



RESEARCH ARTICLE

Information Systems and Digital Marketing: Driving Sustainable Consumer Behavior

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In the digital age, information systems and digital marketing are powerful tools that can drive sustainable consumer behavior. This study explores the intricate relationship between digital marketing, social media, and online sustainability communication, emphasizing the role of information systems in this dynamic. A questionnaire survey conducted with 423 participants was used to test a structural model, evaluating the significance of digital marketing tools and online sustainability communication (Chaffey & Smith, 2013). The findings reveal that organizations' strategic use of digital marketing, supported by robust information systems, and their active presence on social networks significantly enhance online sustainability communication (Jones et al., 2008; Russo et al., 2022). Organizations can leverage information systems and digital marketing to communicate sustainability effectively by developing engaging content, utilizing social media platforms, and investing in advanced digital marketing tools (Shahzamal & Hassan, 2019; Patrício Silva et al., 2020). Businesses can apply these findings to craft more impactful digital marketing strategies that drive sustainable consumer behavior (McDonagh & Prothero, 2014). Marketers can use these insights to create content that resonates with consumers, encouraging sustainable actions (Kannan & Li, 2017). Furthermore, researchers can build on these findings to explore the broader impact of information systems on the relationship between digital marketing and sustainable consumer behavior.

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INTRODUCTION

Digital marketing is a powerful tool that can be used to educate consumers about sustainability, change attitudes and behaviors, and promote sustainable products and services. Sustainability is a growing concern for businesses and consumers (Al-Mulla et al., 2022). As the world faces the challenges of climate change and resource scarcity, organizations are increasingly looking for ways to reduce their environmental impact and operate more sustainably (Jones et al., 2008). Information systems play a crucial role in this process by enabling organizations to collect, process, and analyze data on consumer behavior and sustainability metrics. Digital marketing can play a vital role in helping organizations achieve their sustainability goals (Kemper & Ballantine, 2019). This study investigates the relationship between digital marketing, social media, and online sustainability communication in India, specifically focusing on how digital marketing influences online sustainability communication."

Digital marketing can communicate sustainability initiatives, engage with consumers on sustainability issues, and promote sustainable products and services (Patrício Silva et al., 2020). For

example, organizations can use social media to share information about their sustainability initiatives, engage with consumers on sustainability issues, and promote sustainable products and services (Al-Mulla et al., 2022). Additionally, information systems enable organizations to use digital marketing tools to track the effectiveness of their sustainability communication campaigns, analyze consumer engagement, and target specific consumer segments with relevant messaging (Russo et al., 2022). Despite the potential of digital marketing to promote sustainable consumer behavior, there is still a limited understanding of how digital marketing can be used most effectively for this purpose (McDonagh & Prothero, 2014).

The purpose of this study is to investigate the relationship between digital marketing, social media, and online sustainability communication. Specifically, the study aims to answer the following research question: **"How does digital marketing influence online sustainability communication?" This study also examines how information systems contribute to optimizing digital marketing efforts by providing insights into consumer behavior and sustainability outcomes.**

The study adopts a theoretical framework based on the theory of planned behavior and the theory of diffusion of innovation (Kannan & Li, 2017). The theory of planned behavior posits that individuals' intentions to engage in behavior are influenced by their attitudes towards the behavior, subjective norms, and perceived behavioral control.

The study uses a quantitative research methodology, and data is collected through a questionnaire survey of consumers. The survey measures the following variables: digital marketing use, social media use, online sustainability communication, attitude towards sustainable consumption, subjective norms, perceived behavioral control, relative advantage of sustainable consumption, compatibility of sustainable consumption with lifestyle, complexity of sustainable consumption, trialability of sustainable consumption, and observability of sustainable consumption.

The study's findings are expected to significantly contribute to understanding how digital marketing can be used to promote sustainable consumer behavior. The study's findings will interest businesses, marketers, and researchers. Businesses can use the findings to develop more effective digital marketing strategies for communicating sustainability. Marketers can use the insights to create engaging content that resonates with consumers and encourages sustainable behaviors. Researchers can use the findings to investigate further the relationship between digital marketing and sustainable consumer behavior and identify other factors influencing sustainable consumer behavior.

1.1 Theoretical rationale: The theoretical rationale for this study is based on the theory of learned behavior and the theory of diffusion of innovation. The theory of planned behavior posits that individuals' intentions to engage in behavior are influenced by their attitudes towards the behavior, subjective norms, and perceived behavioral control. The diffusion of innovation theory posits that adopting new products, services, or ideas is influenced by five factors: relative advantage, compatibility, complexity, trialability, and observability.

