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How Does Sustainable Digital Marketing Affect Consumer Behavior?

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Abstract

This study delves into the intricate relationship between sustainable digital marketing and consumer behavior, revealing multifaceted insights through correlation analysis. The findings emphasize the need for marketers to strike a delicate balance between engaging consumers with digital content and avoiding content overload to influence behavior effectively. Moreover, the study highlights a potential gap between consumers' awareness of sustainability issues and their actual behavior, underscoring the importance of educational initiatives and transparent communication strategies. On a positive note, correlations indicate the potential of sustainability messaging to drive consumer behavior and the importance of building trust in sustainability efforts. Overall, these insights enable businesses to develop targeted, effective sustainability strategies that resonate with consumer values, fostering positive changes in behavior and contributing to broader environmental and social goals.

Keywords

Digital Marketing, Sustainability Awareness, Consumer Behavior

1. Introduction

1.1. Sustainable Development

As an emerging notion, sustainable development represents a relatively recent and evolving theory and industrial sector. Consequently, it remains a dynamic concept, subject to alteration based on varying local environments, priorities, and interests (Rahadian, 2016). Nevertheless, both academic circles and the corporate realm have consistently struggled to provide a comprehensive elucidation of this idea (Fauzi & Oxtavianus, 2014). When prompted to define sustainable

development, the majority of experts highlight the intricate interplay among economic, ecological, and social elements as fundamental to its essence. Recognized as an imperative to be addressed, sustainable development garners consensus among governments, businesses, and forward-thinking individuals globally (Springett, 2003).

Expanding further, sustainable development embodies a holistic approach to growth that considers not only economic prosperity but also environmental stewardship and social equity. It emphasizes the importance of striking a balance between meeting present needs without compromising the ability of future generations to meet their own needs. This multifaceted perspective underscores the complexity inherent in achieving sustainability across various sectors and contexts. Moreover, the evolving nature of sustainable development reflects ongoing efforts to adapt strategies and practices to address emerging challenges and opportunities, underscoring its dynamic and iterative nature. Despite persistent challenges in defining and operationalizing sustainable development, its overarching goal of fostering harmonious and resilient societies remains a shared aspiration among diverse stakeholders worldwide. The primary complexities faced by sustainable development revolve around addressing the adverse impacts of poverty and the overconsumption by affluent individuals on the environment. During the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, governments of UN member states emphasized the necessity of prioritizing environmental concerns in both international and domestic policies (Widyastuti, 2019). This concerted effort has led to the widespread adoption of the principle of ecological efficiency, not only by private enterprises but also by governmental bodies. Recognizing the role of fossil fuels in exacerbating global warming, the United Nations (UN) and its member nations are actively working to phase out fossil fuels gradually. Initiatives such as establishing public transportation systems in urban areas aim to mitigate pollution stemming from vehicular emissions.

The core focus of this study lies in analyzing the pivotal role of digital media in ensuring sustained business success. Over recent decades, the foundation of innovative digital marketing technologies has been laid upon the proliferation of internet activities and the emergence of viable business models. Data collection and extraction from various online sources, including user-generated content (UGC) and digitally orchestrated content like electronic word-of-mouth (eWOM), form the bedrock for the development of these resources and novel approaches to digital business models. A recent study underscores the interdisciplinary nature of this research, providing invaluable insights for companies striving for long-term success in the digital realm.

The initial step involves delving into digital business models to gain insights into their operational mechanisms (Hery, 2019). Recognizing the advantages of deploying and refining these strategies across various platforms such as dedicated platforms, e-commerce channels, and social networks, alongside their impact

on internal dynamics within organizational structures and discoveries within enterprises (Rohmawati et al., 2021). Furthermore, this study delves into knowledge-based analytics, offering companies the tools to assess the efficacy of their online advertising campaigns.

At the heart of knowledge-based methodologies lies the analysis of online behaviors, utilizing techniques such as data mining, sentiment analysis, text analysis, big data analytics, and social network analysis, all crucial for crafting sustainable development strategies in the digital landscape (Cahyono et al., 2016). The investigation also encompasses social media analysis, a subfield of media analysis dedicated to scrutinizing user behaviors on specific topics and platforms. This analysis underscores the importance of leveraging digital methods and neuromarketing concepts to understand users' emotional responses to digital content, thereby maximizing user engagement (Nainggolan et al., 2020). To effectively implement these strategies, it is imperative to study information systems and customer relationship management systems, as they often generate data that can unveil patterns or correlations.

Additionally, the articles featured in this special issue offer comprehensive insights into sustainable development strategies within internet-based digital business models, thereby contributing to our understanding of the long-term performance of corporate digital strategies amidst the evolving digital landscape.

1.2. Digital Marketing

The utilization of digital technology has ushered in a myriad of advantages for consumers, ranging from enhanced convenience and efficiency to access to a wide array of information, diverse product selections, competitive pricing, and cost savings (Tiago & Verissimo, 2014). Moreover, digital technology plays a pivotal role in driving societal technological advancement by facilitating activities like marketing services, goods, and knowledge transfer (Koliouska & Andreopoulou, 2020). It's paramount for businesses to cultivate a robust "digital relationship" with consumers as digital innovations continue to redefine marketing strategies and processes (Phillips, 2015; Kannan, 2017). The contemporary digital landscape is characterized by its rapidity, intricate interconnections, and inherent complexity, as noted by various scholars (Küng, 2008; Royle & Laing, 2014).

