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A Description of Green Hotel Practices and Their Role in Achieving Sustainable Development

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Abstract: In this study, we aim to investigate environmental management representatives' perceptions regarding the extent of the contribution of green hotel practices to achieving the environment-related sustainable development goals (SDGs). To achieve this aim, a questionnaire was developed and directed to the person in charge of environmental duties in the investigated hotels, who were selected by a convenience sample method. A sample of 48 participants from four and five Green Star hotels, representing 63% of the total Certified Green Star hotels in Egypt, was surveyed. The findings of the study revealed that the implementation of green hotel practices in the certified four and five Green Star hotels surveyed contributed positively to achieving SDG 6, SDG 12, SDG 7 and SDG 13, respectively. The main driver of the adoption of Green Star criteria was the hotels' commitment to environmental sustainability. The findings also indicated that, overall, there were statistically significant differences between four and five Green Star hotels in all SDGs addressed. The main implication of this study is that hotel operators should properly incorporate green hotel practices into their operational plans to achieve the environment-related SDGs.

Keywords: sustainable development goals; environmental practices; sustainable tourism; green hotel; eco-labeled hotel

1. Introduction

Recently, tourism has experienced increased development and expanded diversification, and it is becoming one of the fastest developing financial sectors around the world. These dynamics have turned the industry into a pivotal driver of socioeconomic advancement in all nations worldwide, contributing to more than 10% of the gross domestic product [1]. The growing impact of the tourism industry as an economic force and its potential as a development tool are indisputable. At the present time, tourism is widely recognized as the key to accomplishing the United Nations' 17 sustainable development goals (SDGs) and the 169 associated targets. Tourism has been considered to be one of the main sectors in developed and developing countries. It plays an important role in creating job opportunities, in the eradication of poverty, in promoting gender equality and in the preservation and promotion of natural resources; furthermore, it strengthens peaceful relations all over the world. In the Rio + 20 Outcome Document, tourism was identified as one of the vital sectors that is able to make a major contribution to achieving the three pillars of sustainable development (social–economic–environmental), and it has been recognized by the United Nations (UN) as one of the 10 sectors which has the capacity to turn communities towards a Green Economy [1].

Sustainability is currently a major pursuit in many industries, including the hospitality industry, where it is a vital issue for industry development [2]. Although different scholars have illustrated that the rapid growth of the hotel industry contributes significantly to environmental degradation worldwide, as hotels consume a large amount of energy and water for heating, cooling and lighting, which negatively influences the environment, some hotels have implemented environmental policies to specifically promote environmental preservation in the hope of improving the quality of human lives [3,4]. The growing interest in the principles of sustainable development, and the resulting pressure from the media, government and consumer sources to increase activity levels in this area, is forcing many hotels to increasingly implement practices that are more environmentally friendly [5]. Bender [6] examined the results of a survey conducted by TripAdvisor and stated that around two thirds (62%) of travelers consider environmental issues when deciding to stay at a hotel. Hotels benefit from implementing sustainable practices from two perspectives: firstly, the implementation leads to the improvement of resource efficiency and savings related to energy and water consumption; secondly, this functions as a marketing tool for attracting customers interested in sustainability [5,7].

The hotel industry has launched various initiatives to reveal their willingness to support sustainability, such as putting up eco-labels, the implementation of practices related to sustainable conduct and the adoption of environmental management systems [8]. Undoubtedly, if the hotel industry does not incorporate sustainability and the conservation of resources into the core of its business culture, the industry will not be able to move into the future as pollution can damage the basis for further industry development [9]. Green hotel practices are considered to be one of the environmentally friendly initiatives that aim to eliminate the negative impact on the environment by saving energy (e.g., by installing energy-efficient appliances and implementing renewable energy programs), reducing water consumption (e.g., by installing water-efficient devices and equipment and implementing a linen and towel reuse program) and waste management and reduction (e.g., by implementing recycling programs and using durable items rather than disposable ones) [7,10,11].

The leading international hotel chains are increasingly emphasizing their commitment to sustainability and integrating it into their strategic plan [12]. For example, the Intercontinental Hotel Group [13] reports the following: "our policies and standards set out our position on social, environmental and ethical issues. We embrace our responsibility to focus on ensuring that the growth of our business contributes towards the objectives of the UN Sustainable Development Goals and we believe that by using our power of scale and global reach, we can make the biggest contribution to seven of the goals". Wyndham Destinations [14] reported that "a percentage of 96% Wyndham resorts use a combination of proven conservation strategies and energy efficiency retrofits, energy-efficient lighting, motion sensors and default settings for in-unit HVAC systems, to achieve on-going reductions in energy and emissions". Marriott International [15] emphasized the following: "our sustainability strategy supports business growth and reaches beyond the doors of our hotels to preserve and protect our planet's natural resources".

Sustainability in the hospitality industry has been addressed from different points of view. For example, Kapera [5] discussed the current implementation capabilities and barriers to and state of the implementation of sustainable development principles in the hotel industry in Poland. Han, Lee, Trang and Kim [16] tested the role of guests' perceptions regarding hotel practices in terms of water conservation and waste reduction management in increasing hedonic and utilitarian values and examined the influence of such relationships on guest participation intention in green practices and loyalty intention. Jauhari [17] focused on a number of key issues including the design of green hotels, reducing energy consumption, the role of modern technology in achieving sustainability and how human resource management practices could contribute to sustainable development. Gil-Saura and Ruiz [18] illustrated that the application of information and communication technologies could contribute to a reduction in energy demands. Prud'homme and Raymond [19] explored the impact of sustainable development practices in the hospitality industry on customer satisfaction in a number of hotels in the province of Quebec in Canada. Alipour, Safaeimanesh and Soosan [20]

investigated employees' perspectives regarding sustainable practices in four and five-star hotels on a Mediterranean island by employing Global Sustainable Tourism Council hotel criteria indicators, indicators of sustainable development for tourism destinations and the European Union's sustainability framework for the Mediterranean hotels in the context of the three pillars of sustainable development: social, economic and environmental.

While different studies have shown that green hotel practices contribute to reducing operational costs and increasing hotels' profits, enhancing guest satisfaction and loyalty, sustaining the environment and gaining a competitive advantage [21–23], there has been relatively less empirical investigation of the role of green hotel practices in achieving sustainable development goals, especially in developing countries. Consequently, the current study aims to investigate environmental management representatives' perceptions regarding the extent of the contribution of green hotel practices to achieving the environment-related sustainable development goals (SDGs), especially those related to clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), responsible consumption and production (SDG 12) and climate action (SDG 13).

The current study has been divided into six sections. After the introduction, Section 2 presents the literature review regarding sustainable development and green hotel practices. The Section 3, "Materials and Methods", describes the methods utilized in the study. Furthermore, the findings of the study pertaining to the perceptions of the investigated participants towards the extent of green practices implemented in order to achieve the SDGs surveyed are presented in the Section 4, "Results". The results are discussed in Section 5. The Section 6 presents the conclusions of this study, with a brief summary and suggested directions for the future research.

