Systematic Review

ENERGY EFFICIENCY AND CONSERVATION OF HOTELS IN GHANA: A SYSTEMATIC REVIEW ARTICLE

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 and her colleagues study on sustainable energy systems and green practices. Their findings indicated that, 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 Baidoo and colleagues study on Households' energy conservation and efficiency awareness practices in the Cape Coast Metropolis. The study analyzed the energy-saving practices of respondents on selected household gadgets. The main consideration was the frequency at which electrical appliances are used in the metropolis. 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 Appiah and her colleagues, Baidoo and colleagues, as well as Boateng shed light on various aspects of sustainable energy systems, green practices, and environmental awareness.

Keywords: Energy, Efficiency, Conversation, Hotel, Ghana

INTRODUCTION

The current economic crisis has made hotels more ecologically conscious than they have ever been before. This is because of the tremendous costs that are associated with creating and operating a hotel that is not compatible with sustainable practices. The hotel industry has been forced to embrace more environmentally friendly practices as a result of the significant rise in the cost of electricity that has occurred over the course of the last few years (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. Within the context of a framework that makes effective use of energy via the implementation of enhanced energy management systems, modifications in consumer behavior, and the implementation of new technologies (2), the use of energy resources and electrical appliances for conservation purposes is equal to such utilization. Electricity is considered to be an essential component for the development of both society and the economy. This is due to the fact that it is present in every facet of human existence. In the next ninety years, the population of the globe is projected to expand by forty-five percent, as shown by the research conducted by Wu and colleagues. 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 countries that are members of the United Nations, accepted the Sustainable Development Goals (SDGs) in 2015 at the General Assembly of the United Nations in Paris. They were put into effect in an official capacity in January of 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.

As a result of the huge amount of power that is used by the buildings, hotel energy costs are among the highest. The energy consumption of these structures is among the highest in the tertiary sector (4). Methods that are more energy efficient are given priority in hotels in order to reduce operational expenses, such as those associated with energy utilities, by as much as twenty percent. One of the operating expenditures that may be readily managed is the cost of energy utilities, which is the reason why this is the case (5). As a consequence of this, the growth of the hotel sector is intimately connected to concerns about the conservation of energy and the preservation of the environment.

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. The implementation of energy-efficient solutions has a good influence on the aesthetic value of the hotel, the comfort of its guests, and the reliability of its maintenance systems. 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. Even though there have been improvements in efficiency, it is anticipated that emissions from tourism would increase by 135% between the years 2005 and 2035 (6). The provision of high-quality service in the hotel industry, on the other hand, is often dependent on the facility being clean and well-maintained.

There has been a significant amount of research conducted on energy efficiency on a global scale, with a particular emphasis on the hospitality and tourist industries. There is a significant paucity of evidence-based data concerning these themes in countries such as Ghana, despite the fact that the hotel and tourist sector is now seeing a worldwide trend toward more sustainable energy systems, improved operations, and cutting-edge technical innovations. A significant amount of data can be found in the

published literature indicating that hotels in North America, Europe, and Asia have embraced environmentally friendly practices and sustainable energy systems (7). Other emerging regions of the globe, such as nation (8), 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 seeks to review on energy efficiency and conversation of hotels in Ghana.

ENERGY EFFICIENCY AND CONSERVATION

Household and individual activities with respect to energy conservation are influenced by a wide variety of circumstances. For the most part, psychological, social, economic, and environmental elements are the ones that affect the actions that are taken to preserve energy (9,10). Among the many theories that have been proposed to explain energy-saving practices, the concept of planned behavior stands out as particularly noteworthy (11,12). A number of behavioral models have been used in order to get a better understanding of the energy-related activities that families engage in, such as energy laddering and stacking in particular (13, 14). People's energy-saving behaviors in residential buildings are influenced by a wide range of demographic parameters, including the number of people in their household, their age, their income, their level of education, the kind of occupancy, and the length of time they have lived there (15). People's energy-saving habits are influenced by environmental factors that are related with the physical qualities of the structure and the environment that surrounds it (17). Some other sociodemographic characteristics may also play a role in influencing people's behaviors about energy conservation (18). According to Mhagama's theory of planned behavior (18), the cultural norms and social pressure that people are subjected to have a substantial impact on their intentions to engage in energy conservation practices.

