



Energy Efficiency and Conservation of Hotels in Ghana: A Systematic Review Article

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Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

Objective: This study seeks to review on energy efficiency and conversation of hotels in Ghana.

Methods: The reviewed studies adopted a cross-sectional study design. A systematic review was carried out with the aid of online research journal websites as well as other in-context articles. While conducting this study, the key words in the search query were directed towards energy efficiency and conversation of hotels in Ghana. Areas noted in relation to this study was use of green practices in hotels. Therefore, there was linkage of papers pointing out on energy efficiency and conversation of hotels in Ghana.

Results: According to Appiah et al. study on sustainable energy systems and green practices, majority (71.8%) noted that they do not implement and depend largely on renewable energy programs. Only a few indicated they either use or implement renewable energy always, sometimes and some are yet to start its usage. According to Mensah's study, energy-efficient light bulbs (94.2%), linen and towel reuse (74%), staff training in eco-friendly practices (72%), eco-friendly

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cleaning products (72%), and support for the local community (70%), were the most commonly used eco-friendly practices in hotels in Accra. According to Boateng's study, on green hotel development, hotels are perceived to impact the natural environment negatively and the responses given below by respondents were in contention with the fact that high levels of energy consumption is one of the key impact of hotels on the environment.

Conclusion: In conclusion, the studies conducted by the researchers shed light on various aspects of sustainable energy systems, green practices, and environmental awareness.

Keywords: Energy; efficiency; conversation; hotel; ghana.

1. INTRODUCTION

The current economic crisis has made hotels more ecologically conscious than they have ever been before. This is due to the enormous costs associated with creating and operating a hotel that does not comply with sustainable practices. The significant increase in electricity costs over the last few years has forced the hotel industry to adopt more environmentally friendly practices [1]. These efforts include making the most of natural light and decreasing trash.

Energy conservation refers to the process of minimizing energy use in order to achieve the most efficient utilization of energy. When better energy management systems, changes in consumer behavior, and the introduction of new technologies are used to make good use of energy [2], then using energy resources and electrical appliances to save energy is the same as using them in a good way. Electricity is regarded as an essential component for both society and the economy's development. This is because it is present in every aspect of human existence. Wu and colleagues' research projects a 45 percent global population expansion in the next ninety years. In light of this, there is an immediate need for energy that is not only easily accessible, but also broadly available and environmentally friendly in order to meet the standards for net zero carbon [3].

In the seventeen Sustainable Development Goals (SDGs), one of the most important components is the worldwide appeal to eliminate poverty, safeguard the planet, and guarantee that all people experience prosperity and peace by the year 2030. Ghana, along with 193 other United Nations member countries, accepted the Sustainable Development Goals (SDGs) in 2015 at the General Assembly of the United Nations in Paris. Officially, they came into effect in January 2016. The Sustainable Development Goals (SDGs) are a set of worldwide goals with five overarching themes: people, planet, prosperity,

peace, and partnerships. Agenda 2030 is another name for the United Nations' Sustainable Development Goals (SDGs). Ecological preservation, social integration, and economic progress are the objectives that they seek to achieve. Among the objectives, Sustainable Development Goal 7 (SDG 7) aims to guarantee that by the year 2030, all people have access to energy that is modern, cheap, dependable, and sustainable. It is vital to create a solid energy infrastructure, move away from fossil fuels and toward renewable energy sources, and make use of unconventional clean energy sources such as nuclear power and hydrogen in order to achieve target 7.

Hotel energy costs are among the highest due to the buildings' massive power consumption. The energy consumption of these structures is among the highest in the tertiary sector [4]. Hotels prioritize energy-efficient methods to cut operational expenses, including energy utility costs, by up to twenty percent. The cost of energy utilities is a readily manageable operating expenditure [5]. As a result, concerns about energy conservation and environmental preservation intimately connect to the growth of the hotel sector.

The leadership's primary purpose is to develop a sustainable organization that is environmentally conscious and minimizes operating expenses via the exploitation of renewable energy sources. This is the primary objective of the leadership. When it comes to the tourist business, reducing operational expenses might potentially boost both profitability and competitiveness [6,7]. The implementation of energy-efficient solutions has a positive influence on the aesthetic value of the hotel, the comfort of its guests, and the reliability of its maintenance systems. These approaches can reduce pollution because they lower emissions of acid gases, nitrous oxide, greenhouse gases, and other pollutants, these approaches are able to bring about a reduction in pollution. Despite efficiency improvements,

experts predict a 135% increase in tourism emissions between 2005 and 2035 [8]. On the other hand, high-quality service in the hotel industry is often dependent on the facility being clean and well-maintained.