2. Literature Review

2.1. Sustainable Development

Sustainable development was first introduced in the United Nations' Brundtland Commission in 1987, known as "Our Common Future". According to the Brundtland report published by the World Commission on Environment and Development (WCED), sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their needs" [24] (p. 41). In line with this, sustainable tourism development is defined as "an activity that takes full account of its current and future economic, social, and environmental impacts, addressing, in a befitting manner, the needs of visitors, the industry, and the environment and host communities" [25] (p. 12). Sustainable tourism should optimally use environmental resources, ensure viable and long-term economic operations, respect the host communities and distribute benefits equitably between all stakeholders. In order to achieve sustainable tourism development, three basic elements need to be aligned: economic growth, social inclusion and environmental protection. These elements are interrelated, and all are essential to the wellbeing of individuals and societies. In general, sustainable tourism development can be recognized as a means to achieve the principles of sustainable development [26,27].

On 25 September 2015, the 2030 Agenda for sustainable development and 17 SDGs with 169 targets as a universal and transformative development strategy were adopted by the United Nations General Assembly [28]. Through this agenda and its goals, the global community is committed to achieving sustainable development in its three dimensions (economic development, social and cultural development and environmental development) in a balanced and incorporated manner [29]. These dimensions are a powerful tool for achieving sustainable development. If any pillar is weak, the system as a whole is unsustainable [30,31]. Economic development pertains to job creation, income enhancement through the multiplier effect, creating new job opportunities and the renewal and restructuring of urban economies. Social and cultural development focuses on public engagement, stakeholder cooperation and cultural heritage preservation, and environmental development addresses the protection of natural resources and assesses and minimizes the impacts on them by encouraging

enterprises to mitigate their greenhouse gas emissions, besides creating policies to improve water quality and reduce energy consumption [29].

The 17 SDGs, as illustrated in Figure 1, are defined by [32] as "the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including poverty, inequality, climate change, environmental degradation, peace, and justice". The UN [32] reports that the sustainable development goals and associated targets are integrated and indivisible, global in nature and universally applicable, taking into account different national realities, capacities and levels of development besides respecting national policies and priorities. The tourism industry is specifically included as a target in SDG 8, SDG 12 and SDG 14, which relate to inclusive and sustainable economic growth, sustainable consumption and production and the sustainable use of oceans and marine resources, respectively. However, tourism, through its spread and influence, can contribute directly or indirectly to all 17 SDGs [32]. Jones, Hiller and Comfort [32,33] argued that the tourism and hospitality industry can contribute to the realization of the SDGs while developing a wide range of market opportunities. For example, in the outline of the contribution of tourism and hospitality to achieving goal 6 (Ensure availability and sustainable management of water and sanitation for all), "tourism investment requirement for providing utilities can play a critical role in achieving water access and security, as well as hygiene and sanitation for all. The efficient use of water in tourism, pollution control and technology efficiency can be key to safeguarding the most precious resource" [32] (p. 16). Additionally, the tourism and hospitality industry could contribute to achieving goal 12 (Ensure sustainable consumption and production patterns) by adopting sustainable consumption and production (SCP) modes and tools, such as efficient technologies for energy and water, including renewable energies, recycling, waste treatment, pollution reduction, local purchase and enterprises and community involvement, which monitor sustainable development impacts for tourism and enhance economic, social and environmental outcomes [32].

Figure 1. The 17 sustainable development goals. Source: [32].

2.2. Green Hotel Practices and Environmental Sustainability

The hotel industry is one of the various components of tourism whose activities cause a serious threat to the environment owing to its huge consumption of water, energy and non-durable goods along with the discharge of large amounts of raw and solid waste in various quantities [34]. If these resources are not managed properly, they will have a negative impact on the environment and the operating costs of an organization [34,35]. Over the last few years, there have been many forces (i.e., growth of customers' environmental awareness, reducing hotels' negative environmental impacts,

building a positive image and the economic return) that have encouraged the hotel industry to become more environmentally friendly [36,37]. Consequently, many hotels have begun implementing various innovative practices to increase the "greenness" of their operations in order to eliminate their environmental pressure in addition to responding to growing customer environmental concerns [38,39]. The growth of customers' attention towards environmental sustainability has encouraged hoteliers to transform their businesses by implementing green practices in their operations which help them in achieving a competitive advantage and increasing their market share through acquiring guest segments that are concerned with green sustainability [40,41].

Environmental sustainability in the hospitality industry refers to the balance that must exist between an activity and the environment in which it is developed, where the two interact without being detrimental to each other [42]. Jones et al. [33] argued that environmental issues in the hospitality industry should include water and energy efficiency and conservation, climate change and greenhouse gas emissions, waste management and recycling, bio-diversity and the protection of natural resources, the reduction of environmental impacts, environmentally responsible sourcing and the creation of green construction standards for new hotel construction. Recently, the question of how to manage these aspects has become a priority due to the growing environmental awareness across society in general and among tourists in particular [33,43].

Different studies have addressed the positive relationship between environmental sustainability and the tourist experience. Lee, Hsu, Han & Kim [44] showed that a green image of the hotel promotes a more favorable intention to revisit and make positive recommendations and a willingness to pay higher prices. Rogerson & Sims [45] considered that hotels which implement sustainable practices are more competitive because customers expect to find environmental attributes. Moliner, Monferrer, Estrada & Rodríguez [46] demonstrated that environmental sustainability has a direct and positive influence on the customer's experience in the accommodation and, indirectly, on their satisfaction.

Green practices' definition in the hospitality industry varies and is associated with different approaches. Kim, Lee & Fairhurst [47] (p. 236) defined green practices as "a value-added business strategy that benefits a hospitality operation that engages in environmental protection initiatives". Similarly, Rahman, Reynolds & Svaren [48] (p. 721) defined "green" as "environmentally friendly, that is doing business in a way that reduces waste, conserves energy, and generally promotes environmental health". Myung, McClaren & Li [49] stated that green practices aim to reduce the negative impact on the environment by adopting environmental measures for reducing waste and using sustainable materials and resources. According to Wolfe and Shanklin [50], green hotel practices refer to measures that eliminate the negative impact on the environment, i.e., recycling and eco-purchasing. In a similar manner, "green hotels" are defined as "environmentally-friendly properties whose managers are eager to institute programs that save water, save energy, and reduce solid waste—while saving money—to help protect our one and only earth" [51]. Manaktola and Jauhari [38] (p. 365) defined it as "a less environmentally damaging property which has made a commitment to various ecologically sound practices such as saving water, saving energy, and reducing solid waste".

Despite the fact that green practices in the hospitality industry have been surveyed from different perspectives, most scholars have identified three reasons for adopting green practices: financial benefits, customers' needs and desires and stakeholder relations [22,23,43,52]. On the other hand, Buunk and van derWerf [21] concluded that the main reasons for adopting eco-label criteria were that they are better for the environment and good for the image of the hotel. Hsieh [53] and Esparon, Gyuris & Stoeckl [54] stated that although green practices were primarily introduced as a means of cost reduction, recently, they have been focused on acquiring a large market share by enhancing relationships with stakeholders. The adoption of green practices in hospitality operations depends on internal factors—for example, managerial attitudes and financial strength—and external business variables, such as environmental regulations and stakeholder pressure [55–57].