Furthermore, extensive research has uncovered a profound correlation between digital marketing and sustainable development (Leonidou & Leonidou, 2011). This synergy is underscored by the positive impact sustainable practices have on supply chain optimization, product differentiation, and fostering alliances with environmentally conscious entities. Notably, sustainable development confers competitive advantages through improved supply chain processes, product diversification, nurturing relationships with eco-minded investors, and fostering commitments from forward-thinking employees (McDonagh & Pro-

thero, 2014; Diez-Martin et al., 2019). Entrepreneurs are increasingly cognizant of the potent role green products play in driving economic growth while ensuring environmental sustainability (Song et al., 2019; Bernal-Conesa et al., 2017; Chang & Chen, 2013). This underscores the imperative for businesses to embrace sustainable practices not only as a moral imperative but also as a strategic asset in today's competitive marketplace.

Thus, we generate the following hypotheses:

*H*1: *There is a positive relationship between Sustainable Digital Marketing* (*SDM*) *and Consumer Behavior* (*CB*);

*H*2: *The relationship between SDM and CB remains significant after controlling for demographic variables.*

The remaining of the study is structured as follows: literature review will provide an in-depth analysis of prior research, discussing the factors known to influence acceptance of green products. Next, section 3 will describe the data, variables, and models used in the study and explain the research design, data collection, and data analysis. Section 4 will present the results of the analysis and explain the findings. Finally in section 5, the paper will summarize the key points and highlight the implications of the findings for future research and practice, and section 6 will discuss any limitations or shortcomings that may have been encountered during the course of the study.

2. Literature Review

2.1. The Influence of Green Products on Retailers

The adoption and advancement of green products within e-commerce platforms represent strategic choices aimed at not only enhancing the public perception of a store but also at bolstering its financial viability. The primary advantage of this approach lies in the sustained improvement of profit margins for retailers, attributed to cost-saving measures (Ashokkumar & Gopal, 2009). Retailers are able to procure products from manufacturers at reduced costs, as the considerable decrease in production expenses does not significantly alter the bargaining power held by manufacturers. Additionally, the pricing of green products tends to be more competitive due to reduced packaging expenses, minimized advertising efforts, and overall lower production costs. Furthermore, the market share commanded by green products tends to be satisfactory, granting retailers a perception of autonomy compared to branded alternatives. Consequently, this dynamic compels manufacturers of branded products to amplify their online promotional activities and marketing endeavors.

Another notable advantage for retailers lies in the potential for online sales of green products to serve as a platform for enhancing the overall image of the store. A fundamental tenet of a differentiation strategy is the establishment of a strong correlation between the online storefront and its perceived image (Gielens, 2012). The adoption of green products contributes to enhancing the overall image and perceived value proposition of online stores, thereby expanding the

range of choices available to consumers. Moreover, the integration of green products into the retailer's offerings helps to differentiate them from competitors, fostering increased loyalty among online clientele (Horvat, 2013). This loyalty is further nurtured by the exclusive provision of green products by the retailers producing them.

Lastly, a significant boon of retailing green products online is the cultivation of consumer loyalty towards the online storefront (Horvat, 2013). By offering specialized products, online retailers foster a deeper level of trust between themselves and their customers, who develop a sense of brand affinity akin to that associated with the retailer's brick-and-mortar outlets. Retailers not only guarantee the quality of their green products through their brand reputation but also provide essential information regarding the unique features and benefits of these eco-friendly offerings.

2.2. The Influence of Green Products on Consumers

As environmental consciousness among online shoppers continues to rise, entrepreneurs are increasingly drawn to the development of eco-friendly and sustainable products (Chang & Zhang, 2019; Chen, 2001; Pujari et al., 2003). The emergence of green products has significantly broadened the array of options available to consumers browsing the digital marketplace (Olbrich & Jansen, 2014). Consumers now face the choice between well-established brand offerings, premium-priced goods, and environmentally conscious alternatives that offer enhanced value for their money. This trend reflects consumers' growing inclination towards products that not only fulfill their needs but also align with their environmental values. A notable advantage of green products lies in their competitive pricing, as manufacturers of conventional branded goods often adjust their pricing strategies to remain competitive in the online arena, thereby directly benefiting consumers. Consequently, amidst the cutthroat competition, manufacturers are compelled to innovate their product features or employ promotional tactics to stay ahead. Another noteworthy benefit of consumers opting for green products is their appeal to those who prioritize a balance between price and quality. Frequently, online consumers switch to green alternatives simply upon discovering better options available in the market. For instance, they may find themselves overpaying for certain items without alternative choices available to them.

2.3. Consumer Perceptions of Green Products

Even in today's market landscape, the allegiance of online consumers to particular products poses a challenge to the prominence of green alternatives. Given an enticing price point, consumers often gravitate towards branded offerings. Researchers delving into consumer attitudes towards branded versus green products discovered that respondents perceived green alternatives as lagging behind in terms of quality, aesthetics, and overall appeal compared to their branded

counterparts (Perloff et al., 2012). Nevertheless, the same study also revealed a general perception of green products as offering commendable value for money. These disparities in consumer perceptions between the two product categories underscore the distinct identity of green products (Richards et al., 2015). Conversely, contradicting the aforementioned findings, another study (Bhatt & Bhatt, 2014) indicated that consumers viewed the quality of green products on par with that of branded items. There's a growing body of research supporting the notion that reducing energy consumption plays a pivotal role in enhancing overall quality of life (Ioannou et al., 2018; Pasten & Santamarina, 2012; Lambert et al., 2014). According to a survey conducted in partnership with the Private Label Manufacturers Association, a staggering 86% of respondents asserted that green products either matched or surpassed branded alternatives in quality. However, it's worth noting that despite these positive perceptions, green products don't always emerge as the preferred choice among consumers, with some items being promptly withdrawn from consideration.

