong and Tzeng (2021), the authors did not find a statistical significance between green product awareness and food purchase intentions among Chinese consumers. Similarly, in a study by Ogiemwonyi and Harun (2020), Malaysian consumers do not have a substantial level of environmental awareness. Interestingly, in three developing countries (South Africa, China, and Malaysia), "awareness" is not an antecedent of pro-environmental behaviors. In these countries, awareness alone may not be enough to create the desired impact on pro-environmental behavior. In emerging economies, people can still be in an "awakening stage" regarding sustainable issues (Sahioun et al., 2023). Another reason can be drawn from the fact that, especially in green beauty product firms, marketers are not effectively communicating their sustainable market positioning, failing to build products that awaken consumers' awareness (Brunk, 2010).

This possibility can explain why trust in green beauty products is not an antecedent of environmental concern. While previous studies in China found a positive relationship between trust in green products and purchasing environmentally friendly products (Li et al., 2021) or affecting green consumption (Lian & Chen, 2024), we empirically found the opposite. According to Kaur et al. (2024), when suspicious of environmental stewardship promises, consumers tend to doubt the ecological competency, stability, and usability of a green product, which precipitates trust issues and impacts their purchase behavior. Based on these arguments, green beauty products firms probably have not gained the trust of South African consumers and, consequently, have not affected their environmental concerns (Lin et al., 2021).

Contrary to awareness and trust, evidence suggests that consumer-perceived ethicality has a positive effect on environmental concern, supporting H3. This finding aligns with the Social Comparison Theory (Hogg et al., 1995), which states that individuals' environmental concerns and behaviors are influenced by how they compare themselves to others, especially when they perceive the brand as behaving ethically (Chen & Tsai, 2021). Although trust and consumer ethical perceptions have a direct relationship as stated in the literature (Tolentino

et al., 2021), the perceived ethicality is more evident to consumers since it refers to pro-environmental attitudes that are performed by a company, altering their reputation (Fatma & Rahman, 2017). In other words, if a company is involved in scandals or unethical practices, the media reports it immediately, and consumers are rapidly alerted. When the opposite happens, consumers learn from firms' behavior and become conscious of good sustainability practices. Consequently, ethicality in business practices, including environmental stewardship, is viewed as a moral obligation, making consumer perceptions of ethicality a driver of concern for broader environmental issues (S. et al., 2024).

Similarly to consumer-perceived ethicality, empirical results show that self-transcendence positively influences environmental concern, confirming H4. Under Guo et al. (2023), self-transcendence is related to altruistic motivation and environmental concern. More specifically, this characteristic makes individuals more familiar with green products due to their environmental awareness. This is in line with the Self-Theory and its applicability in the sustainability arena (Lian & Chen, 2024). We mean that individuals who hold strong self-transcendent values are more likely to demonstrate environmental concern, as they perceive environmental protection as vital for promoting the well-being of others, preserving ecosystems, and ensuring a sustainable future for everyone. Previous studies found that self-transcendent values have a significant and positive relationship with environmentalism. Considering our sample, we can affirm that South African individuals see the world and other people as extensions of themselves and are highly sensitive to the interdependencies among people (Beattie, 1980). As a result, self-transcendence values impact environmental concerns by consuming green beauty products.

As stated by the literature, environmental behavior develops at different levels. It is necessary to have high levels of concern and knowledge to develop positive environmental attitudes (Bulut et al., 2021; Sinha & Annamdevula, 2024). Therefore, the findings of this study support H5, in which environmental concern directly and positively influences environmental knowledge. This finding is in line with existing literature (Dangelico et al., 2022; Yadav & Pathak, 2016), suggesting that heightened concern prompts individuals to seek environmental information (Sinha & Annamdevula, 2024). In the same way, H6 is also confirmed. It means that environmental concern also influences attitudes. In practice, individuals who demonstrate higher levels of environmental concern foster favorable attitudes toward green practices, actions, and purchases (Yen & Hoang, 2023). Previous research has already found that environmental concerns affect attitudes in other developing countries, such as Vietnam (Hoang & Tung, 2024), including South Africa (Lupindo et al., 2024). In this regard, we agree that environmental concern is a representative variable of environmental attitudes (Hoang & Tung, 2024; Wong & Tzeng, 2021), referring to the extent to which consumers are aware of environmental problems and support solutions to the problems (Li et al., 2021).

