

# Information and Communication Technology, Integrated Marketing Communication, Social Media Branding and Memorable Tourist Experience Impact on Heritage Green Tourism

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Recommended citation:

**Alyahya, Mansour** (2024). "Information and Communication Technology, Integrated Marketing Communication, Social Media Branding and Memorable Tourist Experience Impact on Heritage Green Tourism". *Profesional de la información*, v. 33, n. 5, e330323.

<https://doi.org/10.3145/epi.2024.ene.0323>

Manuscript received on 5<sup>th</sup> February 2024

Accepted on 20<sup>th</sup> June 2024



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## Abstract

The research aimed to empirically test the impact of information and communication technology, information marketing communication, social branding, and memorable tourist experiences on green tourism with the mediating effect of tourist behavior on Saudi Arabian heritage tourism. The study also tested the moderating role of tourist environmental attitudes between tourist behavior and green tourism. For this purpose, employing self-administered questionnaire data collected from 370 tourists from two Saudi Arabia areas namely Al-Ula and Diriyah. Use a convenient sampling technique, cross-sectional research design, and Partial Least Square (PLS)-Structural Equation Modeling (SEM) technique for data analysis. The findings reveal that social media branding, information and communication technology, information marketing communication, and memorable tourism experiences each have a positive and significant impact on green tourism. The study also identifies the mediating role of tourism behavior and the moderating effect of environmental attitudes. These findings contribute to theoretical understanding by integrating these factors into a mediated-moderated model and offer implications for developing targeted green tourism strategies which emphasize the need for coordinated marketing efforts, and memorable eco-focused experiences. Practically, these results highlight the importance of enhancing tourist engagement with green tourism and achieving sustainability goals which is offering an actionable insights for green tourism.

## Keywords

Social Media, Green Tourism, Tourist Environment Attitude, Saudi Arabia.

## 1. Introduction

Heritage is an important aspect of any country, as it shows cultural and historical assets that contribute significantly to economic development (**Brooks et al.**, 2023). This is the reason, emphasizes on enhancement of green tourism is important for sustainable heritage sites and mitigating tourism activities (**Al Fahmawee; Jawabreh**, 2023). Green tourism promotes environmentally responsible practices that help preserve the integrity of heritage sites, reduce resource consumption, and minimize ecological footprints (**Al Fahmawee; Jawabreh**, 2023). By integrating sustainable practices, heritage tourism can ensure the long-term viability of cultural assets which could lead to enhancing quality of visitor experiences and enhancing greater environmental stewardship. In another sense, green tourism is an integral part of any economic development from both social and economic perspectives. Therefore, adopting green tourism principles is important for maintaining the balance between tourism developments and preserving heritage assets.



Green tourism becomes an integral part of any economic development. Various factors are important which help to increase the green tourism of any nation. Among those, tourist behaviors are an impact factor that helps to significantly enhance the tourist experience by aligning activities with personal values and preferences that could lead to more satisfying visits (**Chiwaridzo; Masengu, 2023; Leung et al., 2023**). To improve tourist behavior which helps to increase green tourism, Information and communication technology, integrated marketing communication, memorable tourism experiences, and social media branding play a crucial role (**Leung et al., 2023; Chiwaridzo; Masengu, 2023**). Information technology provides tourists with real-time, accessible information about sustainable practices, influencing their choices toward eco-friendly options (**Chiwaridzo; Masengu, 2023**). Integrated marketing communication ensures consistent messaging about sustainability, helping tourists make informed decisions and reinforcing their commitment to green practices (**Hasdiansa; Hasbiah, 2023**). Memorable tourism experiences, which integrate cultural and environmental aspects help to enhance sustainability and encourage responsible behavior (**Çevrimkaya; Zengin, 2023**). Social media branding through effectively promoting sustainable initiatives and engaging with eco-conscious audiences shapes positive tourist behavior (**Abbasi et al., 2023**), which could increase greater participation in green tourism activities (**Chiwaridzo; Masengu, 2023**). Seeking significance, research focused on testing the impact of information and communication technology, information marketing communication, social branding, and memorable tourist experiences on green tourism through tourist behavior.

Several empirical studies have been conducted but still have several gaps. Firstly, different studies have examined the direct effects of social media branding, information marketing communication, information communication technology, and memorable tourism experiences on other tourism factors with a limited focus on green tourism and mediating effects. For example, social media branding is generally recognized for increasing green tourism (**Chiwaridzo; Masengu, 2023**), but research has often overlooked how tourist behavior mediates this relationship in the context of Saudi Arabia. Similarly, information and communication technology is known to support green tourism by providing real-time information which helps to positively increase tourism (**Li et al., 2023**), while studying the unexplored impact of green tourism and tourist mediating role. Studies on integrated marketing communication and memorable tourism experiences also emphasize direct impacts without fully addressing how these factors influence tourist behavior and subsequently affect green tourism (**Dahana et al., 2023; Juliana et al., 2024**). This gap in understanding highlighted the need for research that considers the mediating effects of tourist behavior in the context of green tourism

Furthermore, extant studies also have inconsistent findings regarding their relationship. Some of the studies on integrated marketing communication have shown a positive and significant effect on tourism (**Chutimant, 2024; Yuliandari; Anom, 2024**), while another study has shown the negative impact of integrated marketing communication on tourism (**Li et al., 2024**). Other studies on information and communication technology have also shown a positive and significant impact on tourism (**Huang et al., 2023**), and other studies have shown a negative impact of information and communication technology on tourism (**Ali et al., 2024; Li et al., 2024**). Social media brands have had a positive and significant impact on tourism (**Chiwaridzo; Masengu, 2023**), while other study shown results in other contexts (**Chiwaridzo; Masengu, 2024**). Memorable tourist experience also has a positive and significant impact on tourism (**Rasoolimanesh et al., 2022**) while other studies found an insignificant impact of memorable tourist experience on tourism (**Chen et al., 2023**). Given the inconsistent findings and limited attention on green tourism in extant research, the moderating effect of tourist environmental attitude becomes a critical factor to clear the relationship. Tourist environmental attitude could serve as a crucial moderating factor that could strengthen the inconsistencies in the impact of marketing communication, social media, and memorable experiences on green tourism. Tourists with strong pro-environmental attitudes change their behavior (**DeVillie et al., 2021; Khan, 2024**) which increase green tourism. In contrast, those with weaker environmental attitudes might not be as influenced, or could even react negatively (**Khan, 2024**). Various authors also argued that in further research environmental attitude could be used a moderating variables (**Liao, 2018; Bissing-Olson et al., 2013**). Therefore, the study focused on moderating the effect of tourist environmental attitudes in the context of Saudi Arabia's heritage tourism.