Currently, the leading international hotel chains are increasingly emphasizing their commitment to sustainability and are integrating it into their strategic plan [12]. For example, the Intercontinental

Hotel Group [13] reports this commitment as follows: "our policies and standards set out our position on social, environmental, and ethical issues. We embrace our responsibility to focus on ensuring that the growth of our business contributes towards the objectives of the UN Sustainable Development Goals, and we believe that using our power of scale and global reach, we can make the biggest contribution to seven of the goals". At the same time, Hilton Worldwide [58] describes the value chain target in 2030 as follows: "By 2030, we are committed to double our investment in social impact and cut our environmental footprint to half through responsible hospitality across our value chain". Marriot International reported in [15] that "from design to the guest experience, sustainability is embedded into our business strategy. We collaborate with associates, hotel owners, franchisees, brands, suppliers, business partners, customers, and guests to actively reduce our environmental impact and potential business risks by constructing and operating sustainable hotels".

Green practices in the hotel industry mainly include saving energy, reducing water consumption and waste management and reduction [7–9].

2.2.1. Energy Conservation Measures

Energy reduction has been recognized as one of the most significant areas of environmental management in the hotel industry. Generally, hotels consume huge amounts of fossil fuel energy and electricity in different operational areas. Based on the literature reviewed, different energy conservation measures in the hotel industry have been adopted [59–61]. These measures include implementing renewable energy programs (i.e., solar and wind power), installing energy-efficient appliances and equipment, controlling guestroom energy consumption by using digital thermostats, use of energy star-qualified products, installation of motion sensors that automatically turn lights off in low-traffic areas, installation of reflective glass or triple-glazed windows, using energy-efficient light bulbs (LED) and depending on daylight rather than artificial light when cleaning vacant dirty rooms [62–64].

2.2.2. Water Conservation Measures

Water conservation management has been used widely as an important green management strategy in the hotel sector [65]. Hotels consume intensive amounts of water on daily operation. Water consumption in the hotel industry depends on the hotel's size and capacity, occupancy percentage, type and standard of services and facilities provided [62]. Water conservation measures adopted by the hotel sector include installing water-efficient devices and appliances (e.g., using low-flow toilets and showerheads and installing infrared-activated faucets), implementing towel/bed linen reuse programs, fixing leaks in toilets and baths regularly, watering grass and plants early in the morning and late at night to limit evaporation, recycling the grey water (water from washing vegetables and fruits) for grass irrigation and monitoring the water consumption in each department to track usage [16,35,60,66,67].

2.2.3. Waste Management Measures

The hotel industry is regarded as a major contributor to greenhouse gas emissions by generating a huge amount of wet waste (e.g., garden waste, food waste and cooking oil waste) and dry waste (e.g., cardboard, plastics, cans/metal, linen, paper and other garbage) that is transferred into landfills. Consequently, hotel operators began adopting various practices that aim at reducing hotel wastes as follows: separating hotel wastes by using clearly labeled containers and colored bins for collecting recyclables, purchasing products containing recycled content, collecting organic kitchen wastes separately for soil composting, purchasing food items and cleaning chemicals in bulk, adopting a donation program (donating food leftovers and linens to charity) and grinding the remaining guest soaps to use as laundry detergent [16,68,69].

According to Baynova [70], the practical aspects of achieving sustainability in the hospitality industry are extremely complex. On the one hand, there is the issue of reevaluating every process that supports the hotel business, from amenities to distribution, while also seeking means of creating sustainable luxuries. On the other hand, the cost of this process is a major issue. Sustainability in

the hotel industry is only achievable if proper control is implemented. In order to measure the sustainability success rate, it is crucial to determine the parameters (energy consumption, water management and waste management) according to which the operation will be improved. Consequently, the conceptual framework presented in Figure 2 was developed to illustrate the link between green hotel practices and environment-related SDGs and associated targets that will be investigated in terms of environmental management representatives' perceptions in order to identify to what extent green hotel practices, implemented in certified four and five Green Star hotels, contribute to achieving sustainable development goals, especially those related to environmental sustainability.
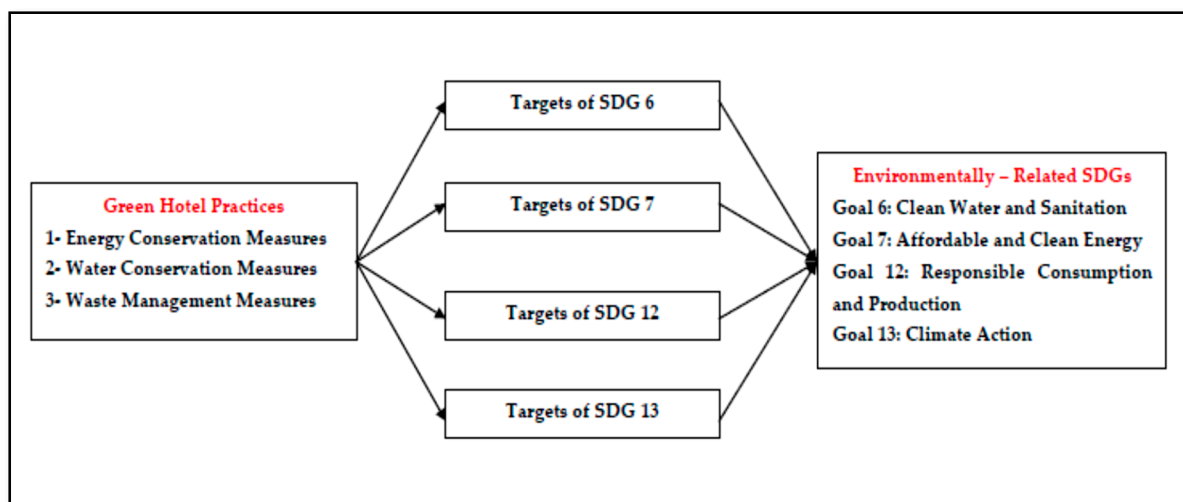

Figure 2. Conceptual framework of the study.

3. Materials and Methods

3.1. Study Population and Sample

The population of this study was composed of individuals in charge of environmental duties in Egyptian Certified Green Star Hotels. According to the Egyptian Hotel Association (EHA) [71], the Green Star Hotel (GSH) is a national green certification awarded by the EHA under the support of the Ministry of Tourism in Egypt. The GSH provides Egyptian hotels with an opportunity to be globally recognized to raise their environmental and social performance in addition to reducing their operational costs. Eleven aspects of hotel operation are impacted by the GSH program, including guest information, environmental management, housekeeping and guest rooms, sustainable management, training and instructions, energy, water, waste, food and beverages and kitchen, gardening and beach area and design, architecture and surroundings. The Green Stars are awarded according to the commitment of the hotel to its environmental performance. There are three levels of certification: three, four and five Green Stars. According to the EHA [71], the total number of certified Green Star hotels was 76, distributed over 17 destinations across Egypt. These were classified according to Green Star rating as follows: three Green Stars—2 hotels, four Green Stars—38 hotels and five Green Stars—36 hotels. In this study, we will focus only on certified four and five Green Star hotels that show high commitment to the protection of nature and the environment in all sectors.