Similarly, results suggest that knowledge positively influences environmental attitudes, supporting H7. In other words, South Africans with environmental knowledge are capable of translating their attitude toward green beauty product consumerism (Wong & Tzeng, 2021).

Similar to us, Simanjuntak et al. (2023) identified a positive influence of environmental knowledge and environmental care attitudes in greater Jakarta, another emerging economy. It means that, regarding consumption, individuals with high levels of concern and knowledge about nature issues tend to buy green products (Yadav & Pathak, 2016). As shown in the theoretical framework section, customers with favorable environmental attitudes are more likely to act in environmentally sensitive ways since they take responsibility for protecting the environment (Kaur et al., 2024). As proof, in other developing countries, like China, the environmental attitude was proven to be an antecedent of green makeup purchase intention. In Brazil, Ritter et al. (2015) found that environmental attitude precedes green product consumption (Ritter et al., 2015).

In the same vein, H8 was also supported. It was found that "knowledge" plays a mediating role in the relationship between environmental concern and environmental attitude. This variable is commonly used to test mediation, as observed in a study by Paço and Lavrador (2017). In sum, it was discovered that the relationships between environmental concern, knowledge, and attitudes are complex. However, we argue that since society has become more concerned regarding sustainability, a greater possibility exists in buying green beauty products in developing economies.

Implications and contributions

By analysing the antecedents of environmental attitudes among green beauty product consumers in a developing country, it is possible to offer significant implications and contributions. From a theoretical standpoint, this study, *firstly*, has broadened the existing literature by evidencing the factors that directly and indirectly influence environmental attitudes. In the same vein, our theoretical model enriches the existing research on green beauty product attitudes by incorporating products' attributes (awareness and trust), green consumers' perspectives (perception of ethicality and self-transcendence), and the environmental dimension (concern, knowledge, and attitude). *Second*, despite supporting that environmental knowledge is a direct antecedent of environmental attitudes, it was also found that knowledge mediates the relationship between environmental concern and attitude. Simultaneously, the impacts of perceived ethicality and self-transcendence demonstrate positive influences on environmental concern. This evidence is based on a robust model with high explanatory power of environmental attitudes in a developing country. In this regard, methodologically, the study contributes by evaluating construct validity through EFA and CFA.

From a managerial perspective, we have some specific contributions to South Africa. *First*, based on the fact that South Africa has the largest cosmetic market in Africa, considered the gateway to the African market (Lupindo et al., 2024), it is interesting for (international) companies to understand South African consumers' behavior. From our findings, marketers are provided with a clear indication of the significance of consumer-perceived ethicality and self-transcendence in influencing environmental concern for green beauty products. Marketers can use our results

to understand that consumers of green beauty products with a positive perception of a firm's ethical standards are more environmentally concerned. Similarly, when these same consumers pursue values aligned with self-transcendence, they are also more environmentally concerned and, consequently, perform a pro-environmental attitude (Shiel et al., 2020). *Second*, South Africa has an abundant and diverse biodiversity, including extracts and oils derived from local plants (Lupindo et al., 2024). Additionally, the sustainable cosmetics sector is expected to experience an increase in the next few years. Thus, we can see a potential demand for green beauty products driven by an enhanced environmental awareness from the South African people, resulting from policymaking efforts toward sustainable development.

