



## Studying The Impact of Carbon Footprint Practices in Tourism Destinations A Case of Hurghada

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### Abstract

The aim of the study is to introduce key practices with a low carbon footprint that can help reduce the carbon footprint in tourist destinations. The carbon footprint is thus proposed as an innovative means of sustainable tourism supported by low carbon footprint practices to combat climate change. The study relied on the quantitative approach, where the questionnaire was used as a tool for data collection and 414 questionnaires were distributed randomly on tourists in Hurghada. Only 400 questionnaires were retrieved and valid for statistical analysis, with a response rate of 96.6 percent. Version 24 of the SPSS analytical software was used to analyze respondents' responses and prove the validity of the study hypotheses. The study concluded that carbon footprint practices are important to make Hurghada an environmentally friendly destination with low carbon emissions. They also positively affect the tourist's choice of destination. The study recommended the importance of applying carbon footprint practices within the framework of accommodation, transportation and energy in tourism destinations because of their positive impact on the tourist's decision-making process in choosing the tourism destination.

**Keywords:** carbon footprint, low carbon footprint practices, tourism destination, tourists' attitudes.

### Introduction

The idea of man-made climate change first appeared on the public agenda in the mid to late 80s (Moser, 2010). In recent years, the term climate change has been widely used in daily life. It exists and affects a lot of people in all aspects of human life. Since climate change is a global problem, this phenomenon has attracted great attention from many countries in the world (Watkiss et al.,2005).

According to Anne (2012), climate change has been defined as an environmental degradation problem. Additionally, Parry (2009) assured that direct and indirect changes lead to changes in the composition of the global atmosphere such as human activities and the natural climate fluctuations observed during similar periods.

Furthermore, Shah (2019) stated that climate change is caused by greenhouse gas emissions, deforestation and land use. Underlying all this is the depletion of the ozone layer, thereby exacerbating temperature and climate change. The atmosphere is constantly being polluted due to carbon emissions and depletion of the ozone layer is expected to cause sudden increases in

temperatures, leading to melting glaciers and sudden flooding.

Tourism has increasingly become a significant energy consumer and contributor to carbon emissions and climate change. In this context, new trends emerged with the aim of pushing forward decarbonization in the tourism system (Leh et al., 2021; Tang, 2018; Frantal, 2015 and Luo et al., 2014).

It is in this context of sustainable development that the low-carbon concept was proposed and expanded to various fields. It is worth noting that low carbonization has become a new trend in the global economic development process, the low-carbon concept was introduced and then has been extended to all fields. Notably, low carbonization has become the recent trend in the world's economic development process (Yang & Chen, 2012; Broer & Titheridge, 2010). The idea of low-carbon transition implies that cities and destinations move towards a new de-carbonized and socio-economic system (Olazabal & Pascual, 2015).

In this context, carbon footprint, low-carbon economy (LCE), low-carbon development, low-carbon city, low-carbon society and low-carbon lifestyle are synonyms used interchangeably. Broadly speaking, low-carbon footprint has become a new approach that depends on the change in human energy consumption patterns (Zhang et al., 2015; Yu, 2013; Xin et al., 2011).

The tourism carbon footprint can be used to determine the level of carbon dioxide consumed by tourism in each area over a given period (Sun, 2016). According to Waskow & Morgan (2015), carbon footprint at the individual level have become more systematized. For this to happen, people need to be more aware on an individual level of the unintended impacts of carbon dioxide emissions from tourism and everyday activities.

The carbon footprint can predict risk implications for the future and its current effects by making strategic decisions and publicly reporting greenhouse gas emissions (Tol, 2012).

As noted by Xu et al. (2014), the main goal of low carbon footprint is to achieve strong sustainability over time such that low carbon footprint is economically viable, environmentally sustainable and socially desired. Moreover, as reported by Ioannou & Serafeim (2016), carbon footprint is useful for setting a target for reducing emissions (to set a reduction, target it is necessary to know what current emissions are).

Low-carbon footprint was formally proposed in the report of go to low carbon travel and tourism industry on World Economic Forum in May 2009 (Yu, 2013; Can & Hongbing, 2011; Qi & Hongb, 2011). It is a deeper environmental tourism ideology designed with low-carbon itineraries, equipped with eco-friendly outfit and required low emission transport in terms of reducing the carbon footprint in tourism destinations (Yang, 2015).

### **Research Problem**

Egyptian tourism destination face increasingly challenges in terms of climate change leading to huge problems in relation to sea level rise, mountain glaciers, lakes, hurricanes rainstorms, wildfires, droughts and infrastructure (Moustafa, Elganainy & Mansour, 2023; Pörtner et al., 2023; Aboelnaga, 2021; Raey & Askary, 2020).

Climate change threatens its coastal and marine systems, resulting in the degradation of such systems, the occurrence of direct climatic impacts, indirect environmental change impacts and indirect societal change impacts (Subramanian, et al., 2023; Hughes, et al., 2021; Delgado, 2015).

The carbon footprint is considered one of the most important tools for assessing the negative impact of tourism on the climate (Gössling, et al., 2023; Filimonau, Dickinson & Robbins, 2014).

Carbon footprint is an important indicator of the sustainability of the tourist destination, and which may influence tourists towards choosing the tourism destination (Xiao, Zhong & Deng, 2023; Becken & Patterson, 2006). Hence the importance of low carbon footprint practices in the tourist's decision-making process in choosing the tourism destination (Fakfare & Wattanacharoensil, 2023).