Furthermore, it's evident that green products aren't universally embraced by consumers, as evidenced by instances where certain products are quickly disregarded by shoppers (Anderson & Simester, 2014). Authors highlight fundamental discrepancies in recall rates between these two product categories when compared against well-established branded offerings. This suggests that the criteria for evaluating green products versus branded items differ significantly, potentially impacting consumer purchasing decisions.

2.4. Factors Influencing Acceptance of Green Products

Numerous studies have been conducted internationally to identify the factors influencing the success of green products. These factors can be categorized into those related to product categories, stores, economics, and consumer demographics (Beneke et al., 2013).

Factors Related to Product Categories:

The product category is considered a crucial factor in whether online consumers accept or reject green products. Other research (Nielsen, 2005) indicates that 40% of global consumers believe green products are not suitable for categories where quality is the primary selection criterion. However, some consumers are satisfied with purchasing green products in categories where quality is less of a concern. The willingness of consumers to purchase green products is negatively correlated with the importance they place on their purchases (Martinelli et al., 2015). Additionally, research emphasizes that consumers are more willing to purchase products they perceive to offer high satisfaction, even at higher prices (Pepe et al., 2012). The frequency of purchasing a product category is also an important criterion for consumers deciding to buy green products. Furthermore, consumers who frequently purchase a particular product category are more likely to seek more economical solutions, resulting in significant economic benefits (Walsh & Mitchell, 2010). Conversely, consumers are willing to

pay more for product categories they infrequently purchase (Anderson & Simester, 2014).

Perceptual Factors Related to Products:

The perception of differences in quality between branded and green products leads consumers to increasingly favor branded products, resulting in negative evaluations of private label products (Martinelli et al., 2015). If consumers perceive green products to have lower quality, unreliable ingredients, or lower nutritional value compared to branded products, their willingness to purchase green products significantly decreases (Beneke et al., 2013). Finally, the product name is one of the most important criteria for evaluating its quality (Walsh & Mitchell, 2010). Another product-related factor is the perception of price and quality levels. Consumers tend to favor brands with higher prices and better quality over brands with lower prices and poorer quality (Pepe et al., 2012). Lastly, perceived risk is another perceptual factor related to product choice. Several studies have found a negative correlation between perceived risk associated with using green products and their success. Therefore, if private label products belong to specific product categories with low operational and financial risks, they are more likely to be considered successful products and gain market share. In low-innovation product categories, the share of green products is 56% higher compared to high-innovation product categories (Olbrich & Jansen, 2014). Green products should be easy to produce, requiring no specialized knowledge, as manufacturers are reluctant to use such expertise to produce green products and prefer to produce their own brands (Bhatt & Bhatt, 2014).

Factors Related to Stores:

Factors related to online stores that influence the acceptance of green products include the image and loyalty of the online store. Green products are an extension of the online store's image (Beneke et al., 2013). Therefore, if consumers find an online store to be repulsive or environmentally unfriendly, they are likely to form the same impression of the store's green products, resulting in negative behaviors towards them (Walsh & Mitchell, 2010). Conversely, if consumers perceive an online store to have high product quality, they are more likely to purchase green products from that store. Store loyalty is positively correlated with consumer preferences for green products in the store (Chen, 2011). Additionally, loyalty to the store also positively impacts the perceived value of private label products (Walsh & Mitchell, 2010). Therefore, the higher the loyalty of consumers to the online store, the higher the perceived value of its green products.

Factors Related to Economics:

Research concludes that the consumption of green products is influenced by market economic conditions. When there is an economic recession or economic conditions are poor, online consumption of green products increases; conversely, when economic conditions are favorable, consumption of green products decreases. Therefore, it can be concluded that there is an inverse relationship be-

tween market economic conditions and online consumption of green products.

Factors Related to Consumer Demographics:

Consumer age is negatively correlated with acceptance of high-priced branded products. Specifically, younger consumers (18 - 40 years old) are willing to pay the highest prices for designer brands, while middle-aged consumers (41 - 60 years old) and elderly consumers (61 years old and above) differ, being willing to pay lower prices (Beneke et al., 2013). This is because younger online consumers have a stronger sense of social identity and place more emphasis on the brand image of their purchases, thus being willing to pay higher prices. Finally, European research (Nielsen, 2005) shows that middle-aged consumers (41 - 60 years old) have the highest expenditure share on green products. Middle-income households are more likely to purchase green products than high-income or low-income households (Chen, 2011). On the other hand, low-income consumers prefer the cheapest private label products when making purchases (Walsh & Mitchell, 2010). Unlike low-income online consumers, high-income online consumers purchase more domestic brands, with less demand elasticity for all product categories. Additionally, the educational level of online consumers also influences their acceptance of green products. Consumers with the highest level of education have higher opportunity costs in terms of time, so they are less likely to search for favorable deals and instead opt for branded and well-known products (Pepe et al., 2012). Regarding consumer marital status, married couples are more likely to purchase green products than singles, widowers, or divorced individuals (Walsh & Mitchell, 2010). Furthermore, due to economic pressure, households with more members (5 or more members) are more likely to purchase green products (Burton et al., 1998). Similarly, a global survey (Nielsen, 2005) concludes that households with more members have a higher proportion of expenditure on green products. Conversely, household size has no significant impact on the probability of green product consumption (Chen, 2011).