In the context of sustainable consumer behavior, digital marketing can influence consumers' attitudes toward sustainable consumption, subjective norms, and perceived behavioral control. For example, digital marketing campaigns can be used to educate consumers about the benefits of sustainable consumption (relative advantage), show how sustainable consumption is compatible with their lifestyle (compatibility), and reduce the perceived complexity of sustainable consumption (complexity). Additionally, digital marketing can facilitate the trialability and observability of sustainable consumption.

1.2 Managerial rationale: The managerial rationale for this study is to help businesses develop more effective digital marketing strategies for promoting sustainable consumer behavior. Businesses can use the study's findings to:

- Identify the most effective digital marketing channels for reaching and engaging consumers with sustainability messages.
- Develop content that resonates with consumers and encourages sustainable behaviors.
- Track the effectiveness of their sustainability communication campaigns.

1.3 Context of the research: This study was conducted in India, a rapidly growing economy with a large consumer base. As such, India is a crucial market for businesses promoting sustainability. However, there is still a limited understanding of how digital marketing can effectively promote sustainable consumer behavior in India.

This study aims to fill this gap by investigating the relationship between India's digital marketing, social media, and online sustainability communication. The study's findings will interest businesses, marketers, and researchers interested in learning more about how to use digital marketing to promote sustainable consumer behavior in India.

1.4 Characteristics of India relevant to sustainable consumer behavior: India is a country with a high level of poverty and inequality. Additionally, India faces several environmental challenges, including climate change, water scarcity, and air pollution. These factors can make it difficult for Indian consumers to adopt sustainable behaviors. However, there is a growing awareness of sustainability issues among Indian consumers, and digital marketing can play a vital role in promoting sustainable consumer behavior in India. By understanding the theoretical and managerial rationale for this study and the context of the research in India, the reader can better appreciate the significance of this study and its potential implications for businesses, marketers, and researchers.

The remainder of this paper is organized as follows: Section 2 reviews the relevant literature on digital marketing, social media, and online sustainability communication. Section 3 presents the theoretical framework for the study, which is based on the theory of planned behavior and the theory of diffusion of innovation. Section 4 describes the research methodology, which includes a description of the sample, data collection procedures, and measurement instruments. Section 5 presents the study's results, including the structural equation modeling analysis findings. Section 6 discusses the implications of the findings for businesses, marketers, and researchers. Section 7 concludes the paper with a summary of the main findings and suggestions for future research.

2. LITERATURE REVIEW AND RESEARCH HYPOTHESIS

This section will explore the theoretical framework supporting our study's research hypotheses. Digital marketing strategies have become increasingly vital for brands and organizations to remain competitive and effectively engage with consumers. Social networks are integral to this digital marketing strategy, providing a platform for building relationships between brands and their target audience. However, it is crucial to leverage digital marketing and social networks for promotional purposes and for developing sustainable communication to foster consumers' adoption of sustainable behaviors.

At the same time, sustainability is a growing concern for businesses and consumers. As the world faces the challenges of climate change and resource scarcity, organizations are increasingly looking for ways to reduce their environmental impact and operate more sustainably (Jones et al., 2008). Digital marketing can play a vital role in helping organizations achieve their sustainability goals (Kemper & Ballantine, 2019). Digital marketing can communicate sustainability initiatives, engage

with consumers on sustainability issues, and promote sustainable products and services (Patrício Silva et al., 2020). For example, organizations can use social media to share information about their sustainability initiatives, engage with consumers on sustainability issues, and promote sustainable products and services (Al-Mulla et al., 2022).

Additionally, organizations can use digital marketing tools to track the effectiveness of their sustainability communication campaigns and target specific consumer segments with relevant messaging (Russo et al., 2022). Despite the potential of digital marketing to promote sustainable consumer behavior, there still needs to be a greater understanding of how digital marketing can be used most effectively for this purpose (McDonagh & Prothero, 2014). The purpose of this study is to investigate the relationship between digital marketing, social media, and online sustainability communication.

This study adopts a theoretical framework based on the theory of planned behavior and the theory of diffusion of innovation (Kannan & Li, 2017). The theory of planned behavior posits that individuals' intentions to engage in behavior are influenced by their attitudes towards the behavior, subjective norms, and perceived behavioral control. The study's theoretical framework suggests that digital marketing can influence online sustainability communication through various mechanisms. For example, digital marketing can increase consumers' awareness of sustainability issues, change their attitudes toward sustainable consumption, and provide them with the necessary information and resources to engage in sustainable behaviors. Social media can also promote online sustainability communication by providing a platform for consumers to share information about sustainability, connect with other consumers interested in sustainability, and engage in dialogue with organizations about sustainability issues.