Globally, there has been a significant amount of research on energy efficiency, with a particular focus on the hospitality and tourist industries. In countries such as Ghana, there is a significant paucity of evidence-based data concerning these themes, despite the fact that the hotel and tourism sector is now seeing a worldwide trend toward more sustainable energy systems, improved operations, and cutting-edge technical innovations. The published literature contains a significant amount of data indicating that hotels in North America, Europe, and Asia have embraced environmentally friendly practices and sustainable energy systems [9]. Other emerging regions of the globe, such as Nation [10], have also been subjected to a comparable amount of research.

However, efficient sustainable energy systems by the hospitality industry in Ghana have not been given much research attention. This study aims to examine the energy efficiency and communication practices of hotels in Ghana.

2. ENERGY EFFICIENCY AND CONSERVATION

Numerous factors influence household and individual energy conservation activities. Psychological, social, economic, and environmental elements primarily influence the actions taken to preserve energy [11,12]. The concept of planned behavior stands out as particularly noteworthy among the many theories proposed to explain energy-saving practices [13,14]. A number of behavioral models have been used to gain a better understanding of the energy-related activities that families engage in, such as energy laddering and stacking [15,16]. A wide range of demographic parameters influence people's energy-saving behaviors in residential buildings, including the number of people in their household, their age, their income, their level of education, the type of occupancy, and the duration of their stay [17]. Environmental factors, related to the physical qualities of the structure and its surrounding environment, influence people's energy-saving habits [18]. Some other socio-demographic characteristics may also play a role in influencing people's behaviors about energy conservation [19]. Cultural norms and

social pressure significantly influence people's intentions to engage in energy conservation practices, as per the theory of planned behavior [19].

Investing in expensive equipment like electric sub-meters, renewable energy sources, artificial intelligence (AI), and the habit of turning off lights and appliances when not in use is necessary to find a solution [20,21]. Woodroof et al. recommend moving on to more difficult pursuits after completing these simpler tasks, also known as "low-hanging fruits." Continue on until you have achieved your policy goals, maintained your gains, or improved them even more [22]. In 2005, the Ministry of Energy and its associated agencies aggressively pushed and implemented laws to limit energy usage and distribution that lose efficiency. These rules aim to regulate the use and distribution of energy. This category includes policies that aim to curb the national demand for energy commodities through incentives and mandatory measures. The year 2005 marked the beginning of Ghana's energy efficiency strategy, which was implemented as a component of a wider national energy policy that attempted to solve all energy-related economic concerns during that time period. In order to achieve the goal of increasing energy efficiency in Ghana, it was important to design a pricing structure that was equitable and would provide incentives to both residential and business users to lower their energy use on their own will. In addition to this, the system would fund public education programs that educate individuals on the reasons for and methods for conserving energy [23, 2].

The survey found that hotels may save money, make a favorable impression, and attract more customers by implementing sustainable practices. Hotels also appear to be making a good financial decision by introducing sustainable practices, as there is a quick payback time and long-term economic savings. Hotel operations can produce solid and liquid waste, which may have an impact on the environment on a global or local scale. Liquid trash often originates from the kitchen, laundry, and restrooms, whereas solid garbage consists of things like wasted paper and plastic, food scraps, and rubber. Hotels' high energy consumption contributes to climate change by increasing carbon dioxide emissions. Proper waste management and efficient resource usage are two examples of sustainable business practices that an eco-conscious company might use. Still, hotels stand to gain from eco-friendly

practices and sustainable initiatives. These environmental advantages include less pollution, less waste, and a smaller carbon footprint. It safeguards the well-being of both employees and consumers from a social perspective. Additionally, it greatly enhances the company's reputation.

Economically speaking, it helps the company's bottom line, as cutting down on electricity and water use may save a ton of money. Lanjewar's research in the hotel business revealed that independent hotels, in particular, can gain a cost-and differentiating advantage through quality and environmental management [24].