In other words, extant studies also majorly focused on other countries with limited attention on Saudi Arabia especially, Al-Ula and Diriyah (**Chiwaridzo; Masengu, 2023**), which is leaving a significant gap in understanding how these variables interact within the specific context of Saudi Arabia's heritage tourism. The Al-Ula and Diriyah are considered to be important to Saudi Arabia's heritage tourism which is representing the nation's ancient and foundational history. Al-Ula, with its UNESCO-listed Mada'in Salih, showcases the Nabatean civilization's monumental rock-cut tombs, while Diriyah birthplace of the Saudi state highlights the cultural and historical roots of the Saudi royal family (**Amin; Mesaed, 2023**). These sites not only preserve the nation's rich history but also serve as symbols of Saudi Arabia's cultural renaissance and its commitment to promoting heritage tourism on the global stage (**Bay et al., 2022**). Seeking the significance of two heritage tourism areas and several gaps, the study mainly focused on the impact of information and communication technology, information marketing communication, social branding, and memorable tourist experiences on green tourism with the mediating effect of tourist behavior on Saudi Arabia heritage tourism. The study also tested the moderating role of tourist environmental attitudes between tourist behavior and green tourism in Saudi Arabia's heritage tourism sector.

The study incorporating these factors into a comprehensive model, researchers can develop a stronger theoretical framework that could improve both direct and indirect influences, particularly in the context of Saudi Arabia's unique heritage tourism. Practically, study objectives findings could offer crucial insights for developing targeted and effective green tourism strategies. Understanding how tourist behavior mediates the impact of promotional tools and how environmental attitudes moderate these relationships can guide tourism operators and policymakers in designing interventions that enhance sustainability efforts. The study findings could lead to more informed decision making which could improve marketing practices and better alignment of tourism initiatives with environmental goals that could ultimately support the preservation of heritage sites and promoting sustainable tourism practices in Saudi Arabia. The study is further divided into four chapters, literature review which discusses theoretical and empirical aspects of literature to develop the study hypothesis, next chapter discusses the research methodology which discusses the research design, data collection procedure, and sampling technique. The next chapter was the data analysis where collected data analysis and interpreted the results. The last chapter was the discussion where the main findings and supported with the relevant studies.

## 2. Literature Review and Hypothesis Development

Social media brandings help to improve the brand image significantly to shape consumer perceptions and behavior (**Chiwaridzo; Masengu, 2023**). Social media provides an integral platform for tourists to project their sustainability efforts to potential tourists about their destinations which helps to increase their travel decisions (**Murti et al., 2023**). Through using a social media as a branding tool, destinations can engage with environmentally conscious tourists more effectively which helps to increase long-term relationships which increases green tourism (**Murti et al., 2023**). Furthermore, **Chiwaridzo and Masengu (2023)** empirically found that destinations actively promoting their green practices on social media tend to attract tourists who prioritize sustainability in their travel choices. **Chiwaridzo and Masengu (2024)** also found that social media campaigns highlighting a destination's environmental credentials can significantly increase their potential appeal to eco-conscious travelers. Another study (**Chiwaridzo; Masengu, 2024**) also found that use of generated content on social media platforms, such as reviews and photos can enhance a destination's green image further driving tourist engagement in sustainable tourism activities. These previous studies have shown that social media branding is an important step in increasing green tourism. Therefore, the following hypothesis has been formulated below,

H1: Social media branding has a significant impact on green tourism.

Information and communication technology (ICT) refers to the use of computers or another electronic system to store data which enables the exchange of information (**Huang et al., 2023**). ICT also increase the access of tourist in accessing information about sustainable tourism options which positively influences to green tourism improving attitude and intentions (**Shabankareh et al., 2023**). Through facilitating the promotion of environmentally friendly practices and supporting operational efficiencies, ICT contributes to the broader goals of sustainable tourism development. **Escandon-Barbosa and Salas-Paramo (2024)** demonstrated that ICT tools, such as mobile apps and online platforms provide tourists with essential information about sustainable travel options which influencing their decision-making towards greener choices. In the same vein, **Huang et al. (2023)** also found that ICT applications, including GPS-based services and eco-friendly travel apps, enhance tourists' ability to make environmentally conscious decisions during their trips which increases tourism. They also further argued that further research could be explored on other countries where tourists have a major focused. Therefore, study has formulated the following hypothesis in the context of Saudi Arabia.

H2: Information and communication technology (ICT) has a significant impact on green tourism.

Integrated marketing communication (IMC) strategically consists of various promotional tools which help to deliver a regular message to their target audience (**Chutimant, 2024**). In other study, it was argued leveraging IMC the destinations could effectively communicate their commitment to sustainability which helps to influence tourists' decisions and behaviors towards green tourism (**Devy et al., 2024**). Empirically, **Roy et al. (2024)** found that destinations using a well-coordinated IMC strategy are more successful in promoting sustainable tourism practices. Further empirical study of **Chutimant (2024)** also confirmed that IMC which include advertising, public relations, and social media can significantly influence tourists' perceptions and behaviors towards green tourism. **Yulianti and Yuda (2024)** also found that a destination's consistent messaging about its environmental initiatives across multiple platforms can enhance its green image, leading to higher engagement in sustainable tourism activities. Furthermore, **Rezalina and Setianingrum (2024)** also highlighted that IMC efforts focusing on sustainability themes could lead to increased tourist satisfaction and loyalty which helps to increase green tourism practices. Further study found a significant impact of IMC on green tourism. Therefore, a study has formulated the following research hypothesis.

H3: Integrated marketing communication (IMC) has a significant impact on green tourism.