The study's theoretical framework is supported by a growing body of research on the relationship between digital marketing, social media, and sustainable consumer behavior. For example, a study by (Diez-Martin et al., 2019) found that digital marketing can increase consumer awareness of sustainable products and services, change consumer attitudes toward sustainable consumption, and make purchasing sustainable products and services more accessible. Another study by (Ktisti et al., 2022) found that green social media marketing can positively impact consumer purchase intentions for sustainable products. The literature suggests that digital marketing and social media can be crucial in promoting online sustainability communication and sustainable consumer behavior. However, more research is needed to understand how digital marketing and social media can be used most effectively to achieve these goals. The present study aims to contribute to this research by investigating the relationship between digital marketing, social media, and online sustainability communication.

2.1 Digital marketing and its tools

Digital marketing encompasses using digital technologies to implement marketing strategies that enhance organizations' understanding of their audiences and better meet their needs. It involves various actions directed toward the online environment, such as consumer purchase decisions on the Internet, product/service dissemination, and reinforcing a brand's positioning on social networks. The Internet is a potent tool for brands, significantly influencing pricing, product distribution, and promotional strategies. Various tools and methods for measuring the impact of strategies applied by brands and organizations have been developed to execute digital marketing effectively.

Information systems are integral to executing digital marketing effectively, as they enable the collection, processing, and analysis of vast amounts of data, providing insights that help tailor marketing efforts to specific consumer segments. These systems support various tools and methods for measuring the impact of strategies applied by brands and organizations. These tools include websites, mobile marketing (e.g., apps, Q.R. codes, SMS), email marketing (e.g., newsletters), social media platforms, search engine marketing (e.g., webmaster tools, Google Ads), content marketing

(e.g., white papers, videos, documents), and marketing analytics (e.g., Google Analytics, Social Bakers, among others). **By leveraging information systems, organizations can optimize these tools to enhance their digital presence, facilitate consumer interaction, and influence behaviors.** Within our study, we aim to explore the relationship between digital marketing strategies, their tools, the presence of brands on social networks, and the communication of sustainability. By examining this relationship, we seek to uncover how digital marketing efforts can effectively promote sustainable consumer behavior. It is essential to recognize the potential of digital marketing platforms and techniques to reach consumers, foster a sense of environmental responsibility, and encourage sustainable choices. We will proceed to the methodology section to further our understanding, outlining the research design and data collection methods employed to investigate the proposed relationships and test our research hypotheses.

2.2 Sustainability communication

The increasing awareness of climate change, resource depletion, and the negative impact of fossil fuel consumption has underscored the importance of sustainable behaviors among individuals and organizations. Sustainable development, encompassing economic, social, and environmental dimensions, has emerged as a vital concept in addressing these challenges (United Nations, 2015). It emphasizes the ability to achieve present goals without jeopardizing the well-being of future generations (Di Fabio & Peiró, 2018). Climate change has had far-reaching effects on human life, manifesting in increased mortality, the spread of diseases, and ecological disruptions (Intergovernmental Panel on Climate Change, 2022). Extreme weather events, such as floods, droughts, and heat waves, have become more frequent, posing significant risks to human populations and ecosystems (Stevens et al., 2021). The need for sustainable communication and promoting sustainable behaviors has become increasingly urgent in light of these challenges. Sustainability communication is crucial in promoting individuals' adoption of sustainable behaviors. It enhances knowledge, raises awareness, and facilitates access to information, education, and diverse perspectives on sustainability-related issues (Shahzalal & Hassan, 2019). Through digital marketing and social media platforms, brands and organizations can actively engage with stakeholders, fostering interaction and encouraging the adoption of sustainable practices.

In the context of our study, understanding the relationship between digital marketing strategies, social media presence, and sustainability communication is essential. By exploring how organizations leverage digital platforms and social networks to communicate sustainability, we aim to shed light on the effectiveness of such initiatives in fostering sustainable behaviors among consumers. Recognizing the power of digital marketing tools and online platforms, we can identify strategies that effectively disseminate sustainability-related information, encourage engagement, and drive positive changes in consumer behavior. Based on the information presented earlier, we have developed a research hypothesis that explores the relationship between organizations' use of digital marketing and online sustainability communication. It is worth noting that some authors argue against the compatibility of digital marketing and sustainability, as the former tends to emphasize continuous consumption by promoting new products or enhancing brand presence in digital media; this contrasts the principles advocated by sustainability proponents, prioritizing reuse, reduced purchases, and limitations on non-renewable resources (Jones et al., 2008; Kemper & Ballantine, 2019; Hu et al., 2019).