As a result of its speed, cheap cost, and ease of implementation, the management of "low-hanging fruits" is the first step in achieving higher energy efficiency and conservation in Ghana (2). To find a solution, it is necessary to make investments in expensive equipment such as electric sub-meters that monitor and improve consumption, renewable energy sources, artificial intelligence (AI), and the habit of turning off lights and appliances when they are not being used (19, 20). Following the completion of these simpler tasks, which are referred to as "low-hanging fruits,"

Woodroof et al. recommend moving on to more difficult pursuits. Continue on until you have achieved your policy goals, maintained your gains, or improved them even more (21). In 2005, the Ministry of Energy and its associated agencies have been aggressively pushing and implementing laws to limit energy usage and distribution that lose efficiency. These rules are intended to manage energy use and distribution. Policies that strive to limit the national demand for energy commodities on a national scale via the use of incentives and required measures are included in this category (22). The year 2005 marked the beginning of Ghana's energy and 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 finance public education programs that would educate individuals on the reasons for and methods for conserving energy (23, 2).

The survey found that hotels may save money, make a good impression, and attract more customers by implementing sustainable practices. Also, hotels 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 result in the production of solid and liquid waste, which may have an effect 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 rubbers. Hotels' high energy use contributes to climate change by increasing emissions of carbon dioxide. 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. Among these environmental advantages include less pollution, less waste, and a smaller carbon footprint. From a social perspective, the well-being of both employees and consumers is safeguarded. 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. A research conducted by Lanjewar in the hotel business discovered that independent hotels, in particular, may get a cost and differentiating advantage via quality and environmental management (24).

METHOD

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 on energy efficiency and conversation of hotels. Therefore, there was linkage of papers pointing out on energy efficiency and conversation of hotels in Ghana. In addition, the researcher emphasize that action research is extremely valuable in gaining insights about managerial sense-making, sense-giving and the impact on decision-making in the midst of change interventions. The researcher collected data using Interviews and questionnaire techniques. The research methodology is appropriate and makes absolute sense because there were evident on energy efficiency and conversation of hotels.

RESULTS

Based on the findings of study that Baidoo and his colleagues did on the energy conservation and efficiency awareness behaviors of homes in the Cape Coast Metropolis. In this study, we investigated the ways in which individuals conserve energy on various household appliances. One of the most important factors was the amount of times that electrical appliances were used in the city. For the purpose of determining the frequency with which individuals "Always," "Sometimes," and "Rarely" switch off their electrical appliances when they are not being used, we presented them with the task of ranking this habit. "Sometimes" and "Rarely" were the most common options when questioned about shutting off electrical appliances when they are not in use. This was the case across all devices and income levels. The cumulative responses on energy saving practices revealed that these two actions were the most popular choices. A little less than half of the households that have TVs (29.80%), light bulbs (33.90%), refrigerators/freezers (40.60%), and fans (38.60%) always switch them off, even when they are not being used. It is possible that this will add validity to the assertion that the energy regulatory agency (ECG) of the Cape Coast metropolitan area has been executing a campaign to promote energy literacy (25).

Appiah and her colleagues have been doing research on 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. An further 27.3% of respondents said that they never make use of it. The installation of shade windows was cited by a significant number of participants as an activity that their institution engages in that is beneficial to the environment. Moreover, a majority of 64.5% of respondents said that they take precautions to ensure that the lights are turned off in rooms that are vacant. After guests have left, magnetic cards are used to promptly turn off the power in the room. The majority of respondents also highlighted the fact that their establishments made use of staff training and actively encouraged tourists to engage in green practices as a kind of green practice (26).

Boateng carried out an investigation on the development of hotels that are environmentally sustainable. It is a common misconception that hotels have a negative impact on the surrounding environment. This viewpoint is supported by the responses in the next section, which cite high energy use as an example. According to the findings of the research, hotels might 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. Due to the fact that the key card, also known as a swipe card, eliminates the unnecessary consumption of power, it is a vital strategy for both hotels to use in order to save energy (27).