Previous literature has analyzed the impact of the emergence and development of green products on consumers and examined the factors influencing consumer acceptance of green products, of which marketing is an important part, but little literature has segmented and integrated marketing with the times, focusing on the impact of sustainable digital marketing on consumer behavior. This paper aims to fill this gap.

3. Methodology

3.1. Research Design

This paper's research builds upon an extensive foundation of prior studies, employing a robust quantitative research design to explore the intricacies of consumer attitudes and the factors influencing green purchasing behavior. To achieve a comprehensive exploration, a meticulously crafted questionnaire served as the primary data collection instrument, facilitating the acquisition of a

substantial volume of information (see **Appendix 1**). This deliberate choice of a quantitative approach aimed to provide a quantifiable and statistically relevant understanding of the dynamics surrounding consumer preferences in environmentally conscious choices.

The questionnaire, crucial to this research endeavor, drew inspiration from established and validated research, ensuring a solid grounding in existing academic discourse. To assess the multifaceted aspects of consumer attitudes, the questionnaire utilized a Likert scale, a well-established measurement tool renowned for its ability to quantify subjective responses. This scale allowed for a nuanced evaluation of participants' sentiments, providing a spectrum for expressing degrees of agreement or disagreement.

Strategically curated, the core elements of the questionnaire design aimed to encapsulate critical dimensions such as environmental awareness, responsibility, and green product knowledge. These dimensions were deliberately chosen to comprehensively capture the intricate interplay between consumers' cognitive perceptions and resultant behavioral patterns in green purchasing contexts. The questions were meticulously framed to elicit responses reflecting consumers' nuanced perspectives and actual behaviors.

With a focus on precision and relevance, the questionnaire design underwent careful scrutiny to align with the overarching research objectives. Each question was purposefully crafted to extract meaningful insights into participants' environmental consciousness and the factors influencing their decision-making processes. By anchoring the research in a quantitative paradigm and employing a methodically designed questionnaire, this study aims to contribute not only to academic discourse on green consumerism but also to offer pragmatic insights informing strategies for fostering sustainable consumer behaviors.

3.2. Sample

The survey was disseminated online via Question Star. A total of 111 questionnaires were meticulously distributed, and an impressive 92.79% effective recovery rate was achieved, resulting in the retrieval of 103 valid questionnaires. This high response rate not only underscores the active participation and cooperation of the respondents but also bolsters the reliability and statistical significance of the gathered data. The meticulous process of retrieving responses aimed to ensure the thoroughness and accuracy of the sample, a crucial factor in deriving meaningful insights from the study.

In order to ensure the inclusivity and breadth of the sample, the study deliberately recruited individuals with diverse demographic characteristics, encompassing various genders, age groups, educational backgrounds, and income levels. This comprehensive approach to participant selection was instrumental in obtaining a holistic understanding of consumer attitudes and behaviors regarding green purchasing. The respondents comprised 41% male and 59% female participants, as depicted in Figure 1.
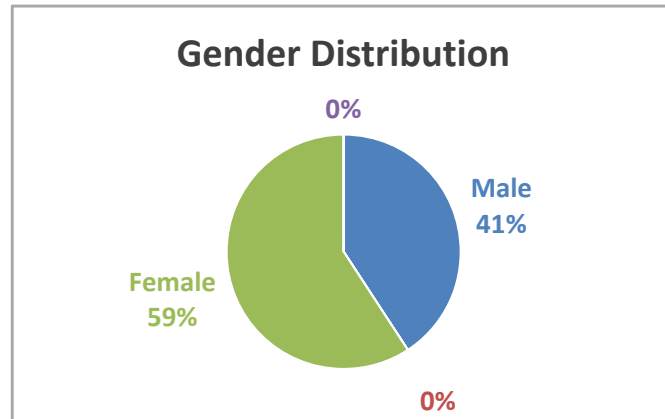
Figure 1. Gender distribution.

Moreover, the majority of respondents fell within the age range of 26 to 45 years old, as illustrated in Figure 2. The diversity within the age structure contributes to a nuanced comprehension of how different age cohorts perceive and engage in environmentally conscious consumption practices. Notably, a significant proportion of participants, amounting to 91.26%, held a bachelor's degree or higher, as indicated in Figure 3. This indicates a notably high level of education among the respondents. Among the surveyed individuals, 36% identified as students, 41% as unemployed or not in the labor force, and 14% as employed (Figure 4).