However, despite this perceived contradiction, digital marketing can contribute to a deeper understanding of consumer behavior and shape their attitudes, beliefs, and behaviors toward adopting sustainable practices. Furthermore, it can facilitate sustainability efforts such as product differentiation, attracting environmentally conscious investors, and promoting a more significant commitment to environmental well-being among employees (Diez-Martin et al., 2019). Therefore, these two domains, digital marketing and sustainability, have the potential to complement each other

and, most importantly, foster environmental awareness among all stakeholders involved. As companies navigate this duality, new technologies have a significant impact, prompting organizations to adapt, innovate, and explore new avenues for creating competitive value. Social networks play a crucial role in this landscape, enabling users to create, share, and exchange information and facilitating interaction among various groups, including companies, customers, and stakeholders (Russo et al., 2022). Based on these considerations, we have formulated an additional hypothesis that explores the indirect relationship between organizations' use of digital marketing and online sustainability communication through the significance placed on digital marketing tools. This hypothesis acknowledges that digital marketing can catalyze sustainable communication efforts online when employed effectively.

Hypothesis 2.1: Organizations' use of digital marketing is estimated to indirectly contribute to online sustainability communication through the importance assigned to digital marketing tools.

2.3 Social media

Social media has become a crucial platform for brands and organizations to effectively shape strategies and engage with consumers. It serves as an open gateway to a vast global audience, allowing brands and organizations to communicate and connect with millions of people, presenting limitless market opportunities (Bala & Verma, 2018).

Data from April 2022 indicates that approximately 58.7% of the world's population, equivalent to 6.65 billion people, actively use social networks. These users spend an average of two and a half hours daily on social media, accounting for around 15% of their daily time (Data Reports, 2022). These statistics highlight the need for brands and organizations to establish a strong presence on social media platforms since consumers invest significant time. Consequently, we propose the following research hypothesis:

Hypothesis 3: The use of digital marketing by organizations is directly related to their social media presence.

Furthermore, the proliferation of social networks has increased the need for brands and organizations to establish their presence on these platforms. This presence facilitates enhanced connectivity and consumer interaction (De Ruyter et al., 2022). It also creates an opportunity to develop effective strategies for communicating sustainability by leveraging various approaches such as sustainability education, inclusive design, digital media, and gamification concepts and methods (Al-Mulla et al., 2022). Therefore, we will test the following hypothesis:

Hypothesis 3.1: The use of digital marketing by organizations is indirectly related to online sustainability communication through their social media presence.

To investigate the relationships outlined in the research hypotheses, we propose a structural model, as depicted in Figure 1. This model aims to represent the interconnections between the dimensions under examination visually. By examining these relationships, we can gain valuable insights into how digital marketing and social media can be leveraged effectively to communicate sustainability and foster engagement with online audiences.

3. METHODOLOGY

The methodology for this research study involves conducting a comprehensive literature review to gather relevant information and insights. This literature review serves as the foundation for formulating the research hypotheses. From the literature review and the formulated research hypotheses, a structural model (Figure 1) is proposed; it aims to depict the relationships between the different dimensions within the structural framework. The structural model acts as a visual

representation that helps understand and analyze the interconnections among the variables under investigation. This approach ensures a well-grounded and systematic investigation of the research topic.

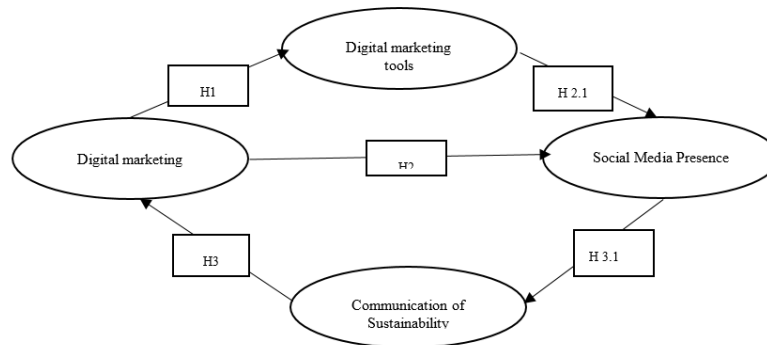


Figure 1: Structural model

3.1 Procedure and characterization of the participants

The study utilized a convenience sampling method, meaning participants were selected based on their availability and willingness to participate rather than through random selection. The data collection involved distributing online questionnaires exclusively between January 28, 2023, and April 28, 2023. After the data collection deadline, the questionnaire protocol was no longer accessible.