3. METHODS

The reviewed studies adopted a cross-sectional study design. We conducted a systematic review using online research journal websites and other in-context articles. During the study, we focused the search query on energy efficiency and discussions about hotels in Ghana using specific keywords. The study focused on two key areas: energy efficiency and hotel conversation. Therefore, there was a linkage between papers highlighting energy efficiency and the conversations taking place in Ghanaian hotels. The research methodology is appropriate and makes absolute sense, given the evident effects on energy efficiency and hotel conversations..

4. RESULTS

Energy-efficient light bulbs (94.2%), linen and towel reuse (74%), staff training in eco-friendly practices (72%), eco-friendly cleaning products (72%), and support for the local community (70%), were the most commonly used eco-friendly practices in Mensah's study on environmental and sustainable tourism in the Greater Accra Region of Ghana. Hotel owners were always looking for ways to save money, so they would reuse linens and towels and switch to energy-efficient light bulbs. This helped them stay competitive and profitable [25].

Appiah et al. have been researching topics such as ecologically friendly methods and renewable energy sources. Their findings indicate that the great majority of firms place a significant amount of importance on renewable energy projects, but that 71.8% of them do not really carry out any of these activities. Despite the fact that some people have begun to use renewable energy sources, only a tiny fraction of people have said

that they do so often, sometimes, or never. The vast majority of respondents, which accounts for 88.1% of the total, also said that they turn off the lights outdoors during the night and reduce the overall lighting during the day. As part of their environmental policy, 87 percent of the participants said that they always use energy-efficient light bulbs, which have a lifespan that is twelve times longer than that of conventional incandescent light bulbs. The majority of individuals, 42.7%, always repair or replace damaged equipment with newer ones that are more efficient; this is another action that is helpful to the environment. On the other hand, a substantial majority of respondents (28.2%) said that they sometimes use or use this strategy, while a sizeable minority of respondents (1.8%) stated that they have not yet started using it.

Also, 27.3% of respondents said that they never make use of it. A significant number of participants cited the installation of shade windows as an environmentally beneficial activity at their institution. Moreover, a majority of 64.5% of respondents stated that they take precautions to turn off the lights in vacant rooms. We use magnetic cards to promptly turn off the power in the room after guests have left. The majority of respondents also emphasized that their establishments implemented staff training and actively encouraged tourists to engage in eco-friendly practices as a form of green practice [26].

Boateng conducted an investigation into the development of environmentally sustainable hotels. It is a common misconception that hotels have a negative impact on the surrounding environment. The responses in the next section, citing high energy use as an example, support this viewpoint. According to the research findings, hotels could potentially reap significant benefits from solar electricity; however, the significant initial expenses associated with installing solar panels are the primary reason why many hotels are hesitant to adopt this technology. The key card, also known as a swipe card, eliminates unnecessary power consumption, making it a crucial strategy for both hotels to implement in order to save energy [27].

5. DISCUSSION

According to Mensah's study, hotels may save money by implementing energy-efficient light bulbs and equipment, as well as limiting the frequency of linen and towel changes. Star-rated

Table 1. Review of literature

Author/s	Title	Country	Method	Results
Mensah I., 2006	Environmental management and sustainable tourism development: The case of hotels in Greater Accra Region (GAR) of Ghana.	Ghana	The statistics presented here represent a subset of a comprehensive study on environmental management practices in hotels in Ghana's Greater Accra Region. The questionnaire gathered data on environmental management practices, perceptions of sustainable tourism, hotel facility details (including classification, ownership type, services offered, and staff size), as well as socio-economic characteristics such as age, gender, education, and income.	Energy-efficient light bulbs (94.2%), linen and towel reuse (74%), staff training in eco-friendly practices (72%), eco-friendly cleaning products (72%), and support for the local community (70%), were the most commonly used eco-friendly practices. Hotel owners were always looking for ways to save money, so they would reuse linens and towels and switch to energy-efficient light bulbs. This helped them stay competitive and profitable.
Appiah P.A., Adongo R., Safo A.R., 2023	Sustainable Energy Systems and Green Hotel Practices in Hotels in Tamale Metropolis, Ghana	Ghana	Sustainable energy systems and green hotel practices in the Tamale metropolitan, Ghana are assessed using a cross-sectional design and quantitative technique. Both descriptive and inferential analysis are used.	Most Tamale hotels have environmental management plans. We also find that pricing and green regulation understanding are the main barriers to consumers adopting and using sustainable energy technologies. The study found a statistically significant association between education and green energy practices. Yet again, study reveals that a green management approach is highly linked to a great team.
Boateng A.K., 2019	Green hotel development: Towards the building of resilient cities in Ghana.	Ghana	Using the purposive sampling technique, the highest star-rated hotels in a city named Koforidua in Ghana were selected as case studies. Top management of these hotels, together with officials from the relevant Government Actors were interviewed.	The research found that these metropolitan hotels promoted dynamic and resilient communities via eco-friendly practices. Our observations and interviews suggest they concentrate on robust systems. This comprises effective solid and liquid waste management, green building design, energy efficiency, water conservation, and green environmental standards.