The problem of this study is to clarify the importance of the carbon footprint with the aim of catching measures that preserve tourist destinations in the long term and reduce climate change.

Hence, this problem can be formulated in the following question: to what extent do tourist destinations concern about the carbon footprint?

### **Study Objectives**

- 1.Introduce key low carbon footprint practices that can help to reduce the carbon footprint in tourist destinations.
- 2.Explain the meaning of low-carbon tourism, besides presenting its goals innovation and analysis.
- 3.Present some of the case studies about carbon footprint practices of low carbon footprint in tourist destinations.
- 4.Illustrate factors affecting tourists' attitudes towards the tourism destination.

### **Literature Review**

#### **Tourism Carbon Footprint**

The phrase carbon footprint (CF) emerged in the 1990s, by Canadian environmentalist William Rees (Shueb & Mir,2014). It is derived from the concept of ecological footprint (Ercin and Hoekstra, 2012).

Tourism footprint is an important tool to quantitatively evaluate the impact of tourism activities on the ecosystem of tourist destinations (Wang et al.,2017).

As reported by Fitzpatrick, McCarthy& Byrne (2015), a personal carbon footprint is a measurement of an individual's GHG emissions. Personal carbon footprint evaluation can help individuals understand their footprints both in magnitude and composition.

As stated by Rico et al. (2019), tourism is a collection of socio-economic activities of high importance energy and carbon dioxide intensities, that increases significantly climate change in the future.

Huang & Tang (2021) stated that the carbon footprint involves all relevant sources, sinks and storage within the spatial and temporal boundaries of a population, system or activity. It measures total carbon dioxide emissions from a given population system.

Xiao, Zhong & Deng (2023) realized that the main idea of tourism carbon footprint is an extension of carbon footprint theory, which refers to the amount of greenhouse gases, including carbon dioxide emitted to meet the energy needs of tourists.

Globally and as referred by Lenzen et al. (2018), the carbon footprint of tourism is equivalent to around 8% of GHG emissions, amounting to 4.5 Gt CO<sub>2</sub>eq in estimates resource consumption and waste emissions by tourism products or services in a step- by-step fashion, starting with tourist activities (Alvarenga et al.,2012). In contrast, the bottom-top method is appropriate for quantifying small regions, such as the tourism footprint of local or scenic spots, in the absence of statistics or satellite tourism data. Visitor surveys can be tailored to represent larger levels of detail, as evidenced by studies on the Chinese Penghu Islands (Kuo & Chen, 2009).

The carbon footprint values can also predict present consequences and future risk implications by using strategic decisions and publicly reporting greenhouse gas emissions (Nguyen, Diaz-Rainey& Kuruppuarachchi,2021).

As noted by Xu et al. (2014), the main goal of low carbon footprint is to achieve strong sustainability over time such that low carbon footprint is economically viable, environmentally sustainable and socially desired. This entails attempting to strike a balance between the economic, environmental and social dimensions of development.

Syafrudin et al. (2020) and Yañez et al. (2019), assured that carbon footprint is important in determining which activities contribute the most to the carbon footprint and thus identifying important areas for emissions reduction efforts.

As described by Anenberg et al. (2012) and Lee (2011), carbon footprint helps to measure changes in emissions over time and to monitor the effectiveness of reduction activities and to offset emissions (to offset emissions, it is necessary to know how many reduction credits to

purchase (Econometrica press,2011).

As suggested by Hertwich& Peters (2009) the carbon footprint is one of the most important method available for estimating human environmental impacts and for helping to tackle the threat of climate change.

### **Carbon Footprint Practices on Tourism**

According to Xu et al. (2014), the main goal of a low carbon footprint is to achieve strong sustainability over time, making a low carbon footprint economically viable, environmentally sustainable and socially desirable. Efforts must be made to achieve a balance between the economic, ecological and social components of development (Punjer, 2013; Ali, 2009).

From an economic standpoint, low carbon footprint strives to increase economic production by consuming fewer natural resources and causing less environmental pollution; hence, this economic development necessitates costlier climate protection and increased investment in low carbon infrastructure construction (Dwyer et al., 2010; Tyfield & Jin,2010).

From an ecological perspective, the low carbon footprint aims to maintain the long-term of the supporting ecosystem (Ocampo, 2011). Its main goal is to establish the concept of ecological civilization, which requires the harmonious coexistence and sustainable development of nature and society (Guangyao, 2016).

From a societal standpoint, low carbon footprint seeks to meet people's needs in an equal manner and to improve family happiness (Singapore, 2015).

Here are some details about low carbon footprint practices which are as follows:

#### **Transportation**

Low carbon approach aims to raise the number of people who use public transportation, stimulate the purchase of new automobiles, increase cycling, walking and educate the community on the environmental benefits of selecting sustainable transportation (Noosa Council, 2016). Additionally, vehicles powered by electricity will be used to replace diesel-powered public transportation vehicles (El-Dorghamy et al., 2018). In this context, Gammon& Sallah (2021) stated that all hotels in Gouna offer and promote environmentally friendly transportation, including electric tuk-tuks and solar-powered shuttle boats.

#### **Accommodation**

In practice, UNEP, UNWTO & WMO (2008) cited a pioneering example of low-carbon accommodation known as The Orchid Hotel which is in Mumbai, India. The orchid hotel seeks to become a zero-garbage hotel, so it has taken various measures to reduce the generated waste. Thus, the treated wastewater is reused in areas like air conditioning and gardening, while the heat generated from the air conditioners provides hot water to the guest rooms, laundry, toilets and kitchen.