Furthermore, memorable tourism experience (MTE) posited that emotionally and psychologically impactful experiences significantly influence green tourism (**Hosseini et al., 2023**). In other context, MTEs that emphasize sustainability can

increase a deep connection between the tourist and the destination which is leading to increased loyalty and repeat visits. When tourists have meaningful experiences that align with their values, such as environmental sustainability they increase their attention on tourism (**Shin et al.**, 2023). This is further supported by an empirical review study of (**Hosseini et al.**, 2023) who also concluded that tourists who have positive, memorable experiences related to sustainability are more likely to engage in green tourism activities. **Shin et al.** (2023) also demonstrated that MTEs that incorporate eco-friendly practices not only enhance tourists' satisfaction but also encourage them to adopt sustainable behaviors in future travels. **Demir and Vatan** (2024) further illustrated that MTEs can create lasting impressions that reinforce tourists' commitment to sustainability, leading to repeat visits and positive word-of-mouth for destinations that prioritize green practices. In another study, **Chen et al.** (2023) also found that MTE significantly and positively increases green tourism. They also argued that further research could be explored on other economies to increase the generalizability. Based on previous, following hypothesis is formulated below,

H4: Memorable tourism experience has a significant impact on green tourism.

Previous relationships showed that social media branding significantly impacts green tourism. Social media branding. Various other studies recommended that social media branding and green tourism relationships could be tested with mediating effects in other countries (**Chiwaridzo; Masengu**, 2023). Further, they also found that tourist behavior is an important mediating variable with other variables relationships. Therefore, tourist behavior is used a mediating variable because social media branding influences tourists' internal processes, such as attitudes and intentions (organism) which then manifest in their behavior (response) towards green tourism. **Abbasi et al.** (2024) also found that social media branding positively influences tourists' attitudes toward sustainability, but the actual engagement in green tourism depends on how these attitudes translate into behavior. In other words, social media campaigns promote a destination's green credentials which can increase tourists' interest in sustainable tourism but this interest only leads to green tourism if tourists actively choose eco-friendly accommodations and activities (**Hussain et al.**, 2024). In addition, **Elliot and Lever** (2024) found the positive and significant impact of social media on tourism. They further argued that when tourist behavior positively improved then the tourism also increased. Based on previous, following hypothesis formulated,

H5: Social media branding has a significant impact on green tourism with the mediating effect of tourist behavior.

ICT increases tourism positively and significantly. ICT worked as a stimulus through providing the tourists with tools and information that can influence their attitudes and intentions towards sustainable tourism. However, the actual impact of ICT on green tourism increases when the individuals have concrete tourism behaviors (**Zheng et al.**, 2024). Argument is further supported by **Law et al.** (2020) who also documented that ICT tools, such as travel apps and online platforms could increase tourists' awareness of sustainable options, the actual adoption of green tourism practices which depends on how tourists use this information to make environmentally conscious decisions. **Li et al.** (2023) also found that tourists who use ICT to find eco-friendly accommodations are more likely to engage in green tourism, but only if their behaviors align with the sustainable practices promoted by these tools. Also, **Ali et al.** (2024) and **Li et al.** (2024) also highlighted that smart tourism technologies, which offer personalized and real-time information can significantly enhance tourists' engagement in sustainable tourism activities by influencing their behavior. These studies highlighted that ICT increases positive tourism behavior which leads to increase the attention of tourists towards green tourism. Therefore, a study has formulated the following research hypothesis below,

H6: Information and communication technology has a significant impact on green tourism with the mediating effect of tourist behavior.

Furthermore, IMC acts as a stimulus that shapes tourists' cognitive and emotional responses which influences their behaviors toward green tourism. In other words, IMC could also effectively communicate sustainability messages which increase the impact on green tourism depending on how these messages influence tourists' behaviors (**Mathew; Soliman**, 2021). This is further supported by **Devkota et al.** (2023) who also found that consistent IMC campaigns can alter tourists' attitudes towards sustainability and they also argued that these attitudes only lead to green tourism if they result in corresponding behavioral changes. In other words, the destination's IMC strategy which highlighted their green initiatives could attract eco-conscious tourists but the effectiveness of these campaigns is ultimately determined by whether tourists engage in sustainable behaviors, such as choosing eco-friendly lodging or participating in conservation activities (**Chutimant**, 2024). **Li et al.** (2024) showed that IMC efforts focusing on sustainability can significantly influence tourists' behavioral intentions. They also argued that when the behavioral attention of any individual increases then tourism could also be increased. Further study of **Sanjaya et al.** (2024) also found that IMC has positive and significant impact on tourism. They recommended that further research could be explored by bridging a mediating variable. Keeping in view previous relationships, the following hypothesis has been formulated below,

H7: Integrated marketing communication has a significant impact on green tourism with the mediating effect of tourist behavior.

MTEs act as a stimulus that creates a lasting impression and emotional connection with tourists. MTEs that emphasize sustainability could lead to positive attitudes towards green tourism, but these attitudes only translate into green tourism if they influence future behaviors. **Zhou et al.** (2023) found that MTEs related to sustainability can significantly enhance tourists' attitudes towards green tourism, but the actual engagement in green tourism depends on how these experiences influence future behaviors. In another study, a tourist who has a memorable, eco-friendly experience may develop a stronger inclination towards green tourism, but this inclination only translates into green tourism if it influences future behaviors, such as choosing sustainable travel options or supporting conservation efforts (**Shin et al.**, 2023). **Rasoolimanesh et al.** (2022) also found the positive and significance of memorable tourist experiences on green tourism. They also further argued, research could be explored with mediating effect on other developing nations. Further study on memorable tourist experiences also has a positive and significant impact on tourist behavior (**Hussain et al.**, 2024). They also recommended that when tourist behavior increased then green tourism. Therefore, a study has formulated the following research hypothesis,

H8: Memorable tourism experience has a significant impact on green tourism with the mediating effect of tourist behavior.