The study began by obtaining informed consent from participants, which outlined the purpose of the study, emphasized voluntary participation, and assured confidentiality regarding data analysis and result dissemination. Participants were then presented with a series of questionnaires. Firstly, they were asked about brands' presence on social networks, followed by a questionnaire on organizations' use of digital marketing, another on the importance of digital marketing tools, a questionnaire on online continuous sustainability communication, and a sociodemographic questionnaire. The sample consisted of 423 participants, including 149 (35.2%) men, 273 (64.5%) women, and 1 (0.2%) participant who identified with another gender. The participants ranged from 18 to 73 years, averaging 42.74 (SD = 15.94). Among the participants, 240 (99.3%) were of Indian nationality, 2 (0.5%) were of Nepali nationality, and 1 (0.2%) was of Srilankan nationality. In terms of marital status, 175 (41.4%) participants were married, 164 (38.8%) were single, 36 (8.5%) were divorced, 36 (8.5%) were in a de facto union, 4 (0.9%) were separated, 4 (0.9%) were widowed, and 4 (0.9%) had another level of civil commitment. Regarding education, 166 (39.2%) participants had a doctorate, 100 (23.6%) had a degree, 86 (20.3%) had a master's degree, 38 (9%) had a post-doctoral degree, 31 (7.3%) had a secondary degree, 1 (0.2%) had a specialization, and finally, 1 (0.2%) had a bachelor's degree.

Table 1: Gender distribution

Gender	Frequency	Percent
Male	149	35.20%
Female	273	64.50%
Other	1	0.20%

Table 2: Age distribution

Age Group	Frequency	Percent
18-34	175	41.10%
35-64	249	58.90%
65+	3	0.70%

Table 3: Nationality of the respondents

Nationality	Frequency	Percent
Indian	240	99.30%
Nepali	2	0.50%
Srilankan	1	0.20%

Table 4: Education distribution

Education Level	Frequency	Percent
Doctorate	166	39.20%
Master's degree	86	20.30%
Post-doctoral degree	38	9%
Degree	100	23.60%
Secondary degree	31	7.30%
Specialization	1	0.20%
Bachelor's degree	1	0.20%

The descriptive analysis of the participant demographics shows that the majority of participants were female (64.5%), between the ages of 18 and 34 (41.1%), and had a doctorate or master's degree (62.8%). The participants also generally agreed or strongly agreed that brands' presence on social networks is essential (mean = 4.88), that organizations should use digital marketing (mean = 4.49), that digital marketing tools are important (mean = 4.18), and that online continuous sustainability communication is important (mean = 4.32).

These findings suggest that the participants are interested in digital marketing and believe it can be useful for promoting sustainable consumption. However, it is essential to note that the sample does not represent the general population, as it consists primarily of highly educated Indians.

3.2 Instruments

To measure the variables in our study, we created a scale of four items to evaluate brands' presence on social networks. Each item represented a different aspect, such as "Information exchange." Participants were asked to rate their agreement using a Likert-type response format on a scale ranging from 1 (strongly disagree) to 5 (strongly agree). The internal consistency of this scale was deemed acceptable based on the analysis using Cronbach's Alpha ($\alpha=.78$), as reported by (Gliem & Gliem, 2003), for the sample in our study. To assess the use of digital marketing by organizations, we constructed a scale with four items. One item, for example, stated: "Measuring digital marketing results is perceived as very important for the companies." Participants indicated their level of agreement on a Likert-type response scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The internal consistency of this scale in our study was considered good, with an α of .86. To gauge the importance attributed to digital marketing tools; we developed a scale of eight items. This scale covered various tools, including "Mobile Marketing (app, QR-codes, SMS)." Participants were asked to rate the importance of these tools on a scale ranging from 1 (very low) to 5 (very high). The internal consistency of this scale for our sample indicated good reliability, with an α of .81.