#### **Energy**

The electricity generation source used in a region also affects the carbon footprint. For example, if electricity is provided through nuclear or renewable energy rather than a thermal power plant where electricity is produced from coal. Then it is more efficient to use electric vehicles or rail transportation (Zhou et al.,2018; Pereira et al. 2017).

For example, in France, where 90% of electricity is generated from low-carbon sources (70% nuclear), the carbon footprint is reduced by an average of 96% by choosing rail transport instead of air travel for short trips (Ritchie, 2020).

According to a study conducted by Pattnaik et al (2022); Fensel, Kumar& Tomic (2014), The importance of following guidelines to support environmentally friendly programs in the tourist destination to reduce the carbon footprints, such as automatic lights off/on systems and the use of energy-saving LED lights.

#### **Tourist's Decision-Making Process in Choosing the Tourism Destination**

The tourism industry and policymakers interested in environmentally sustainable tourism need to develop better ways to provide tourists with reliable and user-friendly information about the impact of their holiday decisions on their carbon footprint (Juvan& Dolnicar,2014).

In this way, they can offer tourists who want to consider environmental factors when planning their vacation, the opportunity to do so (Juven& Dolnicar,2014).

McKetcher et al. (2010) stated that approximately 50% of tourists are willing to pay a carbon tax, travel to a destination with a lower carbon footprint or make a financial contribution to reducing the carbon impact of holiday travel. Some researchers believe that raising awareness of carbon footprint and encouraging people to engage in relevant low carbon footprint practices can help to mitigate climate change.

Geneidy& Baumeister (2019) stated that tourists have a desire to clean beaches. it has a significant impact on reducing carbon footprint by removing waste, plastic and other debris from the beaches, it helps preserve marine ecosystems and protect marine life. Additionally, it can inspire tourists to be more environmentally conscious and adopt eco-friendly habits while traveling, ultimately leading to a reduction in overall carbon footprint.

**Results and Discussion**

**Methodology**

A quantitative approach was used in this study since it enabled the testing of hypotheses, the determination of facts, the demonstration of relationships between variables and the prediction of objective outcomes, which tends to be more biased in terms of data analysis that reflects characteristics and descriptions. A group of tourists coming from different countries were targeted to visit Hurghada. Questionnaire was created consisting of two axes and each axis consists of a set of questions. In addition to the initial demographics. The first section included a set of demographic characteristics of the participants such as (educational level, gender, age, marital status and purpose of the trip). In order to verify the relationship between the respondents' answers and the study variables, the second section of the questionnaire included three axes: First: Questions related to low carbon footprint practices to determine the tourist's point of view through the services provided in accommodation, transportation and energy and the second: Questions about the opinions of tourists in tourist destinations that adhere to environmentally friendly practices and why chosen Hurghada, includes 4 questions and two different types of measures were also used in the questionnaire: "The three-point Likert scale (where one indicates disagreement. Two indicates neutral, three indicates OK) and the second measure is a five-point scale (5 indicates strongly agree, 4 indicates OK, 3 indicates neutral, 2 indicates disagreement and 1 indicates strong disagreement).

**Participants' Demographics**

The respondents' demographic data and characteristics are summarized using basic descriptive statistics such as frequencies and percentages to present a description of the collected data. Table (1) illustrates the frequency and percentage for demographic features of respondents in the study sample.

**Table (1): Demographic Data Analysis**

Variables Percentages	Categories	Frequencies	Percentages
<b>Gender</b>	<b>Male</b>	215	51.9
	<b>Female</b>	185	44.7
<b>Education Level</b>	<b>High school</b>	28	6.8
	<b>Intermediate Education</b>	66	15.9
	<b>Bachelor</b>	211	51.0
	<b>Master</b>	68	16.4
	<b>PhD</b>	27	6.5

<b>Age</b>	<b>Less than 20</b>	37	8.9
	<b>21-30</b>	174	42.0
	<b>31-40</b>	101	24.4
	<b>41-50</b>	58	14.0
	<b>51-60</b>	22	5.3
	<b>More than 60</b>	8	1.9
<b>Marital Status</b>	<b>Single</b>	123	29.7
	<b>Married</b>	220	53.1
	<b>Separated</b>	16	3.9
	<b>Divorced</b>	26	6.3
	<b>Widowed</b>	15	3.6
<b>Purpose_of_the_visit</b>	<b>Leisure</b>	154	37.2
	<b>Visiting Friends and relatives (VFR)</b>	135	32.6
	<b>Business</b>	111	26.8
	<b>Others (please specify)</b>	0	0

Table (1) shows the demographic information of the respondents. They represent several countries, when it comes to gender, the sample population is (51.9%) being males and (44.7%) being females.