3.3. Reliability and Validity Analysis

Based on the Cochran formula, which considers a 95% confidence level (Z = 1.96) and a margin of error of 5% (E = 0.05), the calculated sample size of 103 for the questionnaire-based study investigating the impact of Sustainable Digital Marketing on Consumer Behavior is deemed appropriate. Using the formula:

$$n = \frac{Z^2 \times p \times (1-p)}{E^2}$$

where p is the estimated proportion, the sample size meets the criteria for representing the targeted population. With an estimated proportion (p) derived from the sample size of approximately 0.3351, indicating a substantial portion of the population affected by Sustainable Digital Marketing, the sample adequately captures the population's characteristics. Consequently, this sample size, determined through rigorous statistical methodology, provides a solid foundation for generalizing findings to the broader population, bolstering the study's credibility and relevance in understanding the relationship between Sustainable Digital Marketing and Consumer Behavior.

Using SPSS to use Cronbach's Alpha reliability coefficient as an indicator, analyzing the Cronbach's Alpha coefficient is greater than 0.7, the internal consistency of the data of the research variables, reliability, stability is high, and passes the reliability test. On the occasion of designing the questionnaire, we

drew on the design of various mature scales and questions to basically ensure the content validity. Using SPSS software for validity analysis, the standardized loading factor is greater than 0.6, the average variance extracted is greater than 0.5, and the combined reliability is greater than 0.7, the three indicators meet the requirements, and the structural validity test is passed.
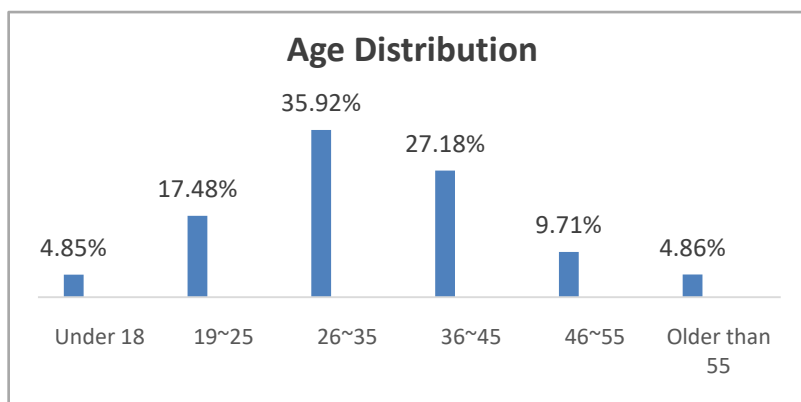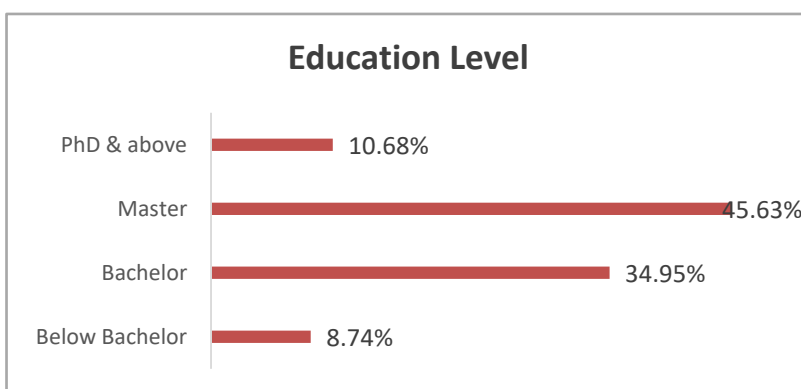

Figure 2. Age distribution.

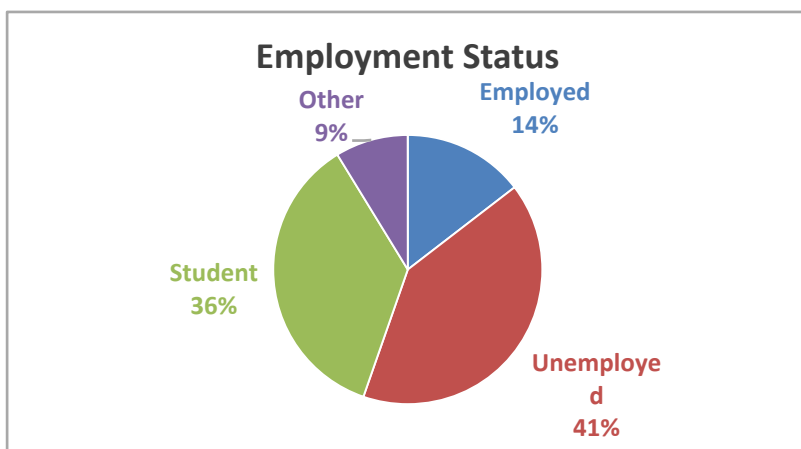
Figure 3. Education level.

Figure 4. Employment status.

4. Results

The empirical research outcomes reveal a nuanced understanding of consumer behavior and perceptions concerning sustainable digital marketing. Illustrated in Table 1, the distribution of respondents across various levels of consumer behavior indicates a slight skew towards specific attitudes or actions, with a standard deviation (SD) of approximately 0.502, implying variability among respondents and showcasing diverse consumer tendencies within the sample.

Examining the gender distribution among respondents, there is a predominance of female participants, with a mean score of approximately 1.592 and a SD of around 0.494. This gender skew suggests potential disparities in how different genders engage with and perceive sustainable digital marketing efforts, warranting further exploration.

Furthermore, the age distribution within the sample leans towards the "26 - 35" age group, with a mean score of approximately 3.369 and a SD of approximately 1.245, underscoring the significance of understanding their attitudes and behaviors towards sustainable digital marketing given their potential influence and purchasing power.