Previous studies on the relationship of tourist behavior and green tourism are not clear which indicated that further research could be explored with the moderating (**Acharya et al.**, 2023). Other authors also argued that a comprehensive model of tourist behavior could be tested with a moderating effect (**McKercher**, 2008). Given the inconsistent findings and arguments on the moderating effect in extant research, moderating effect of tourist environmental attitude becomes a critical factor to clear the relationship. Tourist environmental attitude could serve as a crucial moderating factor that could strengthen the inconsistencies to positively respond to green tourism with the improvement of tourist behavior (**Bissing-Olson et al.**, 2013; **Liao**, 2018). In other words, environmental attitudes represent a key component of an individual's belief system, which influences their behavior towards the environment. In the context of green tourism, tourists with strong pro-environmental attitudes are more likely to engage in behaviors that support sustainability, thus enhancing the relationship between their behavior and green tourism (**DeVillie et al.**, 2021; **Khan**, 2024). In contrast, those with weaker environmental attitudes might not be as influenced, or could even react negatively explaining the divergent findings in previous studies (**Khan**, 2024). Therefore, the study focused on moderating the effect of tourist environmental attitude in the context of Saudi Arabia's heritage tourism which could be explained through the theory of planned behavior (**Zheng et al.**, 2024). Empirically, **Bala et al.** (2023) also showed that tourists with strong environmental attitudes are more likely to engage in sustainable behaviors, which in turn positively impacts green tourism. Furthermore, **Pintassilgo et al.** (2023) also demonstrated that tourists with pro-environmental attitudes are more responsive to green marketing efforts, leading to higher engagement in green tourism practices. Keeping in view previous, study has formulated hypothesis with moderating effect below,

H9: Tourist behavior and green tourism relationship is significantly moderated by tourist environmental attitude.

### 3. Research Methods

Research aimed to mainly test the impact of information and communication technology, information marketing communication, social media branding, and memorable tourist experiences on green tourism with mediating effect of tourist behavior on Saudi Arabia heritage tourism. The study also tested the moderating role of tourist environmental attitudes between tourist behavior and green tourism. For this objective, a quantitative deductive approach was employed. In the quantitative research approach lies in its ability to provide measurable, generalizable data through statistical analysis which offering an objective insights. In contrast, qualitative research provides depth and context but may lack the broad applicability and statistical rigor that quantitative methods offer (**Choy**, 2014). Therefore, researchers adopted a quantitative research approach. Furthermore, research employed cross-sectional research where collected on one. This approach is considered to be more appropriate when collecting data through survey instruments (**Choy**, 2014; **Rindfleisch et al.**, 2008). Therefore, using survey self-administered questionnaire researchers employed cross-sectional research design in the current study.

#### 3.1. Research Instrument Development

Survey instrument adopted from the extant literature where it was already tested which shown more reliability of the constructs. Green tourism was comprised of 6 items, which were adopted from (**Ibnou-Laaroussi et al.**, 2020), information and communication technology measured by 4 items, which were adapted from the study of **Mugobi and Mlozi** (2021). Integrated marketing communication measured by 5 items, which were adapted from the study of **Šerić and Gil-Saura** (2012). Tourist environmental attitude was measured by 5 items, which were adapted from the study of **López-Bonilla et al.** (2018), memorable tourist experience measured by one dimension of information and used three items, which were adopted from the study of (**Rasoolimanesh et al.**, 2022). Social media branding measured by three items which were adopted from the study of **Majeed et al.** (2021). Lastly, tourist behavior was measured by 3 items, which were adopted from the study of **Javed et al.** (2020). The items were ranked on a five-point Likert Scale which was ranked 1 for strongly disagree, and 5 for strongly agree. The above variables are predicted in the following Figure.1 below,

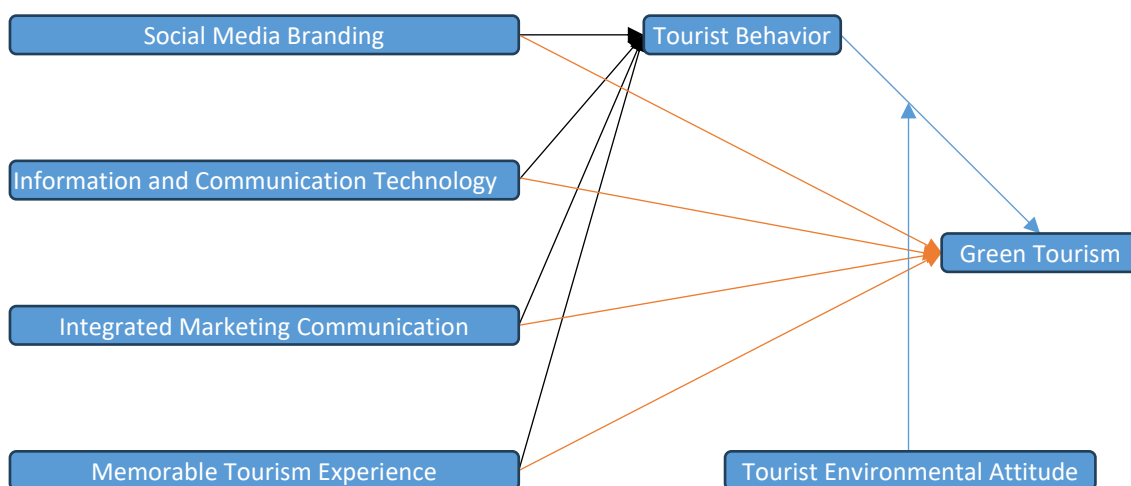


Figure 1: Research Framework.

### 3.2. Data Collection Procedure

The data collected from individual tourists of Saudi Arabia heritage tourism of two areas Al-Ula and Diriyah. These two areas were selected because Al-Ula is renowned for its breathtaking desert landscapes, ancient rock formations, and the UNESCO World Heritage site of Hegra (Mada'in Salih). On the other hand, Diriyah is the birthplace of the Saudi state and features the UNESCO-listed At-Turaif district, with its well-preserved mud-brick architecture and historical significance. For data collection use a convenient sampling technique, which involves selecting participants based on their availability and willingness to participate. The strength of this method lies in its ease of implementation, cost-effectiveness, and ability to quickly gather data, particularly in locations with high tourist traffic (Etikan *et al.*, 2016). Therefore, researchers employed this research convenient sampling technique. Using convenient sampling, sample size of 500 tourists was initially selected to ensure a strong dataset, which is capturing a diverse perspectives from visitors to Al-Ula and Diriyah. After data collection, 370 responses were returned, representing a high response rate of 74%, which is sufficient for reliable analysis while accounting for non-responses and incomplete surveys (Eaker *et al.*, 1998).