As mentioned previously, the main aim of this study is to investigate the environmental management representatives' perceptions regarding the extent of green hotel practices' contribution to achieving environment-related sustainable development goals (SDGs). To achieve this aim, a questionnaire was developed and directed to the person in charge of environmental duties (environmental manager, maintenance engineer and, in some cases, housekeeper and rooms division manager) in the investigated hotels. A sample of 48 participants, representing 63% of the total certified Green Star hotels in Egypt, was surveyed. The participants from the Egyptian certified Green Star hotels

were selected by using a convenience sampling method, "a type of non-probability sampling, in which people are sampled simply because they are 'convenient' sources of data for researchers" [72]. It is widely used when randomization is not possible due to a very large population or researchers' limited resources, time and workforce [73,74]. Consequently, due to the expansion of the geographical scope of the study, since the sampled hotels were located all over Egypt, and limited time and workforce, in addition to those participants who were more cooperative and had the willingness to participate in the field study, the researchers used a convenience sampling method. The sampled hotels were selected from different destinations as follows: Sharm El Sheikh (12 hotels), Cairo (4 hotels) and 32 hotels in the Red Sea Governorate (Hurghada, Safaga, Marsa Alam, Madinat Makadi). The investigated hotels participated in the survey on the condition that their names would not be revealed. Therefore, they were given anonymous names. Data collection spanned almost two months (August–September 2020).

3.2. Data Collection Method

A quantitative survey based on a questionnaire was used in order to investigate the environmental management representatives' perceptions regarding the extent of green hotel practices' contribution to achieving environment-related sustainable development goals (SDGs).

The structure of the questionnaire form was developed based on the review of the literature. Green hotel practices statements related to water conservation, energy reduction and waste management and recycling were adapted from previous studies [16,39,49,75,76]. The motives for adopting Green Star criteria were adapted from Buunk and van derWerf [21] and Shehata and Elfeel [61]. However, the statements concerning sustainable development goals and associated targets were adapted to match with the hotel industry, from the 2030 Agenda for Sustainable Development adopted by all United Nations Member States in 2015. Four SDGs (SDG 6, SDG 7, SDG 12 and SDG13) that mainly focus on environmental sustainability were examined.

The survey instrument was originally prepared in English and then translated into Arabic. The face validity of the questionnaire form was examined by five experts; three of them belonged to the hospitality field, and two of them belonged to hospitality academics. Upon the experts' suggestions, the wording of some statements was modified and some statements were deleted. The second draft of the questionnaire was piloted by four maintenance engineers and one environmental manager. The final version of the questionnaire was developed giving due consideration to the comments received. Based on the respondents' suggestions, the validity was strengthened. In order to test the internal consistency of each section, Cronbach's alpha coefficient was calculated. The calculated Cronbach's alpha coefficient was 0.74, which confirms the high reliability of the study instrument.

The questionnaire form was divided into three sections. The first section dealt with the respondents' demographic data, where participants were asked to provide information about their gender, age, level of education, current position and the duration of their working experience in the investigated hotels in addition to the rating of Green Star they had been awarded. The second section sought to identify the main reason which motivated the investigated hotels to adopt the Green Star criteria. The third section was intended to reveal the respondents' perceptions towards the extent to which their hotel operations contributed to achieving the four SDGs examined through commitment to implement green hotel practices. Each goal with its associated targets and practices was measured by utilizing a five-point Likert-type scale (strongly agree = 5, agree = 4, neutral = 3, disagree = 2 and strongly disagree = 1) to determine the levels of agreement with the statements investigated.

The data collected from the investigated respondents were computed and analyzed by Statistical Package for the Social Sciences (SPSS) version 25.0 for Windows. Frequency counts, percentage distributions, mean and standard deviation were calculated and analyzed. Independent sample t test was used to enable a comparison between four and five Green Star hotels to determine whether there was a statistically significant difference between the means in the two groups.

4. Results

4.1. Demographic Profile of the Respondents

The data collected from the investigated respondents (n = 48) illustrated that the vast majority of participants were males, constituting 93.7% (n = 45). With regard to respondents' ages, participants with an average age ranging from 35 to 45 years were the higher category (58.3%), followed by those who were aged more than 45 years (37.5%), while the youngest, i.e., less than 35 years of age, amounted to only 4.2%. In terms of the respondents' level of education, the highest category (89.6%, n = 43) had university degrees. With regard to the respondents' current position, maintenance engineers represented 66.6% (n = 32), followed by environmental managers at 12.5%, while the others (executive housekeepers and rooms division mangers) represented 14.6% and 6.3%, respectively. Half of the investigated respondents (n = 24) had been employed in the hotel for a period, on average, from 3 to 5 years, followed by those who had been employed for more than 5 years (39.6%). In terms of hotel Green Star rating, 52.1% (n = 25) were certified as four Green Star hotels, and the others (47.9%) were certified as five Green Star Hotels.

4.2. Motivation for Adopting Green Star Criteria

This question aims to identify the main reason which motivated the investigated hotels to adopt the Green Star criteria. The respondents were asked to select only one reason. As shown in Table 1, the main reason to adopt Green Star criteria was the hotels' commitment to environmental sustainability, constituting 52% (n = 25). Increasing the hotel's image among customers and competitors and reducing the hotel's operational costs as well as increasing market share (customers who were interested in environmental patterns) represented 25%, 16.7% and 6.3%, respectively. These findings are in line with the findings of Buunk and van derWerf [21], who concluded that the main reasons behind adopting eco-label criteria were that they were "better to the environment and good for the image of the company".

Table 1. Motivation for adopting green star criteria.

Attribute	Frequency	%
Increasing the hotel's image among customers and competitors	12	25
Hotels' commitment to environmental sustainability	25	52
Reducing hotel's operational costs	8	16.7
Increasing hotel's market share (customers who were interested in environmental patterns)	3	6.3
Other	-	-
Total	**48**	**100**

4.3. Perceptions of the Investigated Respondents towards SDGs

These questions intended to reveal the respondents' perceptions of the extent to which their hotel operations contributed to achieving the four SDGs examined through commitment to implement green hotel practices. The respondents were asked to identify their perceptions of the investigated variables by using a five-point Likert-type scale. The data collected from the investigated respondents are illustrated in the following tables.