By extending our findings to other developing nations, we affirm that increasing environmental concern and knowledge are crucial to changing consumers' environmental attitudes. This evidence is a useful contribution toward the formation of green beauty product interest because an increasing number of people are concerned about environmental issues, leading to increased demand for eco-friendly products in daily behavior (Simanjuntak et al., 2023). We also advise marketers to look for a gap in effective firms' communication. We mean that green beauty products firms have workspace to assure higher trust/accuracy of their products by investing in eco-branding, eco-labelling (Khan et al., 2022), transparency, and reporting (Yadav & Pathak, 2016). Businesses should build better green beauty products to enhance trust in sustainable brands and in the process of communicating with green consumers. Government policies incentivizing green beauty product manufacturing and consumption can drive societal change through awareness and consciousness. Policymakers should facilitate educating consumers about the nuances of green beauty products and the habit of buying eco-friendly products. Implementing educational programs is essential to foster higher levels of environmental awareness, knowledge, and attitudes (Zhao et al., 2014). In designing these programs, it is crucial to emphasize the development of self-transcendence, particularly in the education of children and adolescents, to instill a sense of responsibility and agency in them regarding the promotion of green products and environmental protection. In other words, environmental educators are encouraged to deepen their understanding of environmental issues and related concerns, to drive behavioral change (Carmi et al., 2015) and support sustainable development.

Finally, this research aligns with several of the 17 SDGs, particularly goal 3, good health and well-being, arguing that green beauty products often emphasize their ethical and environmentally friendly production methods, contributing to better health outcomes. Regarding goal 4, quality education, the study underscores the importance of education in fostering a deeper understanding of environmental issues by identifying the role of environmental knowledge in shaping consumer behavior. On goal 12, responsible consumption and production, this assessment focuses on consumer attitudes toward green beauty products, emphasizing the importance of ethical consumer behavior and environmentally conscious purchasing decisions.

CONCLUSION

This study analyzed the influence of environmental concern and knowledge on environmental attitude among 500 green beauty product consumers in South Africa, considering the mediation role of environmental knowledge in the relationship between environmental concern and environmental attitude. The PLS-SEM technique was employed to test whether environmental concern and environmental knowledge influence environmental attitude, and examine whether environmental knowledge mediates the relationship between environmental concern and environmental attitude. The empirical evidence highlights that environmental concern and knowledge are significant predictors of environmental attitudes. Furthermore, it is confirmed that individuals with high perceptions of ethicality and self-transcendence tend to exhibit higher levels of environmental concern, which, in turn, foster environmental attitudes. Additionally, environmental knowledge has a direct and positive effect on environmental attitude and mediates the relationship between environmental concern and environmental attitude. These findings have important theoretical and practical implications, as reported in the previous section.

This research has some limitations that must be overcome by future studies. *First*, the study focused on a sample of 500 consumers of green beauty products, limiting generalization to other categories of green products. *Second*, the sample was non-probabilistic and obtained through convenience sampling. *Third*, the study only examined certain antecedents of environmental attitudes quantitatively. Future research should explore additional antecedents to environmental attitudes. We also encourage qualitative exercises to capture detailed nuances regarding the reasons to buy, or not, beauty products, complementing our quantitative approach. Additionally, future assessments could investigate mediation and moderation effects on environmental attitudes, considering how these relationships may vary across different contexts and types of consumption, and potential moderators or control variables, like cultural, economic, and social factors, that can influence the relationship between constructs. It is also significant that this study be replicated in other categories of green products, such as organic food and sustainable tourism, for instance. Future research could also compare the results of developed and developing countries using our validated measurement instrument. Finally, this research paves the way for longitudinal and other methodological approaches that further explore antecedents of environmental attitudes.

REFERENCES

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. *Action Control: From Cognition to Behavior/Springer*.

AL-Haddad, S., Awad, A., Albate, D., Almashhadani, I., & Dirani, W. (2020). Factors affecting green cosmetics purchase intention. *Journal of Management Information and Decision Sciences*, *23*(4), 332-342.