### 3.3. Demographics Characteristics

Table 1 shows the demographic characteristics of the 370 respondents which offers a comprehensive view of the tourist profile visiting Al-Ula and Diriyah. The sample is predominantly male (58.1%) which is indicating a slightly higher male visitor base. Age-wise, the majority fall within the 35–44 years range (39.7%), which suggests that the sites attract a mature audience, with a notable proportion also in the 45–54 years bracket (29.7%). This demographic is likely to have both the financial means and interest in heritage tourism. The majority of respondents are married (55.1%), which may reflect family-oriented travel patterns. Educational attainment is high, with a significant portion holding diplomas (50.5%) or bachelor’s degrees (36.2%), indicating that visitors are generally well-educated. In terms of family size, most tourists travel with 2–3 family members (67.8%), pointing to moderate group sizes that can facilitate easier planning and travel logistics. Previous results are predicted in Table 1 below.

Table 1: Demographic Characteristics.

Category	Subcategory	Frequency	Percentage (%)
Gender	Female	155	41.9
	Male	215	58.1
Age	18 to 24	20	5.41
	25 to 34	46	12.4
	35 to 44	147	39.7
	45 to 54	110	29.7
	55 to 64	36	9.73
	Above 65	11	2.97
Status Marital	Unmarried	56	15.1
	Married	204	55.1
	Others	110	29.7
Qualification	Matric	30	8.1
	Professional Diploma	187	50.5
	Undergraduate	134	36.2
	Masters	9	2.43
	PhD	10	2.7
Family members	1	19	5.14
	2 to 3	251	67.8
	4 to 5	87	23.5
	Above 5	13	3.51



### 3.4. Measurement Model

The measurement model could be assessed from convergent and discriminant validity. Among these, convergent validity is an important component of measurement model in the Partial Least Square (PLS)-Structural Equation Modeling (SEM) which ensures that the construct indicators are highly correlated and reflects the same underlying concept (Cheah et al., 2018). This could be addressed for loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). Factor loadings should be 0.5 or higher, indicating strong correlations between indicators and their respective latent constructs (Cheah et al., 2018). Cronbach's alpha, a measure of internal consistency, should also meet or exceed 0.70, with higher values preferred for greater reliability (Cheah et al., 2018). CR should exceed 0.70, offering a more refined assessment of construct reliability by considering the varying contributions of each indicator (Hair et al., 2020). Lastly, AVE should be 0.50 or higher, ensuring that at least 50% of the variance in the indicators is captured by the construct, which is essential for establishing good convergent validity (Hair et al., 2020). Table 2 predicted values shown that all values are greater than above threshold values.

Table 2: Convergent Validity.

Constructs	Cronbach's Alpha	CR	AVE
SMB	0.871	0.901	0.722
ICT	0.852	0.881	0.643
IMC	0.891	0.912	0.681
MTE	0.912	0.932	0.721
TB	0.861	0.891	0.662
TEA	0.842	0.872	0.693
GT	0.881	0.912	0.651

Note: SMB-social media branding, IMC-integrated marketing communication, MTE-memorable tourism experience, TB-tourist behavior, TEA-tourist environment attitude, GT-green tourism

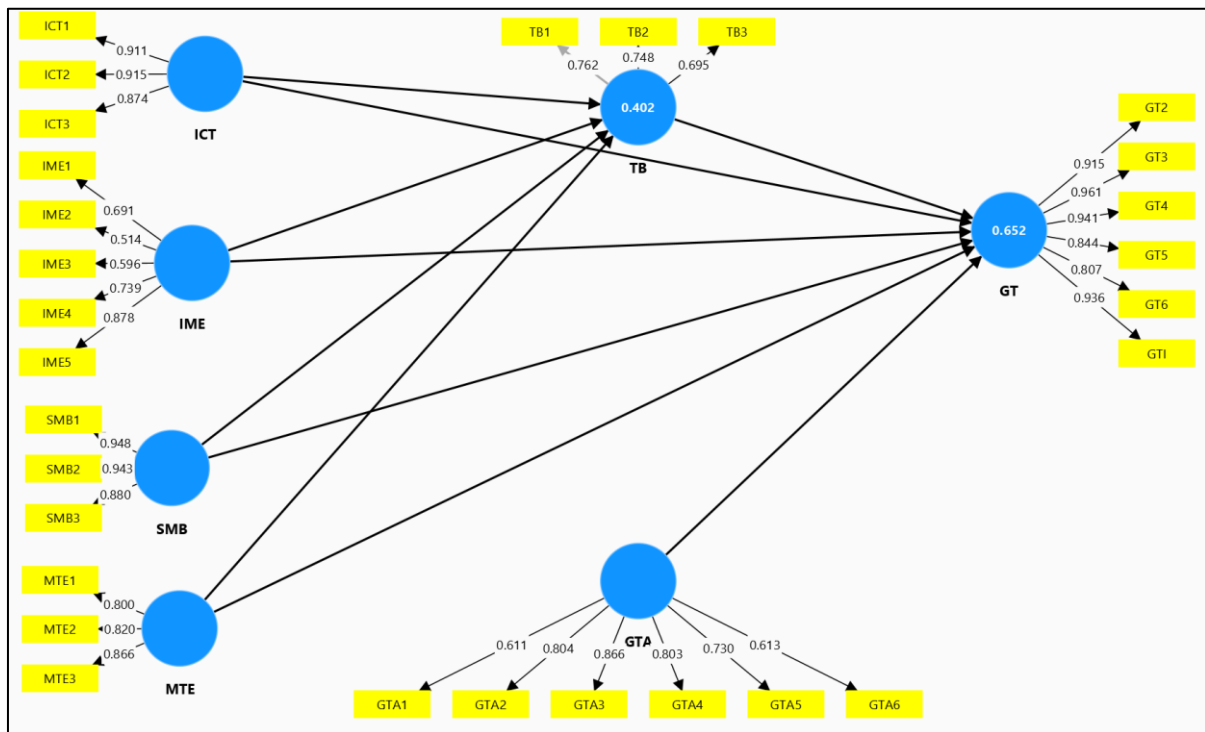


Figure 2: Factor Loadings.