With regard to the contribution of green hotel practices in achieving sustainable development goal 6 and its targets, it could be concluded from the data shown in Table 2 that the majority of the investigated respondents in both categories (four and five Green Star hotels) strongly agreed that their hotel operations contributed to achieving adequate and equitable sanitation and hygiene besides achieving universal and equitable access to safe and affordable drinking water, with a total average mean of 4.51 and 4.50, respectively. They also agreed that their properties were committed to

substantially increasing water-use efficiency across all sectors (M = 4.01) by using low-flow toilets and showerheads and installing water-efficient devices and appliances.

The surveyed hotels contributed to improving water quality (M = 3.99) and implementing integrated water resources management at all levels (M = 3.84) by implementing linen and towel reuse programs, reducing pollution and eliminating dumping, respectively. However, both four and five Green Star hotels neutrally protected and restored water-related ecosystems by collecting rainwater and using it in garden irrigation or flushing toilets (M = 2.92). Generally, using low-flow toilets and showerheads, with a total average mean of 4.58, followed by installing water-efficient devices and appliances and implementing linen and towel reuse programs, were the most green hotel practices implemented by the investigated hotels.

Table 2. Descriptive statistics of the investigated respondents' perceptions regarding SDG 6.

Variable	4-Star (N = 25)		5-Star (N = 23)		Total (N = 48)		*p*-Value
	M	*SD*	*M*	*SD*	*M*	*SD*	
Goal 6: Clean Water and Sanitation							
6/1 The hotel contributes to achieving universal and equitable access to safe and affordable drinking water for all.	**4.48**	**0.510**	**4.52**	**0.511**	**4.50**	**0.505**	**0.778**
6/2 The hotel contributes to achieving access to adequate and equitable sanitation and hygiene	**4.44**	**0.583**	**4.57**	**0.662**	**4.51**	**0.619**	**0.49**
6/3 The hotel improves water quality by:	**3.81**	**0.376**	**4.16**	**0.400**	**3.99**	**0.422**	**0.003 ***
6/3/1 Reducing pollution.	3.84	0.898	4.26	0.810	4.04	0.874	0.096
6/3/2 Eliminating dumping.	3.96	1.020	4.13	0.694	4.04	0.874	0.506
6/3/3 Minimizing release of hazardous chemicals and materials.	3.72	1.061	4.13	0.869	3.92	0.986	0.152
6/3/4 Halving the proportion of untreated wastewater.	3.80	1.000	4.17	0.887	3.98	0.956	0.179
6/3/5 Increasing recycling and safe reuse of wastewater.	3.72	1.061	4.09	0.949	3.90	1.016	0.215
6/4 The hotel substantially increases water-use efficiency across all sectors and ensures sustainable withdrawals and supply of freshwater to address water scarcity by:	**3.76**	**0.523**	**4.29**	**0.535**	**4.03**	**0.587**	**0.001 ***
6/4/1 Installing water-efficient devices and appliances.	4.12	0.781	4.48	0.665	4.30	0.743	0.095
6/4/2 Using low flow toilet and showerheads.	4.52	0.653	4.65	0.487	4.59	0.577	0.434
6/4/3 Recycling the grey water (water of washing vegetables and fruits) for grass irrigation.	2.64	1.114	3.74	1.054	3.19	1.209	0.001 *
6/5 The hotel implements integrated water resources management at all levels.	**3.60**	**0.428**	**4.08**	**0.377**	**3.84**	**0.456**	**0.001 ***
6/5/1 Implementing a linen and towel reuse program.	4.04	1.022	4.12	0.833	4.08	0.919	0.777
6/5/2 Monitoring the water consumption in each department.	3.24	1.300	4.09	0.996	3.67	1.229	0.015 *
6/5/3 Maintaining regularly plumbing fixtures and piping to avoid water losses.	3.60	1.080	4.22	0.736	3.91	0.973	0.026 *
6/5/4 Watering grass and plants early in the morning and late at night to limit evaporation.	3.52	1.046	3.87	1.058	3.70	1.055	0.256
6/6 The hotel protects and restores water-related ecosystems by collecting rainwater and using it for garden irrigation or flushing toilets.	**2.80**	**1.080**	**3.04**	**1.147**	**2.92**	**1.108**	**0.453**
Overall Score	*3.82*	*0.265*	*4.11*	*0.304*	*3.96*	*0.316*	*0.001 **

M = Mean, SD = Standard deviation, * *p*-value = Significant difference at level 0.05.

The least green practice adopted in four Green Star hotels was "Recycling the grey water (water of washing vegetables and fruits) for grass irrigation". However, "Collecting rainwater and using it for garden irrigation or flushing toilets" was the least adopted practice in five Green Star hotels. Data showed that there were statistically significant differences between four and five Green Star hotels in targets 6.3, 6.4 and 6.5. Conversely, there were no statistically significant differences between them in targets 6.1, 6.2 and 6.6. Overall, there were statistically significant differences between the two categories of hotels surveyed (*p*-value = 0.001).

In the context of goal 7 (affordable and clean energy) and its targets, the data in Table 3 illustrate that the investigated hotels are committed to increasing the rate of energy efficiency and contribute to ensuring universal access to affordable, reliable energy services by using energy-efficient light

bulbs (LED), installing timers and movement detectors to reduce lighting time in low-traffic areas and installing energy efficient appliances in all hotel areas including guest rooms, with total average means of 4.42, 4.21 and 4.19, respectively. On the other hand, despite its important role in reducing air pollution, saving energy consumption and operating costs in addition to mitigating greenhouse gases emissions, using renewable energy sources likes solar and wind energy was the least adopted green practice in both categories of investigated hotels. The data shown also reveal that there were statistically significant differences between four and five Green Star hotels in all targets surveyed.

The data presented in Table 4 reveal that goal 12 (sustainable consumption and production patterns) and its targets have been achieved through different green hotel practices. The majority of investigated managers agreed that their properties had strategically sustainable plans and that they were adopting sustainable practices and integrating sustainability information into their reporting cycle, with a total average mean of 4.15 and 4.11, respectively. Natural resources, chemicals and all types of waste were managed sustainably. In order to reduce food waste and losses along the production and supply chain, the hotels measured the amount of waste composition for each department and purchased food supplies in bulk to avoid excess packaging. Moreover, the investigated hotels promoted public procurement practices that were sustainable (e.g., purchasing green products and locally produced food items) and contribute to reducing waste generation substantially through the 3 Rs (reducing—reusing—recycling).

The most adopted green practice in four Green Star hotels as perceived by the investigated respondents was "Informing the guest about the good environmental practices implemented", and the lowest adopted one was "Purchasing supplies in bulk to avoid excess packaging". Meanwhile, the most adopted green practice in five Green Star hotels was "Depending on day light rather than artificial light during cleaning vacant-dirty rooms", and the lowest adopted one was "Measuring the amount of waste composition for each department". Despite the data illustrating that there were no statistically significant differences between four and five Green Star hotels in the majority of the surveyed targets (six targets), overall, there were statistically significant differences between them (See Table 5).

Table 3. Descriptive statistics of the investigated respondents' perceptions regarding SDG 7.