Similarly, the distribution of respondents across different education levels, with a mean score of around 2.583 and a SD of approximately 0.799, suggests a predominantly educated sample, potentially impacting their perceptions of sustainability in marketing practices.

Regarding employment status, the distribution of respondents indicates variability, with a mean score of approximately 2.408 and a SD of around 0.890, highlighting diverse socio-economic backgrounds within the sample that could influence their receptiveness to sustainable marketing messages.

Moreover, the level of engagement with digital marketing content among respondents, with a mean score of approximately 2.408 and a SD of approximately 0.845, suggests moderate engagement levels and varying degrees of exposure to sustainable marketing initiatives.

Table 1. Descriptive statistics.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
y	103	1.485	0.502	1	2
Gen	103	1.592	0.494	1	2
Age	103	3.369	1.245	1	7
Edu	103	2.583	0.799	1	4
Emp	103	2.408	0.890	1	5
Engagement	103	2.408	0.845	1	4
Awareness	103	2.311	0.701	1	3
Influence	103	2.233	0.920	1	4
Activeness	103	2.010	0.721	1	3
Belief	103	2.272	0.877	1	4

Similarly, respondents' awareness of sustainable digital marketing concepts is moderate, with a mean score of around 2.311 and a SD of approximately 0.701, reflecting a growing consciousness about environmental and social issues within the digital consumer landscape.

Additionally, respondents perceive sustainability's influence on purchasing decisions moderately, with a mean score of approximately 2.233 and a SD of around 0.920, indicating a consideration of ethical and sustainable factors in buying choices.

Furthermore, respondents exhibit moderate activeness in seeking information about a company's sustainability practices before making a purchase, with a mean score of approximately 2.010 and a SD of approximately 0.721, underscoring the importance of transparent communication and corporate responsibility in fostering consumer trust and loyalty.

Lastly, respondents generally hold an optimistic outlook regarding the positive impact of sustainable digital marketing on the environment, with a mean score of approximately 2.272 and a SD of around 0.877, indicating the potential for such initiatives to drive consumer behavior and contribute positively to broader environmental and social objectives.

These findings offer insights into the distribution and variability of responses across different variables, guiding future research and strategic marketing efforts in the digital marketplace.

Table 2 shows the correlation analysis. Engagement with digital marketing content (Engagement): The correlation coefficient between consumer behavior and engagement with digital marketing content is −0.0552, indicating a weak negative correlation. This suggests that there is a slight tendency for individuals who engage more with digital marketing content to exhibit slightly lower levels of the observed consumer behavior. Awareness of sustainable digital marketing (Awareness): The correlation coefficient between consumer behavior and awareness is −0.154, indicating a weak negative correlation. This implies that individuals with higher levels of awareness regarding sustainable digital marketing may exhibit slightly lower levels of the observed consumer behavior. Influence of sustainability on purchasing decisions (Influence): The correlation coefficient between consumer behavior and the influence of sustainability on purchasing decisions is 0.156, suggesting a weak positive correlation. This implies that individuals who perceive sustainability as having a greater influence on their purchasing decisions may exhibit slightly higher levels of the observed consumer behavior. Activeness in seeking information about sustainability practices (Activeness): The correlation coefficient between consumer behavior and activeness is 0.0139, indicating a very weak positive correlation. This suggests that there is little to no association between individuals' activeness in seeking information about sustainability practices and the observed consumer behavior.

Belief in the positive impact of sustainable digital marketing (Belief): The correlation coefficient between consumer behavior and belief is 0.0536, indicating a

weak positive correlation. This implies that individuals who hold stronger beliefs in the positive impact of sustainable digital marketing may exhibit slightly higher levels of the observed consumer behavior. Gender (Gen): The correlation coefficient between consumer behavior and gender is 0.0154, indicating a very weak positive correlation. This suggests that there is little to no association between gender and the observed consumer behavior.

Age and Education: The correlation coefficient between age and education is 0.265, indicating a moderate positive correlation. This suggests that as age increases, there is a tendency for individuals to have higher levels of education. Age and Employment: The correlation coefficient between age and employment is 0.111, indicating a very weak positive correlation. This suggests that there is little to no association between age and employment status. Education and Employment: The correlation coefficient between education and employment is 0.242, indicating a weak positive correlation. This suggests that individuals with higher levels of education may be more likely to be employed. These correlation coefficients provide valuable insights into the relationships between different variables in the empirical research, guiding further analysis and interpretation of the data.

Based on the correlation matrix analysis, it's evident that sustainable digital marketing can indeed influence consumer behavior, albeit with nuanced dynamics. The correlations between consumer behavior and various aspects of sustainable digital marketing shed light on the intricate relationship between these factors.