### 3.5. Discriminant Validity

Discriminant validity is an important criterion in the PLS-SEM to ensure that the measurement construct is distinct and not correlated with another construct. This could be assessed from three criteria, the Fornell-Larcker criterion, cross-loadings, and the Heterotrait-Monotrait ratio (HTMT). The Fornell-Larcker criterion requires that the square root of the AVE for each construct should exceed its highest correlation with any other construct, ensuring that the construct shares more variance with its indicators than with other constructs (Cheah et al., 2018). Cross-loadings involve checking that indicators load higher on their associated construct than on any other constructs, ensuring that each indicator is most strongly associated with its intended construct (Hair et al., 2020). The HTMT ratio, a more recent method compares the average correlations between indicators of different constructs to those within the same construct; values below 0.85, or more conservatively 0.90, indicate adequate discriminant validity (Henseler et al., 2015). Table 3 and Table 4 predicted values show that all constructs have discriminant validity.

Table 3: Fornell and Larcker.

Constructs	VIF	SMB	ICT	IMC	MTE	TB	TEA	GT
SMB	<b>1.352</b>	<b>0.841</b>						
ICT	1.782	0.631	<b>0.823</b>					
IMC	1.561	0.552	0.581	<b>0.822</b>				
MTE	1.452	0.622	0.632	0.591	<b>0.852</b>			
TB	1.672	0.534	0.552	0.522	0.641	<b>0.812</b>		
TEA	1.342	0.481	0.523	0.462	0.552	0.591	<b>0.833</b>	
GT	.....	0.650	0.681	0.612	0.712	0.632	0.571	<b>0.812</b>

Table 4: HTMT.

Constructs	SMB	ICT	IMC	MTE	TB	TEA	GT
SMB							
ICT	0.341						
IMC	0.235	0.248					
MTE	0.433	0.345	0.340				
TB	0.225	0.206	0.334	0.423			
TEA	0.356	0.122	0.257	0.451	0.212		
GT	0.346	0.238	0.452	0.123	0.342	0.231	

### 3.6. Hypothesis Testing

After testing the measurement model, the next step was to test the study hypothesis using a structural model employing 5000 resampling techniques. The PLS-SEM results shown that social media branding (SMB) has positive and significant impact on green tourism ( $\beta = 0.32, t = 6.4$ ), which is supporting to hypothesis 1. Information and communication technology (ICT) also has a strong positive effect on green tourism ( $\beta = 0.29, t = 7.25$ ), confirming Hypothesis 2. Integrated marketing communication (IMC) is another significant and positive predictor ( $\beta = 0.27, t = 5.4$ ), aligning with Hypothesis 3. Moreover, memorable tourism experiences (MTE) demonstrate the strongest positive influence on green tourism ( $\beta = 0.35, t = 5.83$ ), supporting Hypothesis 4. When considering the mediating role of tourism behavior, SMB ( $\beta = 0.22, t = 5.5$ ), ICT ( $\beta = 0.19, t = 6.33$ ), IMC ( $\beta = 0.20, t = 5$ ), and MTE ( $\beta = 0.23, t = 4.6$ ) all positively influence green tourism through this pathway, confirming Hypotheses 5 through 8. Finally, tourist behavior moderated by environmental attitude also has a positive and significant impact on green tourism ( $\beta = 0.15, t = 5$ ), supporting Hypothesis 9. The above results are predicted in Table 5 below,

Table 5: Hypothesis Results.

Path	Original Sample	Standard Deviation	T-Statistics	Decision
SMB → GT	0.321	0.051	6.271	Accepted
ICT → GT	0.292	0.043	6.790	Accepted
IMC → GT	0.273	0.052	5.251	Accepted
MTE → GT	0.323	0.064	5.046	Accepted
SMB → TB → GT	0.223	0.043	5.186	Accepted
ICT → TB → GT	0.191	0.034	5.617	Accepted
IMC → TB → GT	0.231	0.045	5.133	Accepted
MTE → TB → GT	0.233	0.054	4.314	Accepted
TB*TEA → GT	0.151	0.033	4.575	Accepted

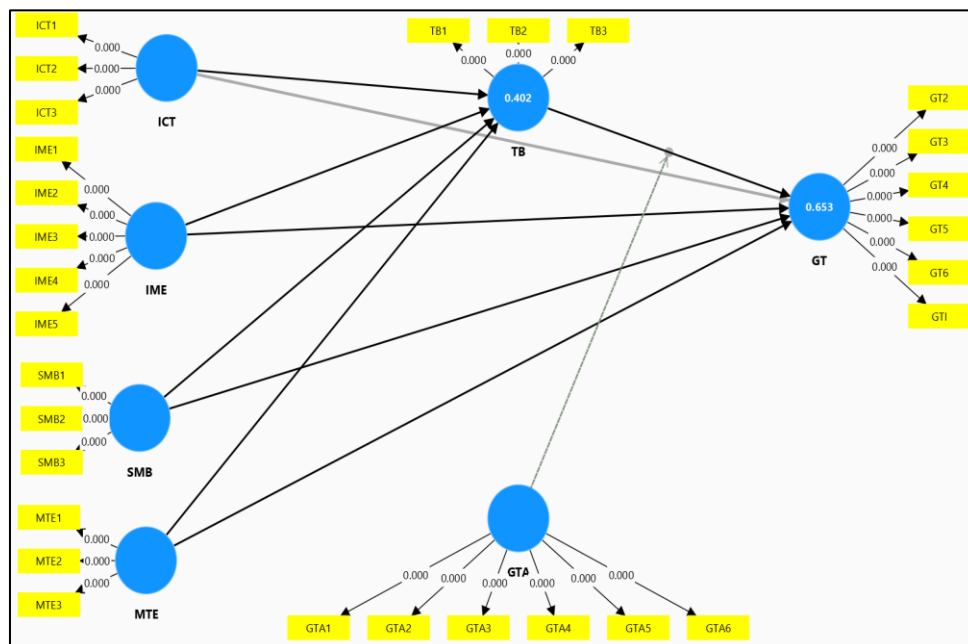


Figure 3: P value and R Square After Moderation.