For assessing sustainability communication online, we created a scale with six items. One item example was "Sustainability must be communicated through digital." Participants expressed their level of agreement on a Likert-type response scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The internal consistency of this scale in our study was good, with an α of .88. By employing these carefully developed measurement scales, which aligned with previous research, we aimed to effectively capture and evaluate the variables of interest in our study.

3.3 Alternative research methods

The quantitative survey method used in this study has certain limitations. First, the sample is not representative of the general population. Second, the survey relies on self-reported data, which may be subject to bias. Third, the survey does not allow an in-depth exploration of the complex motivations and influences behind consumer behavior.

Future research could address these limitations using alternative research methods, such as in-depth interviews, focus groups, case studies, online surveys, and social media analysis. These methods could be used to explore the role of digital marketing in promoting sustainable consumption in more depth and from various perspectives.

- **In-depth interviews:** In-depth interviews with consumers and marketing professionals could provide valuable insights into the role of digital marketing in promoting sustainable consumption. For example, interviews with consumers could explore how they use digital media to learn about sustainable products and services and how digital marketing campaigns influence their purchasing decisions.
- **Focus groups:** Focus groups with consumers could also be used to gather insights on the role of digital marketing in promoting sustainable consumption. Focus groups could be used to explore topics such as:
 - How consumers perceive digital marketing campaigns that promote sustainable consumption
 - The factors that influence consumers to click on or share sustainable digital marketing content
 - The role of digital marketing in building brand awareness and loyalty among consumers who are interested in sustainable consumption
- **Case studies:** Case studies of organizations using digital marketing to promote sustainable consumption could provide valuable insights into the effectiveness of different approaches. Case studies could explore the following:

- The specific digital marketing strategies that organizations are using to promote sustainable consumption
 - The impact of these digital marketing strategies on consumer awareness, attitudes, and behaviors towards sustainable consumption
 - The challenges that organizations face in using digital marketing to promote sustainable consumption
- **Online surveys:** They can collect data from many participants on their perceptions of digital marketing and sustainable consumption. Online surveys can be used to measure variables such as:
 - Brand awareness of sustainable products and services
 - Attitudes towards digital marketing campaigns that promote sustainable consumption
 - Self-reported sustainable consumption behaviors
 - **Social media analysis:** Social media analysis can track how consumers interact with digital marketing content related to sustainable consumption. Social media analysis can be used to measure metrics such as:
 - The reach and engagement of sustainable digital marketing campaigns
 - The sentiment of consumer conversations about sustainable digital marketing
 - The types of sustainable digital marketing content that consumers are most likely to share

4. ANALYSIS

We conducted statistical analyses using the Statistical Package for the Social Sciences (IBM SPSS) version 27.0 and Analysis of Moment Structures (AMOS) version 27.0 for Windows to analyze our data.

Table 5 presents the correlations between the variables in our study and the internal consistency indices of the variables in the structural model. The total sample size was 423 participants. The table also includes the mean values and standard deviations of the variables. The correlations between the variables indicate the presence of moderate relationships ($.30 < r < .50$) and strong relationships ($r > .50$), as defined by (Cohen, 1988). These relationships are statistically significant ($p < .001$), suggesting that the variables are linearly related. Importantly, there is no evidence of multicollinearity among the variables.

Table 5: Correlations, mean values, standard deviations, and internal consistency indices

Variable	Digital Marketing	Sustainability Communication	Social Media	Mean	Standard Deviation	Alpha
Digital Marketing	-	0.54***	0.40***	16.88	2.23	0.86
Sustainability Communication	0.54***	-	0.42***	24.89	3.59	0.88
Social Media	0.40***	0.42***	-	14.26	2.83	0.78

Note: *** $p < .001$

This table presents the correlations between the study variables, including digital marketing, sustainability communication, social media, and digital marketing tools. It also includes the mean

values and standard deviations for each variable, as well as the internal consistency indices (measured by Cronbach's alpha), indicating the reliability of the measures.

Table 6: Adjustment indexes by measurement instrument (values without outliers)

Instrument	GFI	CFI	RMSEA	AIC
Digital Marketing	0.99	0.99	0.10	25.45
Sustainability Communication	0.98	0.99	0.07	48.51
Social Media	0.95	0.92	0.23	62.19
Digital Marketing Tools	0.84	0.73	0.16	331.8

Note: Values represent adjustment indices for each measurement instrument, with outliers excluded from the analysis.