Variable	4-Star (N = 25)		5-Star (N = 23)		Total (N = 48)		*p*-Value
	M	**SD**	**M**	**SD**	**M**	**SD**	
Goal 7: Affordable and Clean Energy							
7/1 The hotel contributes to ensuring universal access to affordable, reliable, and modern energy services.	**3.68**	**0.988**	**4.35**	**0.714**	**4.01**	**0.923**	**0.011 ***
7/2 The hotel increases substantially the share of renewable energy in the total energy consumption by using renewable energy system like solar and wind energy.	**1.72**	**0.614**	**2.61**	**1.373**	**2.16**	**1.130**	**0.005 ***
7/3 The hotel increases the rate of improvement in energy efficiency by:	**4.06**	**0.353**	**4.29**	**0.319**	**4.17**	**0.353**	**0.023 ***
7/3/1 Installing energy efficient appliances in offices, public areas, and guest rooms.	4.16	0.746	4.22	0.902	4.19	0.816	0.811
7/3/2 Installing timers and movement detectors to reduce lighting time in low traffic areas (storing area, corridors, and bathrooms).	4.08	0.862	4.35	0.714	4.21	0.798	0.249
7/3/3 Adopting preventive maintenance programs regularly.	4.08	0.862	4.26	0.752	4.17	0.808	0.444
7/3/4 Using energy efficient light bulbs (LED) instead of fluorescent ones.	4.36	0.757	4.48	0.593	4.42	0.679	0.552
7/3/5 Promoting investment in energy infrastructure and clean energy technology.	3.92	0.997	4.17	0.778	4.04	0.898	0.333
7/3/6 Controlling the air condition and boilers at a reasonable temperature.	3.76	1.012	4.26	0.619	4.00	0.875	0.046 *
Overall Score	*3.15*	*0.334*	*3.75*	*0.617*	*3.45*	*0.571*	*0.000 ***

M = Mean, SD = Standard deviation, * *p*-value = Significant difference at level 0.05.

Table 4. Descriptive statistics of the investigated respondents' perceptions regarding SDG 12.

Variable	4-Star (N = 25)		5-Star (N = 23)		Total (N = 48)		*p*-Value
	M	*SD*	*M*	*SD*	*M*	*SD*	
Goal 12: Responsible Consumption and Production							
12/1 The hotel has strategic plan for sustainability management including (sustainable consumption and production patterns).	**4.00**	**0.707**	**4.30**	**0.876**	**4.15**	**0.799**	**0.19**
12/2 The hotel contributes to achieving the sustainable management and efficient use of natural resources by:	**3.86**	**0.587**	**4.02**	**0.464**	**3.94**	**0.532**	**0.298**
12/2/1 Collecting organic wastes separately for soil composting.	3.64	0.638	3.65	0.832	3.65	0.729	0.955
12/2/2 Depending on day light rather than artificial light during cleaning vacant-dirty rooms.	4.08	0.954	4.39	0.722	4.23	0.857	0.212
12/3 The hotel reduces the food waste at the retail and consumer levels and reduces food losses along production and supply chains by:	**3.40**	**0.722**	**3.80**	**0.808**	**3.60**	**0.783**	**0.074**
12/3/1 Measuring the amount of waste composition for each department.	3.68	1.108	3.52	1.163	3.60	1.125	0.631
12/3/2 Purchasing supplies in bulk to avoid excess packaging.	3.12	1.054	4.09	1.041	3.58	1.145	0.003 *
12/4 The hotel achieves the environmentally sound management of chemicals and all wastes throughout their life cycle.	**3.60**	**1.000**	**3.91**	**0.793**	**3.76**	**0.911**	**0.238**
12/5 The hotel substantially reduces waste generation through prevention, reduction, recycling, and reuse by:	**3.68**	**0.627**	**4.20**	**0.635**	**3.94**	**0.676**	**0.007 ***
12/5/1 Separating hotel wastes by using clearly labeled containers and colored bins for collecting recyclables (glass, metal, cardboard . . . etc.).	4.24	0.723	4.30	0.635	4.27	0.676	0.746
12/5/2 Donation of food leftovers and linens to charity.	3.12	1.054	4.09	1.041	3.58	1.145	0.003 *
12/6 The hotel adopts sustainable practices and integrates sustainability information into their reporting cycle.	**4.00**	**0.816**	**4.22**	**0.671**	**4.11**	**0.751**	**0.321**
12/7 The hotel promotes public procurement practices that are sustainable, in accordance with local policies and priorities by:	**3.63**	**0.646**	**3.79**	**0.637**	**3.71**	**0.634**	**0.926**
12/7/1 Purchasing locally produced food items.	3.60	0.957	3.78	0.951	3.69	0.949	0.511
12/7/2 Purchasing green products such as biodegradable items (e.g., eating utensils, cleaning solutions, etc.).	3.65	0.885	3.80	0.957	3.73	0.917	0.582
12/8 The hotel contributes to ensuring that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature by:	**3.74**	**0.442**	**4.18**	**0.452**	**3.96**	**0.461**	**0.050 ***
12/8/1 Informing the guest about the good environmental practices implemented.	4.09	0.733	4.36	0.700	4.23	0.722	0.193
12/8/2 Encouraging the guest to participate in reducing the hotel's environmental impacts.	3.12	1.054	4.09	1.041	3.58	1.145	0.003 *
12/8/3 Applying continuous training for hotel staff to increase their environmental awareness.	4.00	0.866	4.09	0.793	4.04	0.824	0.719
Overall Score	*3.74*	*0.291*	*4.05*	*0.382*	*3.90*	*0.361*	*0.007 **

M = Mean, SD = Standard deviation, * *p*-value = Significant difference at level 0.05.

Table 5. Descriptive statistics of the investigated respondents' perceptions regarding SDG 13.

Variable	4-Star (N = 25)		5-Star (N = 23)		Total (N = 48)		*p*-Value
	M	*SD*	*M*	*SD*	*M*	*SD*	
Goal 13: Climate Action							
13/1 The hotel integrates climate change measures into its policies, strategies, and planning.	**3.24**	**0.970**	**3.70**	**1.020**	**3.47**	**1.010**	**0.119**
13/2 The hotel improves education and human awareness-raising on climate change mitigation, adaptation, impact reduction, and early warning.	**3.12**	**1.054**	**4.09**	**1.041**	**3.61**	**1.145**	**0.003 ***
13/3 The hotel contributes to mitigating greenhouse gas emissions by:	**3.01**	**0.456**	**3.51**	**0.764**	**3.26**	**0.636**	**0.088**
13/3/1 Implementing advanced technologies to track energy consumption.	4.17	0.700	4.36	0.576	4.27	0.644	0.322
13/3/2 Using renewable energy sources.	1.84	0.554	2.65	1.335	2.25	1.077	0.008 *
Overall Score	*3.12*	*0.514*	*3.77*	*0.572*	*3.45*	*0.611*	*0.001 **

M = Mean, SD = Standard deviation, * *p*-value = Significant difference at level 0.05.