#### 4. Discussion

Research aimed to mainly test the impact of information and communication technology (ICT), information marketing communication (IMC), social media branding (SMB), and memorable tourist experiences (MTEs) on green tourism (GT) with mediating effect of tourist behavior (TB) on Saudi Arabia heritage tourism. The study also tested the moderating role of tourist environmental attitudes (TEA) between TB and GT. PLS-SEM results show that SMBs have a positive and significant impact on GT of Saudi Arabia heritage tourism. These findings designated that in Saudi Arabia emphasizes the power of digital platforms in influencing tourist decisions to increase GT. Therefore, it could be explained that social media platforms like Instagram and Twitter enable targeted outreach to eco-conscious travelers, supporting Saudi Arabia's Vision 2030 goals to boost tourism while emphasizing sustainability. The result is in line with the previous study of **Chiwariidzo and Masengu (2024)** and **Abbasi et al. (2023)** where they also highlighted that effective SMB can enhance the visibility and attractiveness of eco-friendly practices. This strong relationship also reflects that strategically crafted social media campaigns can lead to increased engagement with GT. Therefore, it could be explained that Saudi Arabia's tourism sector should focus on strong social media campaigns that promote sustainable practices at heritage sites can significantly affect tourist interest and participation in GT. Further results shown that ICT also has a positive and significant impact on GT of Saudi Arabia's heritage tourism. This outcome shown that ICT plays a integral role in enhancing GT in Saudi Arabia through providing tourists with essential information and tools to engage in sustainable practices. The positive impact of ICT on GT aligns with findings by **Chiwariidzo and Masengu (2024)** and **Huang et al. (2023)** which show that digital tools like mobile apps and virtual reality enhance the visitor experience and promote eco-friendly behaviors. For example, ICT solutions such as mobile applications that offer information on sustainable practices or virtual tours of heritage sites like Madain Saleh can significantly influence tourist decisions and behaviors. These empirical findings demonstrated that ICT's effectiveness is supporting Saudi Arabia's sustainable tourism initiatives through integrating technology to improve tourist engagement with green practices.

On direct effect, results show that IMC also has a positive and significant impact on GT of Saudi Arabia heritage tourism. This IMC effect on GT in Saudi Arabia shows the significance of integrated marketing strategy in promoting sustainable practices. IMC strategies that integrate messages across various channels like as social media, print media, and on-site promotions can effectively communicate the benefits of GT (**Hasdiansa; Hasbiah, 2023**). These previous arguments and findings are in line with the following studies (**Yulianti; Yuda, 2024**) where they emphasizes that coordinated IMC efforts can enhance the visibility and appeal of eco-friendly tourism options. These findings enforced that Saudi Arabia's Tourism industry should focus on the effectiveness of IMC in driving engagement with GT through coherent and comprehensive messaging that could increase the intention of tourists in Saudi Arabia's tourism industry. Further depicted results present the positive and significant impact of MTE on GT of Saudi Arabia heritage tourism. These findings show that when the memorable experience of any individual increased then intentions towards GT in Saudi Arabia's heritage also increased. The results are further supported by the results of **Abbasi et al. (2024)** who found that memorable experiences that integrate cultural and environmental elements can enhance tourists' commitment. These findings emphasize that MTEs not only enhance the tourist experience but also promote sustainable tourism practices by enhancing a deeper connection between tourists and the environment. Thus, it could be suggested that creating MTEs is essential for enhancing GT behaviors in Saudi Arabia which could increase economic development.

Furthermore, the represented results show partial mediation of tourist behavior between SMB and GT of Saudi Arabia heritage tourism. This partial mediating effect highlighted the role of social media in influencing tourist actions which improves sustainability. **Abbasi et al. (2023)** also designates that social media campaigns could shape tourist behaviors through promoting eco-friendly practices and sustainability initiatives. These results are further in line with the findings of **Chiwariidzo and Masengu (2024)**; where behavior is also partially mediated. These findings enforced that Saudi Arabia's heritage tourism sector should focus on SMBs about their services that can effectively drive GT by altering tourist behavior in favor of economic growth. Further mediating effect results show that ICT also has a positive and significant impact on GT of Saudi Arabia heritage tourism with the mediating effect of tourist behavior. Predicted findings highlighted the significance of ICT in Saudi Arabia's heritage sector in changing tourist behavior to increase intention towards GT. The results is in line with the findings of **Zheng et al. (2024)** who also demonstrated that ICT tools can enhance tourist engagement with sustainable practices by providing real-time information and incentives. Therefore, supporting these findings it is enforced that Saudi Arabia's tourism industry should focus on ICT applications that offer insights into sustainable options or track eco-friendly behaviors that can shape tourist decisions and promote GT.

Other mediating effect predicted results show that the IMC and GT relationship is partially mediated by the effect of tourist behavior. These outlined results emphasized the significance of integrated messaging in influencing sustainable behaviors which is supporting to increase in heritage tourism in Saudi Arabia. IMC strategies that promote GT can effectively alter tourist behaviors by delivering consistent and persuasive messages about sustainability. The same argument has been presented by **Devkota et al. (2023)** who coordinated that the IMC approach integrates various channels that can enhance tourists' awareness and engagement with sustainable practices. These findings enforced that Saudi Arabia's heritage tourism sector should increase their investment on the improvement of IMC which not only promotes GT but also drives

sustainable behaviors among tourists through comprehensive and consistent communication. On the other hand, depicting the relationship between MTE and GT with positive and significant mediating effects on tourist behavior highlighted the significance of MTE in increasing the behavior to increase green tourists. These findings are in line with the study of **Zhou et al.** (2023) which highlighted that tourism experiences that integrate environmental education and conservation efforts can significantly affect tourists' behavior towards tourism. This result indicated that Saudi Arabia should focus on creating memorable experiences at heritage sites like Al-Ula which can encourage GT through shaping tourists' behaviors.

The moderating effect of tourists' environmental attitude significantly and positively moderates tourist behavior and GT of Saudi Arabia heritage tourism. This moderating effect of tourists' environmental attitudes on the relationship between behavior and GT highlighted the role of personal values in influencing sustainable travel practices. This result is also in line with the following studies (**Bissing-Olson et al.**, 2013; **Liao**, 2018), where they also found that environmental attitude positively and significantly moderates. These findings enforced that Saudi Arabia should promote environmental awareness and enhancing positive attitudes towards GT through educational initiatives at heritage sites can enhance the relationship between tourist behavior and GT and could support Saudi Arabia's efforts to cultivate a culture of environmental responsibility within its tourism sector. This research revealed that SMB, ICT, IMC, and MTE all have a positive and significant impact on GT in Saudi Arabia. Tourist behavior plays a mediating role which amplifies the effects of these factors on GT. Additionally, tourists' environmental attitudes significantly moderate these relationships, further influencing GT practices. Above these findings emphasize the need for targeted and well-coordinated strategies to promote sustainable tourism, particularly in the context of Saudi Arabia's heritage tourism.