Ansu-Mensah, P. (2021). Green product awareness effect on green purchase intentions of university students: An emerging market's perspective. *Future Business Journal*, *7*(1), 48. https://doi.org/10.1186/s43093-021-00094-5

Balaskas, S., Panagiotarou, A., & Rigou, M. (2023). Impact of environmental concern, emotional appeals, and attitude toward the advertisement on the intention to buy green products: The case of younger consumer audiences. *Sustainability*, *15*(17), 13204. https://doi.org/10.3390/su151713204

Beattie, J. (1980). Review article: Representations of the self in traditional Africa: La Notion de Personne en Afrique Noire. *Africa*, *50*(3), 313-320. https://doi.org/10.2307/1159123

Biswas, A. (2020). A nexus between environmental literacy, environmental attitude and healthy living. *Environmental Science and Pollution Research*, *27*(6), 5922-5931. https://doi.org/10.1007/s11356-019-07290-5

Brunk, K. H. (2010). Exploring origins of ethical company/brand perceptions: A consumer perspective of corporate ethics. *Journal of Business Research*, *63*(3), 255-262. https://doi.org/10.1016/j.jbusres.2009.03.011

Bulut, C., Nazli, M., Aydin, E., & Haque, A. U. (2021). The effect of environmental concern on conscious green consumption of post-millennials: The moderating role of greenwashing perceptions. *Young Consumers*, *22*(2), 306-319. https://doi.org/10.1108/YC-10-2020-1241

Cachero-Martínez, S. (2020). Consumer behaviour towards organic products: The moderating role of environmental concern. *Journal of Risk and Financial Management*, *13*(12), 330. https://doi.org/10.3390/jrfm13120330

Canio, F. De, Martinelli, E., & Endrighi, E. (2021). Enhancing consumers' pro-environmental purchase intentions: The moderating role of environmental concern. *International Journal of Retail & Distribution Management*, *49*(9), 1312-1329. https://doi.org/10.1108/IJRDM-08-2020-0301

Carmi, N., Arnon, S., & Orion, N. (2015). Transforming environmental knowledge into behavior: The mediating role of environmental emotions. *The Journal of Environmental Education*, *46*(3), 183-201. https://doi.org/10.1080/00958964.2015.1028517

Chen, L., Wu, Q., & Jiang, L. (2022). Impact of environmental concern on ecological purchasing behavior: The moderating effect of prosociality. *Sustainability*, *14*(5), 3004. https://doi.org/10.3390/su14053004

Chen, W.-S., & Tsai, K.-H. (2021). Antecedents and consequences of brand ownership: moderating roles of social value orientation and consumer perceived ethicality in Taiwan's food industry. *British Food Journal*, *123*(5), 1875-1898. https://doi.org/10.1108/BFJ-07-2020-0640

Chen, Y., & Chang, C. (2013). Towards green trust. *Management Decision*, *51*(1), 63-82. https://doi.org/10.1108/00251741311291319

Cohen, J. (1998). *Statistical power analysis for the behavioral sciences* (2nd ed.). Erlbaum.

Costa, C. S. R., Costa, M. F. da, Maciel, R. G., Aguiar, E. C., & Wanderley, L. O. (2021). Consumer antecedents towards green product purchase intentions. *Journal of Cleaner Production*, *313*, 127964. https://doi.org/10.1016/j.jclepro.2021.127964

Dangelico, R. M., Alvino, L., & Fraccascia, L. (2022). Investigating the antecedents of consumer behavioral intention for sustainable fashion products: Evidence from a large survey of Italian consumers. *Technological Forecasting and Social Change*, *185*, 122010. https://doi.org/10.1016/j.techfore.2022.122010

Department of Trade Industry and Competition. (2023). *Chemicals, cosmetics, plastics and pharmaceutical sectors to be exposed to African Continental Free Trade Area benefits*. https://www.thedtic.gov.za/chemicals-cosmetics-plastics-and-pharmaceutical-sectors-to-be-exposed-to-african-continental-free-trade-area-benefits/?hilite=cosmetics

Fatma, M., & Rahman, Z. (2017). An integrated framework to understand how consumer-perceived ethicality influences consumer hotel brand loyalty. *Service Science*, 9(2), 136-146. https://doi.org/10.1287/serv.2016.0166

Global Natural and Organic Market. (2025). *Growth trends, key players and competitive strategies*.