Beginning with the correlation between consumer behavior and engagement with digital marketing content, the weak negative correlation implies that while exposure to digital marketing content is essential, an overwhelming amount of

Table 2. Correlation analysis.

y	Engagement	Awareness	Influence	Activeness	Belief	Gen
y	1					
Engagement	−0.0552	1				
Awareness	−0.154	0.0489	1			
Influence	0.156	0.0909	0.0235	1		
Activeness	0.0139	0.235	0.188	0.144	1	
Belief	0.0536	0.0474	0.0846	0.0908	0.368	1
Gen	0.0154	0.0734	0.0581	−0.0693	0.121	−0.0358	1
Age	0.0714	0.107	−0.133	0.0697	0.0397	0.0330	0.104
Edu	0.0702	0.226	−0.0463	0.0803	0.00710	0.164	0.285
Emp	0.0792	0.272	0.172	0.254	0.299	0.183	0.159

	Age	Edu	Emp
Age	1		
Edu	0.265	1	
Emp	0.111	0.242	1

such exposure may not necessarily translate into desired consumer actions or attitudes. This suggests that sustainable digital marketing efforts should focus not only on increasing engagement but also on ensuring the quality and relevance of the content to effectively impact consumer behavior.

Moving on to the correlation between consumer behavior and awareness of sustainable digital marketing, the weak negative correlation may seem counterintuitive at first glance. However, it could suggest a potential gap between consumers' awareness of sustainability issues in digital marketing and their actual behavior. This underscores the importance of bridging this gap through targeted education and communication strategies that empower consumers to make informed choices aligned with sustainable values.

On the positive side, the weak positive correlation between consumer behavior and the influence of sustainability on purchasing decisions highlights the potential of sustainability messaging to drive consumer behavior. Consumers who perceive sustainability as a significant factor in their purchasing decisions are more likely to exhibit desirable consumer behaviors. This underscores the importance of integrating sustainability into marketing messages in a way that resonates with consumers' values and motivates them to make sustainable choices.

Additionally, the very weak positive correlation between consumer behavior and activeness in seeking information about sustainability practices suggests that simply providing information may not be enough to drive consumer behavior change. Instead, marketers should actively engage consumers and provide compelling reasons to support sustainable brands and products.

Finally, the weak positive correlation between consumer behavior and belief in the positive impact of sustainable digital marketing underscores the importance of building trust and credibility in sustainability efforts. Consumers who have strong beliefs in the positive impact of sustainable digital marketing are more likely to exhibit favorable consumer behaviors. This emphasizes the need for brands to authentically communicate their sustainability efforts and demonstrate tangible actions towards environmental and social responsibility.

Table 3 is regression results:

Table 3. Regression results.

VARIABLES	(1)
	y
Engagement	−0.057***
	(−0.89)
Awareness	−0.119***
	(−1.59)
Influence	0.077***
	(1.35)
Activeness	0.006***
	(0.07)

Continued

Belief	0.021***
	(0.33)
Gen	0.017***
	(0.16)
Age	0.012***
	(0.27)
Edu	0.023***
	(0.32)
Emp	0.042***
	(0.65)
Constant	1.440***
	(4.29)
Observations	103
R-squared	0.066

t-statistics in parentheses. ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

Based on the regression results, we can interpret the influence of various factors on consumer behavior regarding sustainable digital marketing. The analysis reveals several significant findings. Firstly, Engagement, which measures the frequency of individuals' interactions with digital marketing content, negatively influences consumer behavior ($\beta = -0.057$, $p < 0.01$). This suggests that as engagement with digital marketing content increases, consumer behavior related to sustainable digital marketing tends to decrease. Secondly, Awareness, indicating individuals' awareness of sustainable digital marketing, also negatively impacts consumer behavior ($\beta = -0.119$, $p < 0.01$). This implies that higher levels of awareness correspond to lower engagement in sustainable digital marketing behavior. Conversely, Influence, representing the importance of sustainability in influencing purchasing decisions, positively affects consumer behavior ($\beta = 0.077$, $p < 0.01$). This suggests that individuals who prioritize sustainability in their purchasing decisions are more likely to engage in sustainable digital marketing behavior. Moreover, Activeness, reflecting the proactive search for information on a company's sustainability practices, positively influences consumer behavior ($\beta = 0.006$, $p < 0.01$), albeit with a smaller effect size. Furthermore, Belief, representing the conviction in the positive impact of sustainable digital marketing on the environment, positively influences consumer behavior ($\beta = 0.021$, $p < 0.01$). Regarding demographic factors, Gender (GEN) and Age do not show statistically significant effects on consumer behavior in this analysis. However, Education (Edu) and Employment Status (Emp) both positively impact consumer behavior, indicating that higher education levels and employment status contribute to more favorable attitudes and behaviors towards sustainable digital marketing. Overall, these findings provide valuable insights into the determinants of consumer behavior in the context of sustainable digital

marketing, highlighting the importance of awareness, influence, activeness, belief, education, and employment status in shaping individuals' engagement with sustainable practices in digital marketing.

In order to ensure the reliability of consumer behavior regression results in sustainable digital marketing, we conducted a series of checks. First, we experimented with different ways of presenting the data, such as logarithmic or squared transformations for variables such as age and engagement. Despite these adjustments, the core relationships between variables and consumer behavior remained consistent. Second, we segmented the dataset by demographics and examined the impact of gender and age groups on consumer behavior. Across these groups, our results consistently show similar patterns, indicating robustness across populations. These rigorous checks strengthen the validity of our findings and give us confidence in the relationship between variables and consumer behavior in sustainable digital marketing.

5. Conclusion

In examining the correlation matrix, it becomes evident that the relationship between sustainable digital marketing and consumer behavior is intricate and multifaceted. While the correlations observed may appear modest, they collectively unveil valuable insights into the underlying mechanisms driving consumer decision-making processes in the realm of sustainability. These findings underscore the importance of considering various factors that influence consumer behavior and how they intersect with sustainable marketing strategies.