With regard to taking action to combat climate change and its impacts (goal 13), the investigated respondents stated that their hotel operations neutrally contributed to mitigating greenhouse gas emissions by implementing advanced technologies to track energy consumption. Moreover, they agreed that their hotels improved education and raised awareness regarding climate change mitigation, adaptation and impact reduction and that they integrated climate change measures into their sustainable management plans, with a total average mean of 3.61 and 3.47, respectively. On the other hand, they rarely used renewable energy sources to mitigate greenhouse gas emissions. Overall, there were statistically significant differences between the two groups of hotels surveyed.

5. Discussion

The current study aims to investigate the environmental management representatives' perceptions regarding the extent of green hotel practices' contribution to achieving environment-related SDGs. Four SDGs (SDG 6, SDG 7, SDG 12 and SDG13) that primarily focus on environmental sustainability have been examined.

With regard to SDG 6, the investigated respondents perceived that their hotels' operations were more interested in contributing positively to achieving the goals and associated targets via different green practices. Achieving access to safe and affordable drinking water—"sufficient drinking water which is free from pathogens and toxic chemicals with a reasonable price for all guests" and equitable sanitation and hygiene to all"—implies a system that hygienically separates wastes from human contact" and improves water quality. The surveyed hotels were committed to reducing pollution, eliminating dumping (adequate disposal of all wastes), minimizing the use of hazardous chemicals and recycling and reusing wastewater. These findings are consistent with Kasim, Gursoy, Okumus & Wong [77], who stated that water availability for hotels is vulnerable if not managed well. Poor water quality or insufficient water supply can affect the smooth running of hotels. Wastewater generated from daily activities in the kitchen and laundry should be reused after necessary treatment. Younos and Parece [78] confirmed that a system of alternative recycled water use can save particular sources of potable water, especially when drinking water quality is not needed. Purified grey water can be reused for watering gardens, outdoor cleaning and flushing toilets. Marriott International [15] reported that the majority of its hotels use recycled water for landscaping, first wash, cooling tower makeup water, laundry and flushing. Hilton worldwide [58] reports that "everyday 6000 gallons are saved by the grey water recycling system at the Hilton Garden Inn Dubai, Mall of the Emirates".

In line with previous research [16,55,79], using low-flow toilets and showerheads, installing water-efficient devices and appliances and implementing linen and towel reuse programs are the most popular means by which hotels have attempted to reduce water consumption. Tirado, Nilsson, Deyà-Tortella & García [80], addressing the water saving measures implemented in Mallorca hotels, found that the most extended simple innovations to reduce water were the introduction of low-flow fittings in water devices, followed by low-flush toilets. Alexander [81] concluded that installing low-flow showerheads and aerating faucets save the room USD 1.50 per month and save the hotel 180,000 gallons of water per year. Results from in-depth, semi-structured interviews with hotel professionals revealed that the most common water-saving measure was water-flow control technology, such as water restrictors and auto-sensing water devices [82]. As a result of its effective role in reducing water consumption, a linen and towel reuse program was extensively adopted by both types of investigated hotels (M = 4.08). The in-depth interviews conducted by Torres-Bagur, Ribas & Vila-Subirós [83] with 19 hotel owners and managers revealed that more than 75% of the investigated hotels had improved their towel and linen reuse policies, primarily to reduce water and energy consumption.

In terms of ensuring access to affordable, reliable, sustainable and modern energy for all (SDG 7), the study findings reveal that the investigated hotels contribute to increasing the rate of improvement in energy efficiency in different ways. The findings of this study that are related to the role of using energy-efficient light bulbs (LED), installation of timers and movement detectors in low-traffic areas and installing energy-efficient appliances in all hotel areas in energy conservation agreed with

different research in the hospitality industry. Chan et al. [82] concluded that efficient light bulbs (LED), motion sensors and the key-card system were the most common environmental technologies being used to save energy in Hong Kong hotels. Mehta [84] recommended that in order to reduce energy consumption in hotels, energy conservation measures such as energy-saving kitchen equipment, low-wattage lighting fixtures and solar power should be used. Cheung and Fan [85] highlighted that Langham Place Hotel Mongkok Hong Kong, in achieving net zero-energy, makes wise use of technologies to maximize its energy consumption efficiency. The hotel has raised its energy savings from 84,000 kWh/pa in 2006 to 826,000 kWh/pa in 2010. The Four Seasons Doha Hotel [86] reports that "only low-energy light bulbs are used throughout the property, and outdoor lighting is controlled by a timer". Wyndham Destinations [14] reported that "96 percent of the Wyndham resorts use combination of proven conservation strategies and energy efficiency retrofits, energy efficient lighting, motion sensors and default setting for in-unit HVAC systems in order to achieve on-going reductions in energy and emissions".

On the other hand, the findings of this study highlight that using a renewable energy system, like solar and wind energy, was rarely adopted (M = 2.15). This result is consistent with Chan et al. [82], who concluded that the use of renewable energy systems in Hong Kong hotels was very low; only one manger from the participants interviewed (23 participants) stated that his hotel used solar-based renewable energy for power supply. None of the informants applied wind-based renewable energy. The main reason was "Large scale solar energy-related technology can hardly be used as its payback period is about 20–30 years". In line with this, Petrevska, Cingoski and Serafimova [87] examined the nature of energy applied in Macedonian hotels. The findings of an online questionnaire conducted among (45) managers and supervisors illustrated that a large number of hotels lack measures to reduce conventional energy use and replace it with renewable sources of energy. The study conducted by Parpairi [88] on small-scale Greek hotels emphasized the need for increased use of renewable energy technologies (RET). Contrary to this finding, Marriott International aims to achieve a minimum of 30% renewable electricity use by 2025. In 2018, the JW Marriott Hotel Cairo installed a photovoltaic rooftop solar-powered station, which is expected to save over 270,000 kWh of electricity annually [15].

With regard to the responsible consumption and production goal (SDG 12), the findings of this study reveal that the investigated hotels are committed to achieving this goal and its targets. Separating hotel wastes by using clearly labeled containers and colored bins for collecting recyclables (e.g., glass, metal, cardboard, etc.) was the most commonly applied green hotel practice (M = 4.27). The study conducted by Pham Phu, Fujiwara, Hoang, Pham and Tran [89] to assess the practice of waste separation and the possibility of recycling in Hoi An City, Vietnam hotels indicated that waste separation practices and solid waste management are favorable strategies for enhancing recycling practices. The investigated hotels properly contribute to reducing food waste along production and supply chains (M = 3.60), which is in line with the "food waste program" that was adopted by Hilton International. This program guides hotels regarding techniques for reducing food waste at every step of the food cycle, from purchasing and menu planning to the donation of excess edible items and disposal of remaining inedible food [58].