hotels, in particular, are reluctant to reduce air conditioning consumption in order to save money on energy costs; in fact, they seldom turn off their air conditioners. To ensure the comfort of their guests, the majority of star-rated hotels maintain continuous air conditioning in the reception area, despite the fact that the Electricity Company of Ghana (ECG) imposes a penalty for excessive energy use [25].

Appiah et al. have conducted research that proposes various strategies to reduce energy consumption and the need for air conditioning. Some of them include shading windows to block the sun's rays, shutting off outside lights during the day and putting them back on at night, using energy-efficient light bulbs that last twelve times longer than incandescent light bulbs, and reducing the amount of lighting that is used during a research by Fang et al., which found that green energy programs include both energy-saving strategies and projects that use renewable energy sources saves cost [28]. Additionally, Abdou, Hassan, and El Dief's research, which found that green hotel practices include energy efficiency, effective water management, and garbage management, corroborates the findings of this study [29].

Despite the research emphasizing the use and implementation of the following green energy practices in their facilities, the questioned respondents either did not use them or had not yet begun to do so. This is another significant factor to take into consideration. Some of these measures include using occupancy sensors or key card control systems to reduce energy consumption in guest rooms, utilizing refrigeration units to heat water for guest rooms and laundry, installing thermostats, upgrading to high-efficiency cooking units, cleaning door seals and defrosting the refrigerator once a month, and installing automatic air conditioning systems throughout the building.

As shown by Hoegh-Guldberg, Ove; Jacob, Daniela; and Taylor [30], solar heat and solar photovoltaics perform better than other technologies when it comes to promoting the use of renewable energy sources.

The results of Boateng's study on resource conservation indicates that hotels consume more energy than any other type of accommodation

facility [27]. According to Singji et al., the depletion of energy supply is one of the most significant challenges that the hospitality and tourism industry is now facing. Because of its high rates of energy consumption, the hotel sector in particular is believed to be a significant contributor to greenhouse gas production [31]. Based on earlier findings, several scholars have argued that hotels can generate energy savings across a wide range of activities due to the wide range of services they offer.

According to Tritto, this technique is not only cost-effective but also effective in reducing energy consumption, as evidenced by the comparable results reported by several hotels [32]. Young argues that a hotel's readiness to address environmental issues correlates with its size and the services it offers [33]. This is due to the fact that larger hotels use more energy. Larger hotels often have a higher number of guests and provide services that require a greater amount of energy, which leads to a higher energy cost.

6. CONCLUSION

In conclusion, the studies conducted by Mensah, Appiah et al., as well as Boateng shed light on various aspects of sustainable energy systems, green practices, and environmental awareness. Appiah's findings underscore a significant gap in the implementation of renewable energy programs among the majority of respondents, indicating a need for greater adoption of sustainable energy sources. Meanwhile, Mensah's study the importance of environmental and sustainable tourism in hotels in the Greater Accra Region of Ghana. How hotel owners utilize energy efficient bulbs and reusable materials to save cost and increase profitability. Furthermore, Boateng's research emphasizes the critical role of the hospitality sector, particularly hotels, in environmental conservation efforts, revealing a pressing need for strategies to mitigate the negative environmental impacts associated with high energy consumption in this industry. Collectively, these studies underscore the imperative for concerted efforts towards promoting renewable energy adoption, enhancing energy conservation awareness, and implementing sustainable practices across various sectors to mitigate environmental degradation and foster a greener future.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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