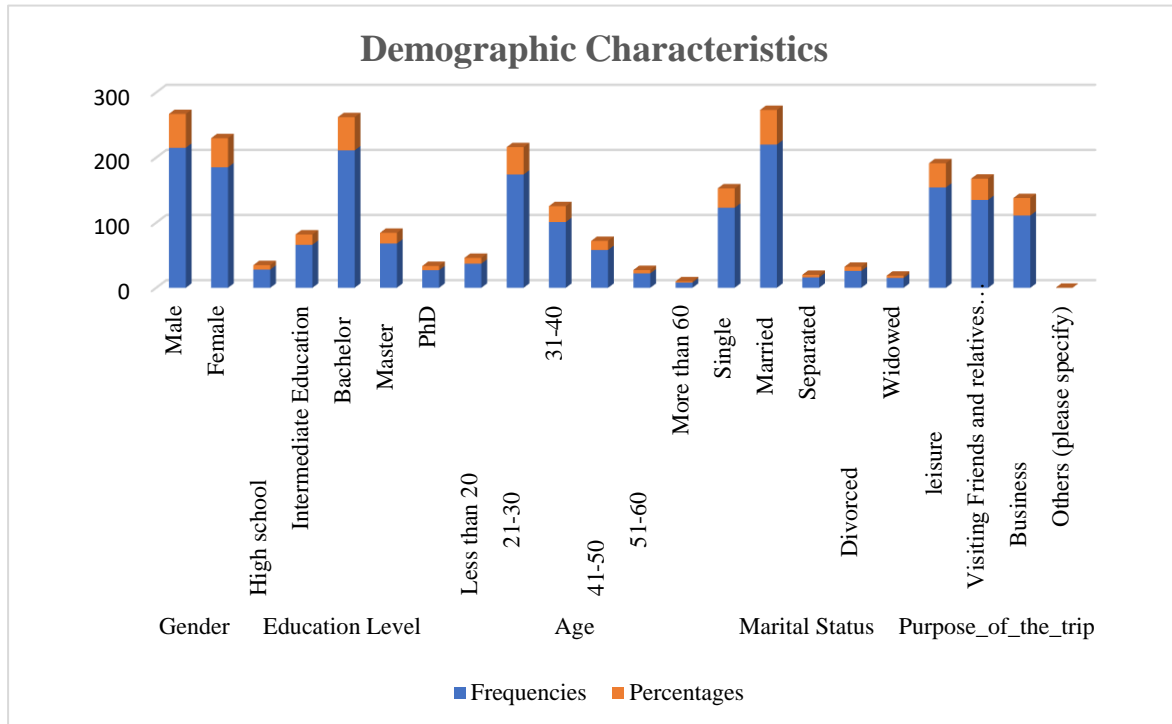
About educational level, the sample seems to be composed by highly educated individuals, with more than (51.0%) of participants had a bachelor's degree, (16.4%) of participants had master's degree, followed by those with Intermediate Education (15.9%), followed by those with High school (6.8%) and (6.5%) with a doctoral degree.

The results shown in Table (1) demonstrate that (42%) of the sample fall into the age segment ranging from 21 to 30, followed by the age segment ranging from 31 to 40 that represents (24.4%) of the total sample. Moreover, (14%) of the total sample are in the age segment ranging from 41 to 50 years old, followed by those who are younger than 20 years old (8.9%). While those who are aged 51-60 account (5.3%) of the total respondents. In addition, (1.9%) over 60 years old.

As detailed in Table (1) over half of the respondents (53.1%) are married with children, while about one-third (29.7%) of the respondents are single. The percentage of the separated (3.9%) and divorced respondent is (6.3%) of the total sample, followed by (3.6%) widowed respondent. according Table (1) the purpose of visiting tourists, divided into 4 purposes. One of the four main purposes, leisure covers about (37.2%) of the total tourists visiting Hurghada. Visiting Friends and Relatives (VFR) followed with 32.6% of all visitors and others for business (26.8%).

These findings are similar to those by Jackowitz et al. (2016) who reported that most visitors to low-carbon footprint areas travel in family groups motivated by the healthy environmental for their children's sake. Moreover, Lu & Stepchenkova (2012) declared that the family unit has the potential to 'shape' the environmental attitudes and behavior of family members and also observed that married couples who visit tourism destination want their children to experience eco-tourism activities.

The Following Diagram Illustrates the Demographic Characteristics of the Research Sample.



Figure( 1) The Demographic Characteristics of the Research Sample.

### Quantitative Analysis

the SPSS V. 24 program (The statical package for social sciences) and the following methods were used:

Reliability analysis was carried out to measure the results reliability of the questionnaire’s statements.

Frequencies, percentages, arithmetic averages and standard deviation: to describe the characteristics of the sample and determine the responses of the sample members towards all axes of the study tools.

The regression coefficient and correlation coefficient were also calculated to determine the relationship between carbon footprint practices and tourists' views towards tourist destinations that consider those practices. The statistical significance level was set at  $p < 0.05$ , which corresponded to the significance levels adopted in similar studies.

### Reliability and Validity

Stability coefficient test (Cronbach's alpha): It was used to measure the stability of the study instruments.

Table (2) Cronbach’s Alpha Results

Criteria		Cronbach’s Alpha
Low Carbon Footprint Practices	Accommodation	.638
	Transportation	.697
	Energy	.693
Tourist’s Attitudes		.878
Total		.726

Table (2) shows that the results of the Cronbach alpha value for all axes of the questionnaire was (.726) greater than 0.7, indicating that the buildability has been achieved, and there is consistency and stability in the model. The test of how positively the elements of a certain group is related to each other is achieved through Cronbach’s Alpha the reliability coefficient. Cronbach’s alpha is computed in terms of the average inter-correlations among the items measuring the concept. After the experimental test, the results of the reliability test show that the alpha value of Cronbach for the whole examined structure is above 0.70. Thus, although the threshold value given to Cronbach alpha is .797 it can be concluded that all axes are reliable. Therefore, there was no need to remove any element from the given tools.