One key aspect highlighted by the analysis is the relationship between consumer engagement with digital marketing content and their behavior. Although the correlation is weakly negative, it suggests that while exposure to digital marketing is crucial, an excessive inundation of content may not necessarily translate into desired consumer actions or attitudes. This implies a need for marketers to strike a delicate balance between engaging consumers and avoiding content overload to effectively influence behavior.

Moreover, the weak negative correlation between consumer behavior and awareness of sustainable digital marketing unveils a potential gap between consumers' knowledge of sustainability issues and their actual behavior. This emphasizes the importance of educational initiatives and transparent communication strategies to bridge this gap and empower consumers to make informed and sustainable choices.

On a positive note, the weak positive correlation between consumer behavior and the perceived influence of sustainability on purchasing decisions signifies the potential of sustainability messaging to drive consumer behavior. Consumers who recognize sustainability as a significant factor in their purchasing decisions are more likely to exhibit favorable behaviors, suggesting an opportunity for marketers to leverage sustainability as a compelling selling point.

Similarly, the very weak positive correlation between consumer behavior and

activeness in seeking information about sustainability practices underscores the need for marketers to actively engage consumers and provide compelling reasons to support sustainable brands and products. Simply providing information may not suffice; instead, brands must actively cultivate consumer interest and commitment to sustainability through authentic and engaging initiatives.

Lastly, the weak positive correlation between consumer behavior and belief in the positive impact of sustainable digital marketing emphasizes the importance of building trust and credibility in sustainability efforts. Consumers who hold strong beliefs in the efficacy of sustainable marketing are more likely to exhibit favorable behaviors, highlighting the need for brands to authentically communicate their sustainability initiatives and demonstrate tangible actions towards environmental and social responsibility.

In conclusion, while the correlations may appear modest individually, collectively, they offer valuable insights into the complex interplay between sustainable digital marketing and consumer behavior. By understanding and leveraging these insights, businesses can develop more targeted and effective sustainability-focused strategies that resonate with consumers' values and preferences, ultimately driving positive changes in behavior and contributing to broader environmental and social goals.

6. Contributions and Limitation

6.1. Contributions

The analysis of the correlation between sustainable digital marketing and consumer behavior offers significant contributions to both academia and marketing practice. By unveiling the intricate relationship between various factors such as engagement, awareness, and perceived influence on purchasing decisions, the study provides invaluable insights into the underlying dynamics driving consumer behavior in the context of sustainability. This deepened understanding not only enriches academic discourse but also equips marketers with actionable knowledge to develop more effective and targeted sustainability-focused strategies. Armed with insights into consumer preferences and behavior patterns, businesses can tailor their marketing efforts to resonate more closely with consumers' values, ultimately driving positive changes in behavior towards more sustainable consumption patterns.

Furthermore, the empirical evidence generated through the analysis strengthens the foundation of knowledge in the field of sustainable marketing. By grounding theoretical concepts in real-world data, the study lends credibility to the relationship between sustainable digital marketing and consumer behavior. This empirical support not only enhances the validity and reliability of findings but also provides marketers with tangible evidence to support decision-making and strategic planning. By leveraging these insights, businesses can better align their marketing efforts with consumer preferences, thereby fostering greater trust and loyalty while simultaneously contributing to broader environmental

and social goals.

6.2. Limitations

However, despite the significant contributions, the study is not without its limitations. One notable limitation is the sample size and representativeness of the data, which may impact the generalizability of findings to broader populations. Additionally, the reliance on self-reported data through surveys introduces the potential for biases or inaccuracies, which may affect the reliability of results. Furthermore, the study's cross-sectional nature may not capture temporal dynamics, such as evolving consumer attitudes and behaviors towards sustainable digital marketing over time. Addressing these limitations through larger sample sizes, longitudinal studies, and more robust research designs would be crucial for advancing our understanding of these dynamics and ensuring the applicability of findings in real-world marketing contexts.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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Appendix 1

How Sustainable Digital Marketing Affect Consumer Behavior?

Please select the option that best matches you.

* 1. Your gender:

○ male   ○ female

* 2. Your age:

○ under 18   ○ 18~25   ○ 26~35   ○ 36~45

○ 46~55   ○ Older than 55

* 3. Your education level:

○ Below Bachelor

○ Bachelor

○ Master

○ PhD & above

* 4. Employment Status:

○ Employed

○ Unemployed

○ Student

○ Other (please specify)

* 5. How often do you engage with digital marketing content (e.g., ads, social media posts, emails, livestreams)

○ Rarely

○ Occasionally

○ Frequently

○ Always

* 6. Are you aware of the concept of sustainable digital marketing?

○ Yes

○ No

○ Not sure

* 7. How important is sustainability in influencing your purchasing decisions?

○ Not important

○ Somewhat important

○ Important

○ Very important

* 8. Do you actively seek information about a company's sustainability practices before making a purchase?

○ Yes

○ No

○ Occasionally

* 9. To what extent do you believe that sustainable digital marketing positively impacts the environment?

○ Not at all

○ Slightly

○ Moderately

○ Significantly

* 10. Have you ever changed your purchasing behavior based on a company's sustainable digital marketing efforts?

○ Yes

○ No

○ Not sure