Guo, K., Wang, Z., Zhang, L., & Li, C. (2023). Self-transcendence values influence meaningful sports consumption behavior: The chain mediator of team identification and eudaimonic motivation. *Sustainability*, *15*(14), 10938. https://doi.org/10.3390/su151410938

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications Inc.

Hoang, D., & Tung, L. (2024). *Effect of environmental concern, green perceived value on young customers' green purchase intention: The mediating roles of attitude toward green products and perceived behavior control* (Scientific Papers of the University of Pardubice, Series D: Faculty of Economics and Administration, 32[1]). https://doi.org/10.46585/sp32011920

Hogg, M. A., Terry, D. J., & White, K. M. (1995). A tale of two theories: A critical comparison of identity theory with social identity theory. *Social Psychology Quarterly*, 58(4), 255. https://doi.org/10.2307/2787127

Kaur, R., Yadav, S., & Mishra, S. (2024). What triggers people to buy green products? Empirical evidence from an emerging market. *Business Strategy & Development*, 7(3), e70001. https://doi.org/10.1002/bsd2.70001

Khan, K. U., Atlas, F., Arshad, M. Z., Akhtar, S., & Khan, F. (2022). Signaling green: Impact of green product attributes on consumers trust and the mediating role of green marketing. *Frontiers in Psychology*, *13*, 1-11. https://doi.org/10.3389/fpsyg.2022.790272

Kim, Y. (2011). Understanding green purchase: The influence of collectivism, personal values and environmental attitudes, and the moderating effect of perceived consumer effectiveness. *Seoul Journal of Business*, *17*(1), 66-92.

Leonidou, L. C., Leonidou, C. N., & Kvasova, O. (2010). Antecedents and outcomes of consumer environmentally friendly attitudes and behaviour. *Journal of Marketing Management*, *26*(13/14), 1319-1344. https://doi.org/10.1080/0267257X.2010.523710

Li, G., Yang, L., Zhang, B., Li, X., & Chen, F. (2021). How do environmental values impact green product purchase intention? The moderating role of green trust. *Environmental Science and Pollution Research*, 28(33), 46020-46034. https://doi.org/10.1007/s11356-021-13946-y

Lian, C., & Chen, X.-X. (2024). The influence mechanism of self-transcendence on green consumption: The chain-mediating effect of construction of meaning in life and connectedness. *Acta Psychologica*, *244*, 104180. https://doi.org/10.1016/j.actpsy.2024.104180

Lin, C., Lai, X., & Yu, C. (2021). Switching intent of disruptive green products: The roles of comparative economic value and green trust. *Frontiers in Energy Research*, *9*, 1-11. https://doi.org/10.3389/fenrg.2021.764581

Lupindo, M., Madinga, N. W., & Dlamini, S. (2024). Green beauty: Examining factors shaping millennials' attitudes toward organic personal care products in South Africa. *European Journal of Management Studies*, *29*(3), 271-291. https://doi.org/10.1108/EJMS-01-2024-0001

Martínez-Martínez, A., Navarro, J. G. C., García-Pérez, A., & Moreno-Ponce, A. (2019). Environmental knowledge strategy: Driving success of the hospitality industry. *Management Research Review*, *42*(6), 662-680. https://doi.org/10.1108/MRR-02-2018-0091

Momberg, D., Jacobs, B., & Sonnenberg, N. (2012). The role of environmental knowledge in young female consumers' evaluation and selection of apparel in South Africa. *International Journal of Consumer Studies*, *36*(4), 408-415. https://doi.org/10.1111/j.1470-6431.2011.01061.x