**Normality**

**Colmergrove, Simrnov Test**

This test was used to determine whether the responses to the questions of the study axes follow the normal distribution or not to determine the tests that will be used for statistical analysis (parametric or non-parametric).

**Table (3) Colmergrove, Simrnov Test**

N		Accommodation	Transportation	energy	tourist’s attitudes
		400	400	400	400
Normal Parameters <sup>a, b</sup>	Mean	2.6870	2.6213	2.7175	4.5669
	Std. Deviation	.34486	.45020	.41137	.56145
Asymp. Sig. (2-tailed)		.000 <sup>c</sup>	.000 <sup>c</sup>	.000 <sup>c</sup>	.000 <sup>c</sup>

It is clear from the previous table that the significance is less than 0.05, which means that the data do not follow the normal distribution and are therefore statistically tested by non-parametric tests.

**1.The Carbon Footprint has a Positive Impact on Tourist Destinations.**

**Table (4) Respondents' Satisfaction with Destination Low Carbon Footprint Practices.**

Service/Product		N	disagree		Neutral		Agree		Mean	St. D
			Freq	%	Freq	%	Freq	%		
Accommodation	Garbage bins are available on beaches and streets in Hurghada	400	17	4.1	79	19.1	304	73.4	2.72	.537
	Existence of programs to educate tourists about the importance of preserving the environment and encourage their participation in environmental initiatives.	400	11	2.7	96	23.2	293	70.8	2.71	.513
	Usage eco-friendly materials	400	8	1.9	112	27.1	280	67.6	2.68	.508
	Availability of penalties for those who harm the environment.	400	18	4.3	101	24.4	281	67.9	2.66	.562



	<b>water-saving measures such as self-closing taps.</b>	400	22	5.3	86	20.8	292	70.5	2.68	.575
<b>Transportation</b>	<b>The presence of bicycles and public buses at the tourist destination.</b>	400	25	6.0	78	18.8	297	71.7	2.68	.586
	<b>Using environmentally friendly means of transport such as electric cars or electric scooters.</b>	400	21	5.1	100	24.2	279	67.4	2.65	.579
	<b>The maintenance of tourist transport to reduce the negative effects of climate change.</b>	400	24	5.8	72	17.4	304	73.4	2.70	.575
	<b>the presence of green Uber in a tourist destination that uses electric cars</b>	400	58	14.0	100	24.2	242	58.5	2.46	.735
<b>Energy</b>	<b>Following the guidelines for supporting eco-friendly programs in the tourist destination</b>	400	19	4.6	94	22.7	287	69.3	2.67	.563
	<b>Automatic turn off/on lights systems.</b>	400	14	3.4	88	21.3	298	72.0	2.71	.526
	<b>Conserve energy resources as much as possible, such as using energy-efficient LED lights.</b>	400	10	2.4	71	17.1	319	77.1	2.77	.476
<b>Total</b>									2.67	.297

Table (4) shows the extent of respondents' satisfaction with the low carbon footprint practices offered in tourist destination about accommodation, (73.4) of the total sample agreed that they are fully satisfied with the availability of garbage bins on beaches and streets in Hurghada, 293 answered that they are very satisfied with the existence of programs to educate tourists about the importance of preserving the environment and encouraging their participation in environmental initiatives and their percentage was (70.8) of the total research sample and about (70.5) approved of water-saving measures such as self-closing taps. Regarding the availability of penalties for those who harm the environment, the percentage of those who approved them was (67.9) of the total research sample and tourists expressed their satisfaction with environmentally friendly materials at a rate of (67.6).

Lehmann (2021); Ragheb (2016) stated that the importance of carbon footprint practices in tourist destinations and considered environmentally friendly. Additionally, carbon footprint practices aim to reduce climate change and save the environment. Furthermore, Wellmann & Morosuk (2016) and McDonald et al. (2012) added that carbon footprint is a basic criterion for achieving sustainability in the tourist destinations.

About transport services, (73.4%) of the total research sample agreed on the maintenance of tourist transport to reduce the negative effects of climate change and 71.7% of the total sample expressed their complete satisfaction with the presence of bicycles and public buses in the tourist destination (67.4%) of them approved the use of environmentally friendly means of transportation such as electric cars or electric scooters. Moreover, (58.5%) are very satisfied with Uber's green presence in a destination that uses electric vehicles.

According to a study conducted by Foxon et al. (2014); Abel et al. (2011) and Hulkkonen, Mielonen & Prisle (2020) the importance of maintenance of tourist transport to reduce the negative effects of climate change. Moreover, Sakka (2016) also endorsed that the importance of having a green Uber in a tourist destination that uses electric cars.

With regard to energy and through the results, it was found that tourists are fully satisfied with the conservation of energy resources as much as possible, such as the use of energy-saving LED lamps and the percentage of those who supported this was about (77.1 %) and (72%) approved the application of automatic lights off / on systems and regarding following the guidelines for supporting environmentally friendly programs in the tourist destination, the percentage of those who approved them was (69.3%) with (287) tourists.

According to Noosa Council (2016), agreed to support environmentally friendly programs in the tourist destination. In addition, Dabaieh et al. (2021) and Shawket & Ebaid (2017) were with the idea of automatic turn off/on lights systems. Moreover, Papadakis & Katsaprakakis (2023) stated that the importance of using energy-saving LED lamps.