To ensure that people everywhere have relevant information about and awareness of sustainable development, the investigated managers informed their guests about the good environmental practices being implemented in order to encourage them to participate properly in reducing the environmental impacts (M = 4.23). This finding is consistent with the study findings of Eldemerdash and Mohamed [90], who revealed that customers are usually the main drivers of adopting environmentally friendly practices and often have an impact that exceeds any of the other stakeholders. Hotel staff are provided with continuous training to increase their environmental awareness (M = 4.04). This finding is supported by a study conducted by Zengeni and Muzambi [91] on 100 informants from 3–5 star hotels in Harare, Zimbabwe, which revealed that employees' environmental awareness plays an important role in green revolution. Frequently communicating environmental information to employees encourages them to be more involved and, in the same way, increases their environmental awareness.

The hotel sector is highlighted as one of the major emitters of carbon dioxide because of its intensive use of fossil fuels, which generate greenhouse gases that impact negatively on the climate [45,48]. Consequently, different measures have been adopted by hotel operations to mitigate climate change. The study findings reveal that the sampled hotels on a regular basis provide continuous training to hotel staff to increase their awareness of climate change mitigation, adaptation and impact reduction. In South Africa, Odeku [92] suggested that the hospitality industry should respond appropriately and adequately to the greenhouse gases emission challenges.

The findings of this study are in line with the sustainable development plans of different international chains. Marriott International integrates climate change measures into its sustainable plan and reports the following: "To help mitigate climate-related risk, we aim to minimize our environmental footprint by implementing technologies, track our energy consumption, and increase the use of renewable energy. By 2025, we aim to reduce carbon intensity per square meter of conditioned space by 30% from a 2016 baseline" [15]. By 2030, Hilton International seeks to "reduce Scope 1 and 2 carbon intensity from Hilton-managed hotels by 61% and work with their franchisees to reduce Scope 3 carbon intensity from franchises by 52%" [58]. Wyndham Destinations [14] aims to "reduce carbon emissions per square foot by 40% by 2025 as compared to 2010 baseline".

Although using renewable energy sources contributes positively to the mitigation of greenhouse gas emissions, this study found that it was the least adopted practice in both four and five Green Star hotels. This finding contradicts the findings of Odeku [92], who confirmed that "switching to the use of renewable energy as an energy source is the perfect solution to save the earth's biosphere and is essential to the stabilization of the climate worldwide".

6. Conclusions

This study is among the few that investigate environmental management representatives' perceptions regarding the extent of green hotel practices' contribution to achieving environment-related sustainable development goals (SDGs), especially those related to clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), responsible consumption and production (SDG 12) and climate action (SDG 13). The study sample comprised 48 participants (23 participants from five Green Star hotels and 25 from four Green Star hotels) that represent the persons in charge of environmental duties in the investigated hotels. A self-administrated questionnaire was developed and directed to participants to identify their perceptions regarding the role of green hotel practices in achieving environment-related SDGs.

The findings of the present study indicate that the investigated respondents perceived that their hotels' operations were proactive in implementing green hotel practices, regarding energy conservation, water conservation and waste management, but not regarding the use of renewable energies, which led to achieving the targets of the SDGs and, by extension, achieving the environment-related SDGs.

Overall, respondents from five Green Star hotels perceived higher implementation than those of four Green Star hotels for all investigated practices and targets regarding the sustainable development goals surveyed. Moreover, the findings reveal that there were statistically significant differences between four and five Green Star hotels in all SDGs addressed. Based on what has been mentioned previously, we can conclude that commitment to achieving SDGs could be affected by Green Star rating. The higher the Green Star hotel rating, the higher the contribution to achieving the SDGs. Consequently, the lower level hotels' operators should be more committed to achieving environmental sustainability by conducting specific training programs that aim to increase the environmental awareness of hotel staff and engagement of guests in reducing the hotels' environmental impacts by incorporating green environmental practices into their marketing plans. Sharing the best green hotel practices between hotel operators should be encouraged to improve the hotels' commitment to environmental sustainability. A periodical follow-up should be conducted by the granting Green Star organization to ensure that the certified hotels adhere to established environmental standards.

Regarding the motivation to adopt the Green Star criteria, the findings of the study reveal that hotels' commitment to the environmental sustainability was the main driver of adopting the Green Star criteria, which reflects the increased awareness of hotel operators towards sustaining the environment and its natural resources. Concerning SDG 6, "Clean Water and Sanitation", the findings generally reveal that the least adopted green practices were collecting rainwater and using it for garden irrigation or flushing toilets and recycling the grey water for grass irrigation, although previous studies indicated their importance in reducing water consumption in the hospitality industry [61,80]. Atanasova, Dalmau, Comas, Poch, Rodriguez-Roda and Buttiglieri [93] concluded that the recycling and reuse of grey water as well as the collection and use of rainwater are advanced measures that could achieve more sustainable use of water resources and provide cost savings for hotels. Hence, hotel operators should consider these practices while preparing their hotel's environmentally sustainable plan.

Similarly, with regard to SDG 7 and SDG 13, using renewable energy sources, like solar and wind power, was the least adopted practice in both categories of investigated hotels despite its importance in reducing hotel energy consumption and the mitigation of greenhouse gas emissions as sources of clean energy. The study reinforces the importance of using renewable energy sources in the hospitality industry; thereby, the hotel operators should replace fossil fuels, as much as possible, with renewable energy sources (e.g., by installing a photovoltaic rooftop solar-powered station, placing an Eco-Vert wind power turbine, building hydro-electric power stations and reusing compost heat), especially due to the rise in fuel prices.

On the other hand, the study's findings reveal that, overall, using low-flow toilets and showerheads, using energy-efficient light bulbs (LED), separating hotel wastes by using clearly labeled containers and colored bins for collecting recyclables and implementing advanced technologies to track energy consumption were the most adopted green practices. As a result, in order to improve the environmental performance of hotels regarding energy, it is essential for hotel managers to proactively integrate sustainable energy technologies (e.g., light-emitting diode bulbs, dimming and occupancy sensor systems, ozone and tunnel washers, smart vent hoods in the kitchen, etc.) into their operations. Moreover, due consideration should be given to the government's incentives (i.e., reducing government taxes) to support hotel operators to be more committed to sustaining natural resources.

Finally, according to the total average mean of the sustainable development goals addressed, the findings of this study indicate that the implemented green hotel practices in the certified four and five Green Star hotels surveyed contribute positively to achieving SDG 6, SDG 12, SDG 7 and SDG 13, respectively. Consequently, the sooner hotel operators incorporate water and energy conservation practices and waste management measures into their operational plans, the more achievable are the sustainable development goals.

It is important to note that there were some limitations in this study which should be addressed in future research. Firstly, the study sample represents only the perceptions of environmental management representatives in certified four and five Green Star hotels in Egyptian destinations. Consequently, the results could not be generalized to other hotels worldwide. Secondly, this study focuses only on identifying the role of the environmental green hotel practices in achieving four SDGs (SDG 6, SDG 7, SDG 12 and SDG 13) that are mainly related to environmental sustainability. Consequently, we suggest that future research might investigate the role of corporate social responsibility (CSR) of the hotel industry in achieving SDGs. In addition, barriers and challenges that the hotel industry may face in achieving SDGs, especially in small and medium hotel properties, should be addressed.

Conflicts of Interest: The authors declare no conflict of interest.

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