Table 6 provides the adjustment indices for each measurement instrument after addressing the presence of outliers in the data. These indices help evaluate how well the instruments fit the observed data. For the instrument "Digital Marketing," the adjustment indices indicate a good fit. The Goodness-of-Fit Index (GFI) and Comparative Fit Index (CFI) have high values close to 1, suggesting a solid fit. The Root Mean Square Error of Approximation (RMSEA) is 0.10, which falls within an acceptable range. The Akaike Information Criterion (AIC) value is 25.45, indicating a relatively low level of information loss.

Regarding the "Sustainability Communication" instrument, the adjustment indices also indicate a good fit. The GFI and CFI values are high, close to 1, indicating a solid fit. The RMSEA value is 0.07, indicating a good fit with the data. The AIC value is 48.51, which suggests a low level of information loss. The adjustment indices for the "Social Media" instrument show a slightly lower fit than the previous instruments. The GFI and CFI values are still relatively high, indicating an acceptable fit. However, the RMSEA value is 0.23, which suggests a moderate fit. The AIC value is 62.19, indicating a higher information loss level than the previous instruments.

In the case of the instrument "Digital Marketing Tools," the adjustment indices indicate a relatively lower fit. The GFI and CFI values are lower than the previous instruments, suggesting a weaker fit. The RMSEA value is 0.16, meaning a moderate fit. The AIC value is 331.8, indicating a higher level of information loss than the other instruments. These adjustment indices provide insights into the goodness-of-fit of each measurement instrument, allowing us to evaluate their effectiveness in capturing the intended constructs. We utilized several fit indices, including the Goodness of Fit Index (GFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), and Akaike Information Criterion (AIC), to evaluate the measurement instruments and the overall model fit (Gilson et al., 2013; Marôco, 2010). Bootstrapping analyses were conducted with 500 samples and a 95% confidence interval (Cheung & Lau, 2007; Marôco, 2010). We can make the following observations based on the values presented in the table above, as Marôco (2010) suggested. The questionnaire assessing the use of digital marketing by organizations and the questionnaire evaluating online sustainability communication, without outliers, demonstrated excellent GFI and CFI values ($\geq .95$) and good RMSEA values ($.05 < \text{RMSEA} < .10$). On the other hand, the questionnaire assessing the presence of brands on social networks, without outliers, exhibited good GFI and CFI values ($.90 < \text{GFI} < .95$) but had unacceptable RMSEA values ($> .10$). Finally, the questionnaire measuring the importance attributed to digital marketing tools, without outliers, had poor GFI values ($.80 < \text{GFI} < .90$), wrong CFI values ($< .80$), and unacceptable RMSEA values ($> .10$).

With these results, we proceeded to perform path analysis to evaluate the fit of the structural model to the data and test the proposed hypotheses, thus confirming the existence or non-existence of the proposed relationships between the constructs. The structural model demonstrated an excellent CFI value ($\geq .95$; .96 for the present sample) and a good GFI value ($.90 < GFI < .95$; .90 for the present sample). However, the RMSEA value was unacceptable ($> .10$; .22 for the present sample), and the AIC value was 56.21. Despite the unacceptable RMSEA value, it is essential to note that this index is sensitive to sample size and model complexity (Chen, 2007). Considering this, we decided to accept the model based on the robustness of the CFI index (Cheung & Lau, 2008)

5. PRESENTATION OF RESULTS AND DISCUSSION

The results from the confirmatory factor analyses indicate that the measurement models, after excluding outliers, demonstrate a satisfactory fit to the data. However, it should be noted that the instrument assessing the importance attributed to digital marketing tools yielded suboptimal CFI values. Nevertheless, this instrument was retained in the structural model for further analysis.

Concerning the structural model, a robust fit to the data, without outliers, was observed (CFI = .96). Figure 2 provides a more detailed representation of the standardized estimates among the constructs in the final structural model.