The results also demonstrated an increase in tourists' desire for low-carbon practices, as the overall average value for accommodation, transportation and energy was (2.71%).

These results indicate the complete satisfaction of tourists with the environmentally friendly services and practices provided in the tourist destinations they visit and by comparing the total averages of the values for each axis of the practices separately, it became clear that the general average food service is the largest preference for tourists, followed by the rest of the services. Spearman's correlation coefficient between carbon footprint practices was also calculated to illustrate their impact on tourist destinations, which is illustrated in Table (5) as follows.

**Table (5) Spearman's Rho Correlation**

<b>Carbon Footprint Practices</b>	<b>R</b>	<b>P value</b>
<b>Accommodation</b>	.713**	0.000
<b>Transportation</b>	.842**	0.000
<b>Energy</b>	.766**	0.000

The previous table shows the Spearman correlation coefficients between the low carbon footprint practices represented in (accommodation, Transportation and energy), where all strong correlations came with the highest transportation correlation coefficient with a value of (.842\*\*), followed by energy with a value of (.766\*\*), followed by accommodation with a value of (.713\*\*) and all coefficients are statistically significant at the level of significance (0.01).

This result coincided with the results of a study Ibrahim (2017, p89), which aimed at the possibility of applying low-carbon tourism development in the Egyptian coastal areas and through analyzing the opinions of some tourists in those applications, the study concluded that they are completely satisfied with the services provided during accommodation, transportation, shopping.

**Table (6) The Estimated Balance According to the Likert Quintuple Scale**

<b>Level</b>	<b>Length</b>	<b>Weighted average</b>	<b>Response</b>
<b>Low</b>	0.79	1-1.79	<b>Strongly disagree</b>
	0.79	1.8-2.59	<b>Disagree</b>

Moderate	0.79	2.6-3.39	neutral
High	0.79	3.4-4.19	agree
	0.80	4.19-5	Strongly agree

**1. The Carbon Footprint Practices have a Positive Impact on Tourist’s Attitudes in Choosing a Tourist Destination.**

**Table (7) Tourists' Attitudes on Destinations that Consider Low Carbon Footprint Practices.**

Variables Percentages		N	Strongly disagree		Disagree		Neutral		Agree		Strongly agree		Mean	St. D
			Freq	%	Freq	%	Freq	%	Freq	%	Freq	%		
Tourist's attitudes	I think most people have a positive impression of this destination.	400	-	-	9	2.2	59	14.3	97	23.4	235	56.8	4.39	.819
	This tourist destination has a unique image for me	400	-	-	3	.7	14	3.4	113	27.3	270	65.2	4.63	.592
	I will recommend this destination to my friends.	400	-	-	2	.5	17	4.1	109	26.3	272	65.7	4.63	.591
	I will return to this tourist destination	400	-	-	2	.5	17	4.1	112	27.1	269	65.0	4.62	.593
<b>Total</b>												4.56	.561	

Table (7) shows the scale of tourists' attitudes in destinations that take into account the practices of the low-carbon footprint in Hurghada according to the Likert scale and from the point of view of the tourist, a large percentage of them came about (65.7%) strongly agree with this tourist destination and will recommend Hurghada to their friends, followed by (65.2%) strongly in favor of the suitability of this destination for them and (65%) of the total research sample strongly supported that they will return to that destination again, 56.8% strongly agreed that they believed most people had a positive impression of the destination. The results proved through the research sample with approval to a high degree, where the weighted weight value of the whole axis was (4.56) according to the estimated balance of the five-point Likert scale shown in Table (6) and this confirmed the importance of applying low-carbon practices in tourist destinations, as they leave positive impressions on tourists.

These results are consistent with Juvan & Dolnicar, (2014) which indicated that most tourists have a high awareness and positive impression of tourist destinations that adhere to the criteria of low carbon footprint and strongly support them.

According to a study conducted by Gossling (2009) and Tao, Eagles and Smith (2004), those eco-friendly destinations represent a single image for tourists.

As the study of Tierney, Hunt & Latkova (2012) concluded that many tourists return to the same tourist destination by counting the times visited over different years and this confirms that they have a good impression of Hurghada.

**Analyze Respondents’ Awareness Towards low-Carbon Practices in Hurghada**

**Table (8) Respondents’ Awareness Towards low-Carbon Practices in Hurghada**

Variables Percentages	Indicators			N	Mean	St. Deviation	Skewness	Kurtosis	
Visitors’ Awareness	which of the following volunteering activities in the context of low-carbon footprint practices (saving the environment) would you like to advise?	Tree planting	Freq	137	400	2.37	1.312	.214	-1.702
			%	33.1					
		Beach clean-up campaign	Freq	70					
			%	16.9					
		Coral reef and marine life conservation	Freq	33					
			%	8.0					
		Others	Freq	160					
			%	38.6					
Which of the following low-carbon practices (saving environment) would you like to undertake to reduce the environmental impact on Hurghada? (You can mark more than one option)		Choosing eco-friendly transportation like biking or using public transportation	Freq	82	400	4.08	1.627	-1.293	-.240
			%	19.8					
		Reuse of towels in the hotel	Freq	5					
			%	1.2					
		Use less soap or shower gel	Freq	7					
			%	1.7					
		Using reusable water bottles instead of single-use plastic bottles	Freq	12					
			%	2.9					
		All the above	Freq	294					
			%	71.0					