Mostafa, M. M. (2007). Gender differences in Egyptian consumers? Green purchase behaviour: The effects of environmental knowledge, concern and attitude. *International Journal of Consumer Studies*, *31*(3), 220-229. https://doi.org/10.1111/j.1470-6431.2006.00523.x

Munerah, S., Koay, K. Y., & Thambiah, S. (2021). Factors influencing non-green consumers' purchase intention: A partial least squares structural equation modelling (PLS-SEM) approach. *Journal of Cleaner Production*, *280*, 124192. https://doi.org/10.1016/j.jclepro.2020.124192

Nguyen, P.-H., Nguyen, D. N., & Nguyen, L. A. T. (2023). Quantitative insights into green purchase intentions: The interplay of health consciousness, altruism, and sustainability. *Cogent Business & Management*, *10*(3), 1-15. https://doi.org/10.1080/23311975.2023.2253616

Ogiemwonyi, O. (2022). Factors influencing generation Y green behaviour on green products in Nigeria: An application of theory of planned behaviour. *Environmental and Sustainability Indicators*, *13*, 100164. https://doi.org/10.1016/j.indic.2021.100164

Ogiemwonyi, O., & Harun, A. Bin. (2020). Green product awareness has the potential to promote green consumer behaviour: Evidence from Kuala-Lumpur. *Israel Journal of Ecology and Evolution*, *67*(1/2), 39-50. https://doi.org/10.1163/22244662-bja10010

Paço, A., & Lavrador, T. (2017). Environmental knowledge and attitudes and behaviours towards energy consumption. *Journal of Environmental Management*, *197*, 384-392. https://doi.org/10.1016/j.jenvman.2017.03.100

Paço, A. do, Shiel, C., & Alves, H. (2019). A new model for testing green consumer behaviour. *Journal of Cleaner Production*, *207*, 998-1006. https://doi.org/10.1016/j.jclepro.2018.10.105

Pitaloka, L. K., & Widiatami, A. K. (2022). Climate change issue and consumer behavior in purchasing beauty product. *IOP Conference Series: Earth and Environmental Science*, *1098*(1), 12030. https://doi.org/10.1088/1755-1315/1098/1/012030

Ringle, C. M., Wende, S., & Becker, J. (2015). *SmartPLS 3* (3). Bönningstedt: SmartPLS.

Ritter, Á. M., Borchardt, M., Vaccaro, G. L. R., Pereira, G. M., & Almeida, F. (2015). Motivations for promoting the consumption of green products in an emerging country: Exploring attitudes of Brazilian consumers. *Journal of Cleaner Production*, *106*, 507-520. https://doi.org/10.1016/j.jclepro.2014.11.066

Sahioun, A., Q. Bataineh, A., A. Abu-AlSondos, I., & Haddad, H. (2023). The impact of green marketing on consumers' attitudes: A moderating role of green product awareness. *Innovative Marketing*, *19*(3), 237-253. https://doi.org/10.21511/im.19(3).2023.20

Shiel, C., Paço, A. do, & Alves, H. (2020). Generativity, sustainable development and green consumer behaviour. *Journal of Cleaner Production*, *245*, 118865. https://doi.org/10.1016/j.jclepro.2019.118865

Simanjuntak, M., Nafila, N. L., Yuliati, L. N., Johan, I. R., Najib, M., & Sabri, M. F. (2023). Environmental care attitudes and intention to purchase green products: Impact of environmental knowledge, word of mouth, and green marketing. *Sustainability*, *15*(6), 5445. https://doi.org/10.3390/su15065445

Sinha, R., & Annamdevula, S. (2024). Bridging the knowledge-intention gap in sustainable consumption: An extended model. *Journal of Modelling in Management*, 20(2), 648-667. https://doi.org/10.1108/JM2-02-2024-0052