#### 4.1. Practical and theoretical Contributions

Practically, the study contributed to a body of literature in several ways. At first, research findings contributed to understanding how SMB could increase GT in Saudi Arabia. Tourism boards and businesses are encouraged to design and implement targeted social media campaigns that promote sustainable practices and eco-friendly initiatives at heritage sites. This practical application of SMB can increase awareness and attract environmentally conscious tourists. Second, the significant role of ICT in promoting GT which contribute that tourism operators should take investment in digital tools and platforms. Developing mobile applications, virtual tours, and interactive guides that offer real-time information on sustainable practices can enhance the tourist experience and support informed decision-making about eco-friendly activities. At third, study findings contribute to effective marketing practices by highlighting the importance of IMC strategies in promoting GT. By ensuring consistent and cohesive messaging across various communication channels, tourism marketers can create a unified brand message that resonates with eco-conscious travelers which improves the visibility and appeal of GT. Lastly, identification of tourist's environmental attitudes contributes to more effective engagement with GT. Through tailoring marketing and educational efforts to align with the environmental values of the target audience, tourism providers could influence tourist behavior more effectively through GT.

The study also has several theoretical implications. At first, research findings contributed in introducing a novel theoretical framework through integrating social media, ICT, IMC, and MTE into a mediated-moderated model within the context of Saudi Arabia's heritage tourism. This framework contributes to a comprehensive understanding of how these variables interact to influence GT, advancing the theoretical development of sustainable tourism research. At second, the application of this model in a culturally and economically unique context contributes to theoretical advancements through extending the use of the mediated-moderated model. This contribution provides valuable insights into how contextual factors influence the effectiveness of GT strategies, paving the way for comparative studies in other regions. At third, research findings contribute to the theoretical exploration of how integrated marketing and digital tools influence TB and sustainability. Through validating the model in Saudi Arabia, this research contributes to a deeper understanding of the role of modern communication technologies and marketing strategies in promoting GT. At last, the research model also contributed to helping other researchers to conduct their research in the future with the extended model to increase the generalizability of this theoretical framework.

#### 5. Conclusion and Future Directions

The study concluded based on study objective where found that the positive and significant impact of SMB, ICT, IMC, and MTE on GT in Saudi Arabia. SMB significantly enhances GT by boosting visibility and shaping tourist behavior towards sustainability. Additionally, MTE have a positive and significant effect on fostering tourists' commitment to sustainability. The study also highlights the mediating role of TB and the moderating effect of tourists' environmental attitudes, showing their crucial influence on GT outcomes. These findings contribute to theoretical understanding through integrating these factors into a mediated-moderated model and offer practical implications for developing targeted GT strategies, emphasizing the need for coordinated marketing efforts, advanced digital tools, and memorable, eco-focused experiences.

The study with significant contributions still has some limitations that could be addressed in further research. Firstly, the study was limited to two areas of Saudi Arabia's heritage tourism which limited the generalizability of findings for

other areas, therefore future research could be explored on whole heritage tourism areas of Saudi Arabia to increase the generalizability of the findings. Secondly, study limited on a quantitative research approach which could not be generalize to qualitative study findings. Therefore, future research could be explored on mixed methods of quantitative and qualitative research approaches to know the variations in results. Lastly, the study was limited to a cross-sectional research design which limited the scope of the study for long-term effect, and hence further research could be explored on the longitudinal research approach to know the variations in findings.

## 5.1. Acknowledgment

This work was supported by the Deanship of Scientific Research, Vice Presidency for Graduate Studies and Scientific Research, King Faisal University, Saudi Arabia [Grant KFU241229].

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## Appendix: Survey Instrumnt

<b>Green Tourism</b>	<ol style="list-style-type: none"> <li>1. Consuming local food helps reduce carbon emission.</li> <li>2. Reducing use of disposable products helps reduce carbon emission.</li> <li>3. Wearing lightweight clothing helps reduce carbon emission.</li> <li>4. Carrying your own toothbrush and towels helps reduce carbon emission.</li> <li>5. Taking public transportation can reduce carbon emission.</li> <li>6. The carbon emission of different types of hotels is different.</li> </ol>
<b>Environmental Attitude</b>	<ol style="list-style-type: none"> <li>1. Humans severely abusing the environment.</li> <li>2. Despite our special abilities, humans are still subject to the laws of nature.</li> <li>3. The earth is like a spaceship with very limited room and resources.</li> <li>4. The balance of nature is very delicate and easily upset.</li> <li>5. If things continue on their present course, we will soon experience a major ecological catastrophe.</li> </ol>
<b>Information and Communication technology</b>	<ol style="list-style-type: none"> <li>1. Tourism site uses ICT applications to display tourism service information.</li> <li>2. Tourism site uses ICT applications to communicate with our tourist customers.</li> <li>3. I regularly see ICT applications to see information about tourism products online.</li> </ol>
<b>Integrated marketing Communication</b>	<ol style="list-style-type: none"> <li>1. The tourism brand I follow maintains consistency in its communication tools and channels across different platforms.</li> <li>2. The tourism brand I prefer uses a consistent visual style (e.g., colors, logos, imagery) in all its materials and platforms.</li> <li>3. The language and tone used by the tourism brand are consistent across all communication channels.</li> <li>4. The tourism brand presents a consistent image, no matter where I encounter it.</li> <li>5. Over time, the tourism brand has maintained a consistent image and message.</li> </ol>
<b>Social Media Branding</b>	<ol style="list-style-type: none"> <li>1. I can easily share information with others via Brand X maker's Social media page.</li> <li>2. Provided latest Brand X promotional information.</li> <li>3. I always get quick access to information on the brand X phone.</li> </ol>
<b>Tourist Behavior</b>	<ol style="list-style-type: none"> <li>1. I have been using internet often to search for tourist destinations.</li> <li>2. I love visiting social media to see new places of interest.</li> <li>3. I will continue to use and recommend social media channel for friends and relatives in search for tourist destinations.</li> </ol>
<b>Memorable Tourism Experience</b>	<ol style="list-style-type: none"> <li>1. The experience was exploratory.</li> <li>2. I gained alot of information during the trip.</li> <li>3. I experienced a newculture.</li> </ol>