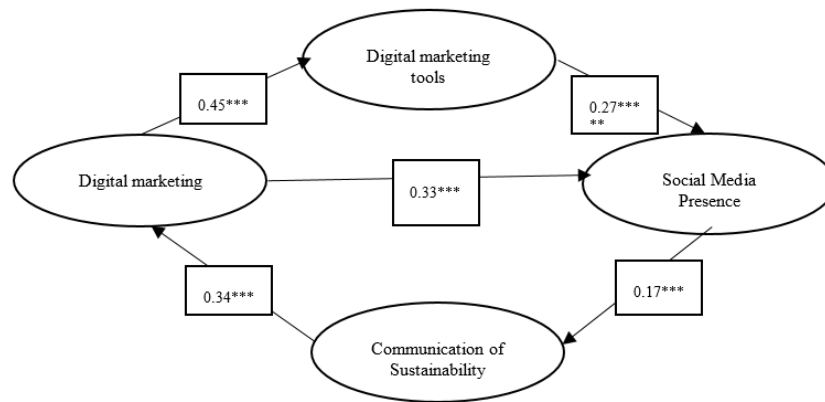


Figure 2: Final structural model (*) $p < .001$**

The findings reveal statistically significant relationships between the constructs. It becomes evident that there is a direct association between the use of digital marketing by organizations and the importance attributed to digital marketing tools ($\beta = .45$). Furthermore, a direct relationship exists between the use of digital marketing by organizations and the communication of sustainability online ($\beta = .33$). Additionally, a direct link is identified between the use of digital marketing by organizations and the presence of brands on social networks ($\beta = .34$).

Regarding indirect effects, it is evident that digital marketing tools act as a mediator between digital marketing and online sustainability communication ($\beta = .12$). Moreover, the presence on social networks serves as a mediator between the use of digital marketing by organizations and online sustainability communication ($\beta = .06$).

Table 7: Beta values (β) of the hypotheses

Hypotheses	β
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H1	.45
H2	.45
H2.1	.12
H3	.34
H3.1	.06

The results confirm all the initially formulated hypotheses. However, Hypothesis 3.1 exhibits the lowest value ($\beta = .06$), potentially due to the nature of the questions in the questionnaire regarding organizations' presence on social networks. While social networks offer opportunities for influencing sustainable behaviors through various means, such as information exchange and positive reinforcement, the specific questions in the questionnaire may have influenced this result (Al-Mulla et al., 2022)

Digital marketing plays a crucial role in promoting sustainability. It enables global reach, allowing organizations to communicate their sustainable practices effectively and influence consumer behaviors. Additionally, digital marketing contributes to understanding consumer decision-making and educating society about climate change impacts. It can be used to develop strategies for product sustainability, reuse, and transformation while differentiating products and improving production chains.

(McDonagh & Prothero, 2014; Diez-Martin et al., 2019; Whittaker et al., 2021).

Participants in the study perceive a direct relationship between marketing and the importance of digital marketing tools, particularly emphasizing the significance of communicating sustainability through digital platforms. However, organizations must ensure transparent and credible communication to avoid greenwashing and maintain stakeholders' trust (Stoknes & Rockström, 2018; Huang et al., 2022)

6. CONCLUSIONS

This study successfully investigated the relationship between digital marketing, its tools, brands' presence on social networks, and the online communication of sustainability. The proposed structural model demonstrated an excellent fit for the data. The relationships between the constructs were statistically significant, except for hypothesis 3.1, which suggested an indirect relationship between the use of digital marketing by organizations and online sustainability communication through the presence on social networks, showing a low value ($\beta = .06$).

Information systems played a crucial role in analyzing these relationships by enabling the precise measurement and interpretation of data across digital platforms. The theoretical implications of this study contribute to the advancement of research in both digital marketing and sustainability. It reaffirms the potential of using digital marketing to promote sustainability despite the ongoing debate surrounding marketing for sustainability purposes. Moreover, the integration of information systems within digital marketing efforts enhances the ability to track and assess the effectiveness of sustainability communication, providing a data-driven approach to promoting sustainable practices.

Interestingly, 84% of the participants in this study agreed or strongly agreed that sustainability can be effectively communicated through digital marketing.

From a practical standpoint, the findings suggest that digital marketing strategies and campaigns can be developed to foster sustainability. For example, initiatives such as used clothing donation or recycling campaigns that offer customers discounts can promote brand recycling efforts and consumer consumption, contributing to economic growth without depleting new resources.

However, it is essential to acknowledge the limitations of this study. One limitation is the need for an in-depth exploration of sustainable consumer behavior concerning the variables studied, which would be valuable to investigate in future research. Additionally, repeating the study with a population characterized by lower levels of education would provide insights into the influence of education on individuals' sustainable behavior and their perspectives on sustainable communication. Furthermore, conducting the study among different generational cohorts would allow for understanding diverse views on using digital marketing in promoting sustainability. Lastly, researching digital influencers' role in promoting and influencing sustainable behaviors could provide valuable insights into the potential impact of digital marketing on sustainability initiatives.

In conclusion, this study sheds light on the interplay between digital marketing, sustainability communication, and brand presence on social networks. It highlights the importance of leveraging digital marketing strategies to promote sustainability and emphasizes the need for further research in this dynamic and evolving field.

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