<p>In your viewpoint, to what extent the above-mentioned low-carbon footprint practices could contribute to enhancing the image of tourist destinations as eco-friendly destinations?</p>	<p>Low</p>	Freq	1	400	2.92	.288	-3.299	10.241
		%	.2					
	<p>Moderate</p>	Freq	32					
		%	7.7					
	<p>High</p>	Freq	367					
		%	88.6					

Table (8) shows the participants' awareness of low-carbon footprint practices in Hurghada, and by asking a set of questions that include specific options to facilitate the answer to the tourist, it became clear that (38.6%) of tourists chose to answer (other) to the question (Which of the following volunteer activities in the context of low carbon footprint practices (saving the environment) would you like to provide advice?), followed by (33.1%) prefer (planting trees), (16.9%) prefer to practice the activity (beach cleaning campaign) and the lowest percentage (8%) choose the activity (coral reefs and marine life preservation) and this percentage may be a result of the lack of awareness of tourists of the importance of preserving coral reefs and marine life) and it is necessary to establish awareness campaigns aimed at this.

By analyzing the answers to the question “Which of the following low-carbon practices (saving environment) would you like to undertake to reduce the environmental impact on Hurghada?” it turned out that (71%) of the total research sample chose (all the above) and this percentage indicates their great awareness and support for environmentally friendly practices.

The results shown in Table 8 confirm the high contribution of low-carbon practices to enhancing the environmentally friendly image of Hurghada, while the majority of respondents (88.6%) believe that this high contribution of low-carbon practices reduces the environmental impact on Hurghada, followed by 7.7% of respondents who indicated the moderate contribution of these practices, while only 0.2 % of the total sample that the low contribution of these practices in defending the environmentally friendly image of Hurghada. Thus, these results are considered to highlight Hurghada image as an environmentally friendly destination and these results in turn confirm that carbon footprint practices have a positive impact on tourists' awareness of them as well as they can lead to a societal role in advocating for low-carbon tourism practices in tourist destinations.

The above-mentioned results assure the high willingness of the respondents to share in some environmental volunteering programs. Thus, these results are considered to highlight the importance of the carbon footprint in making Hurghada as an environmentally friendly destination.

as noted by Wearing and McGehee (2013); Hammerton et al. (2012) the importance of volunteer-based projects in providing reliable data collected by volunteer groups, which in turn can help destination actors make informed decisions about conservation. These results also correspond to the results of the study.

It also corresponded to the study of Lin et al. (2022); Tao (2011), Which recommended planting trees and making all places green; everything that is green is beautiful and restores life in the place and purifies the atmosphere from carbon dioxide and this confirms the impact of environmentally friendly practices positively on the awareness of tourists and visitors to choose the appropriate destinations for them.

the study of Shehata & Elfeel (2017) encouraged that the implementation of beach clean-up campaigns. Moreover, supported the idea of reusing towels in hotels.

The study of Tech& Theophilos (2020); Andrews & Withey (2012) and Villalba & Gemechu (2011) recommended the use of less soap or shower gel in hotels

Fitzpatrick et al (2015) observed through their findings that low carbon footprint practices contribute to enhancing the image of tourist destinations as an environmentally friendly destination.

**Respondents' Recommendations Towards low-Carbon Practices in Hurghada**  
**Table 9 Respondents' Awareness Towards low-Carbon Practices in Hurghada**

Variables Percentages	Indicators			
Visitors' Awareness.	What do you recommend supporting good environmental management policies in tourist destinations?	Energy Saving	Freq	170
			%	35.1
		Climate control	Freq	51
			%	10.5
		Developing low-carbon tourism	Freq	121
			%	25
		Waste recycling pot	Freq	21
			%	4.3
		Increase green spaces	Freq	26
			%	5.4
		Choosing environmentally friendly transportation	Freq	11

As shown in Table 9, the three most well-known low-carbon practices for respondents are energy saving (35.1%), low-carbon tourism development (25%) and climate control (10.5%). Participants' high awareness of these practices is often linked to a wide range of awareness programs offered by hotels in the region through which they try to raise their guests' awareness of reducing their daily energy and water consumption and classify their waste into three types including glass, paper and plastic when disposed of in available garbage bins.

It should be noted that respondents are less aware Increase green spaces (5.4%), waste recycling pot (4.3%), choosing environmentally friendly transportation (2.3%) in the region.

the study of Gössling et al. (2012), found that low-carbon tourists are more aware of accessing websites to make individual CO<sub>2</sub> impacts more transparent (e.g., MakeMeSustainable and Treemagotchi) to learn about destination environmental best practices regarding energy and water consumption. These feedback from social media apps can be directed towards promoting sustainable behavior for destination visitors coastal.

### Conclusion

The findings of this research revealed that low-carbon footprint has become the trend of world's economic development which implies that destinations should move towards a new, de-carbonized and socio-economic system. Consequently, low-carbon footprint (LCF) has been introduced as an innovative solution for the major challenges that threaten the resources sustainability. Since tourism has become a large contributor to greenhouse gas (GHG) emissions in terms of transportation and activities etc., low-carbon tourism had become a prerequisite for the sustained development of tourism destinations.

The study also indicated that the importance of carbon footprint practices in tourist destinations and considering them environmentally friendly. In addition, it aims to reduce climate change and preserve the environment. The carbon footprint is considered a basic criterion for achieving sustainability in tourist destinations.