Suphasomboon, T., & Vassanadumrongdee, S. (2022). Toward sustainable consumption of green cosmetics and personal care products: The role of perceived value and ethical concern. *Sustainable Production and Consumption*, 33, 230-243. https://doi.org/10.1016/j.spc.2022.07.004

Tanner, C., & Kast, S. W. (2003). Promoting sustainable consumption: Determinants of green purchases by Swiss consumers. *Psychology & Marketing*, *20*(10), 883-902. https://doi.org/10.1002/mar.10101

Tolentino, R. D. S. da S., Filho, C. G., Falce, J. L. La, & Santos, M. F. (2021). Marcas e comportamento ético: Explorando a integração do relacionamento consumidor-marca e ética percebida pelos consumidores. *Revista Brasileira de Marketing*, *20*(1), 78-104. https://doi.org/10.5585/remark.v20i1.14884

Vinoth S., Srivastava, N., & Mittal, A. (2024). How does green trust mediate the relationship between environmental concern and green brand knowledge during green purchases? *Global Knowledge, Memory and Communication*. https://doi.org/10.1108/GKMC-04-2024-0229

Wan, Q., & Du, W. (2022). Social capital, environmental knowledge, and pro-environmental behavior. *International Journal of Environmental Research and Public Health*, *19*(3), 1443. https://doi.org/10.3390/ijerph19031443

Wang, H., Ma, B., & Bai, R. (2019). How does green product knowledge effectively promote green purchase intention? *Sustainability*, *11*(4), 1193. https://doi.org/10.3390/su11041193

Wang, X., Waris, I., Bhutto, M. Y., Sun, H., & Hameed, I. (2022). Green initiatives and environmental concern foster environmental sustainability: A study based on the use of reusable drink cups. *International Journal of Environmental Research and Public Health*, *19*(15), 9259. https://doi.org/10.3390/ijerph19159259

Wong, W. M., & Tzeng, S.-Y. (2021). Mediating role of organic labeling awareness and food safety attitudes in the correlation between green product awareness and purchase intentions. *Sage Open*, *11*(4). https://doi.org/10.1177/21582440211061565

Yadav, R., & Pathak, G. S. (2016). Young consumers' intention towards buying green products in a developing nation: Extending the theory of planned behavior. *Journal of Cleaner Production*, *135*, 732-739. https://doi.org/10.1016/j.jclepro.2016.06.120

Yen, N. T. H., & Hoang, D. P. (2023). The formation of attitudes and intention towards green purchase: An analysis of internal and external mechanisms. *Cogent Business & Management*, *10*(1). https://doi.org/10.1080/23311975.2023.2192844

Yoo, B., Donthu, N., & Lee, S. (2000). An examination of selected marketing mix elements and brand equity. *Journal of the Academy of Marketing Science*, *28*(2), 195-211. https://doi.org/10.1177/0092070300282002

Zaman, S. I., & Kusi-Sarpong, S. (2024). Identifying and exploring the relationship among the critical success factors of sustainability toward consumer behavior. *Journal of Modelling in Management*, *19*(2), 492-522. https://doi.org/10.1108/JM2-06-2022-0153

Zeng, Z., Zhong, W., & Naz, S. (2023). Can environmental knowledge and risk perception make a difference? The role of environmental concern and pro-environmental behavior in fostering sustainable consumption behavior. *Sustainability*, *15*(6), 4791. https://doi.org/10.3390/su15064791

Zhao, H., Gao, Q., Wu, Y., Wang, Y., & Zhu, X. (2014). What affects green consumer behavior in China? A case study from Qingdao. *Journal of Cleaner Production*, *63*, 143-151. https://doi.org/10.1016/j.jclepro.2013.05.021

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CONFLICTS OF INTEREST

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AUTHORS' CONTRIBUTION

Nágela Bianca do Prado: Conceptualization; Data curation; Formal analysis; funding acquisition; Investigation; Methodology; Resources; Software; Supervision; Visualization; Writing – original draft; Writing – proofreading, and editing.

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