The study also found that there are a number of important practices that can reduce a visitor's carbon footprint at a destination. These practices are accommodation, transportation and energy.

This study found that the main accommodation practices that influence tourists to choose Hurghada as an environmentally friendly destination are the need for garbage bins on beaches and streets, as well as programs to educate tourists on the importance of environmental protection and encourage them to participate in environmentally friendly initiatives, water-saving measures such as self-closing taps and the use of environmentally friendly materials.

Transportation practices aimed at reducing the carbon footprint of a tourist visit within a tourist destination include the use of environmentally friendly modes of transportation, the use of clean energy sources in all modes of transportation, the constant maintenance of tourist transportation means to reduce their negative effects on the environment, and the use of public transportation such as buses. Instead of a private car to lessen the harmful effects of transportation on the environment.

additionally, low carbon footprint practices included the energy practices followed by tourists regarding reducing the carbon footprint while making the tourist visit within Hurghada, the importance of energy-saving LED lamps, the application of automatic lights off / on systems and regarding following the guidelines for supporting environmentally friendly programs in the tourist destination.

According to their high environmental awareness, low-carbon tourists are willing to participate in some volunteering activities in relation to environment conservation, using public transport and practicing eco-friendly activities. Furthermore, they are highly concerned with the low-carbon practices carried out in every aspect along the destination.

### **Recommendations**

Following the discussion above and drawing out the main findings of the study, this section outlines several key recommendations that can assist relevant authorities in handling a low-carbon tourism framework and implementing practices that reduce the carbon footprint. Recommendations relating to key tourism actors are outlined below:

### **Public Sector Level**

#### **A. Government**

1. Developing various modes of environmentally friendly transport (e.g., railways, coach stations, bus, cycle paths and pedestrian paths).
2. Developing Hurghada in context of low carbon footprint practices.
3. Providing incentives for tourism enterprises to broaden the use of renewable energy sources in the area

#### **B. Ministry of Tourism**

1. Encouraging tour operators to promote eco-friendly destinations in Egypt.
2. Launching online carbon calculators on their official websites and mobile applications to let the tourists able to calculate their consumption of energy, waste, water, thus they could know their carbon footprint.
3. Establishing laws and legislations that guarantee the protection of the environment in tourist areas and obligate all tourism institutions to follow them.
4. Tourism companies and tourists must be encouraged more effectively to achieve sustainability and sustainability should be an intrinsic element of these companies' objectives rather than focusing on profit. These companies must implement green management, expand green jobs, and launch a location to calculate the carbon impact.

#### **C. Environmental Bureaus in Tourist Destination**

1. Raising the awareness of key industry players on being environmentally friendly via posting educational signs, organizing interpretive programs and workshops and giving tips on going

low-carbon footprint.

2.Preparing and disseminating codes of conduct in the area.

3.Promoting low-carbon practices among stakeholders concerning energy saving, water conservation and waste management.

4. Establishing visitor centers to educate the visitors about the high value of marine protected areas, diving sites and marine ecosystems.

5.The necessity of raising awareness and institutional development in tourism destinations and encouraging the local community to participate effectively in making decisions by protecting environmental systems and reducing the activities that cause carbon emissions in the tourist destination.

### Private Sector Level

#### D. Tour operators/Travel Agents

1.Moving towards low-carbon travel through using green accommodation, low-carbon transport and activities.

2.Diversifying the Egyptian tourism product, including the various forms of low-carbon niche tourism such as bird watching tourism, bike tourism, adventure tourism, creative tourism, etc.

3.Tourist companies should study the directions of tourists to know their desires and needs in the services provided.

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## تأثير ممارسات البصمة الكربونية في المقاصد السياحية دراسة حالة الغردقة

### المستخلص

الهدف من الدراسة هو تقديم الممارسات الأساسية ذات البصمة الكربونية المنخفضة التي يمكن أن تساعد في تقليل البصمة الكربونية في الوجهات السياحية. وبالتالي يتم اقتراح البصمة الكربونية كوسيلة مبتكرة للسياحة المستدامة المدعومة بممارسات البصمة الكربونية المنخفضة لمكافحة تغير المناخ. اعتمدت الدراسة على المنهج الكمي، حيث تم استخدام الاستبيان كأداة لجمع البيانات وتم توزيع 414 استبانة بشكل عشوائي على السائحين بمدينة الغردقة. وتم استرداد 400 استبيان فقط وهي صالحة للتحليل الإحصائي، وبلغت نسبة الاستجابة 96.6 بالمائة. تم استخدام الإصدار 24 من البرنامج التحليلي SPSS لتحليل استجابات أفراد العينة وإثبات صحة فرضيات الدراسة. وخلصت الدراسة إلى أن ممارسات البصمة الكربونية مهمة لجعل الغردقة وجهة صديقة للبيئة ذات انبعاثات كربونية منخفضة. كما أنها تؤثر بشكل إيجابي على اختيار السائح للوجهة. وأوصت الدراسة بأهمية تطبيق ممارسات البصمة الكربونية في إطار الإقامة والنقل والطاقة في الوجهات السياحية لما لها من تأثير إيجابي على عملية اتخاذ القرار لدى السائح في اختيار الوجهة السياحية.

**الكلمات الدالة:** البصمة الكربونية، ممارسات البصمة الكربونية المنخفضة، المقصد السياحي، موقف السياح.