DISCUSSION

Results from the research on home energy efficiency conducted by Baidoo and colleagues show that residents of the Cape Coast Metropolis do, to a certain degree, understand the concept of energy conservation (25). Equally concerning, however, is the proportion of those who say they "don't know." It might be because of ineffective energy saving programs in the city or because the message fails to get through to people's homes. The public's understanding of energy conservation ethics may be enhanced by the use of appropriate terminology, language, and media, leading to an uptick in energy-saving measures taken by individual families. Consumers engage in inefficient behavior because they are ignorant of the positive and bad effects of energy use, according to the research of Griebeler and colleagues and Asumadu-Sarkodie and Owusu. Researchers Asumadu-Sarkodie and Owusu, Beltran et al., and Verschoor et al. back up this claim with evidence that shows how much of an impact consumer education has on energy-saving behavior (29, 30, 31).

Appiah and his colleagues have undertaken research that suggests a variety of different strategies that might assist minimize the amount of energy that is used as well as 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 bulbs, and reducing the amount of lighting that is used during the day. The findings are consistent with those of a comparable research conducted by Fang et al., which discovered that green energy programs include both energy saving strategies and projects that use renewable energy sources (32). In addition, the findings of this study are corroborated by the research conducted by Abdou, Hassan, and El Dief, who discovered that green hotel practices include, among other things, energy efficiency, effective water management, and garbage management (33).

Despite the fact that the research emphasizes the use and implementation of the following green energy practices in their facilities, the respondents who were questioned did not use them or have not begun using them. This is another significant factor to take into consideration. Some of these measures include the following: lowering the amount of energy that is consumed in guest rooms by utilizing occupancy sensors or key card control systems; heating water for guest rooms and laundry by utilizing heat from refrigeration units; utilizing thermostats; upgrading to

high-efficiency cooking units; cleaning the door seals and defrosting the refrigerator once a month; and installing automatic air conditioning systems throughout the building.

In spite of the fact that this study in Tamale city shown inefficiency, it is important to point out that solar water heating is a sustainable energy alternative that is highly recommended for usage in the context of sustainability. As shown by Hoegh-Guldberg, Ove; Jacob, Daniela; and Taylor (34), solar heat and solar photovoltaics perform better than other technologies when it comes to promoting the use of renewable energy sources.

According to the results of the study that Boateng conducted on the topic of conserving resources. According to the research that has been conducted, hotels use more energy than any other kind of accommodation facility (27). According to Singjzi et al., the depletion of energy supply is one of the most significant challenges that the hospitality and tourism industry is now facing. As a result of the high rates of energy consumption that it experiences, the hotel sector in particular is believed to be a significant contributor to the production of greenhouse gases (35). A number of scholars have argued, on the basis of the findings that were shown earlier, that hotels have the potential to generate energy savings across a wide range of activities as a consequence of the large range of services that they provide.

This technique, as stated by Tritto, is not only affordable but also quite successful in lowering the amount of energy that is used; a number of hotels have reported results that are comparable (36). It is Young's contention that the preparedness of a hotel to engage in environmental concerns is related to the size of the hotel and the services that it provides (37). This is due to the fact that larger hotels use more energy. As a result of the fact that larger hotels often have a greater number of guests and provide services that need a greater amount of energy, the energy cost tends to be higher.

Table 1 : Review of literature

Author/s	Title	Country	Method	Results
BaidooA.N.A, Danquah, J.A., Nunoo E.K., Mariwah S., Boampong G.N., Twum E., Amankwah E., Nyametso J.K., 2024	Households' energy conservation and efficiency awareness practices in the Cape Coast Metropolis of Ghana.	Ghana	Stratified sample procedures were used to randomly choose 396 families from nine different neighborhoods. Five individuals involved in the electrical industry were selected for in-depth interviews using a purposive sampling method. Economists were able to elucidate socioeconomic variables impacting energy saving behaviors of households by modeling the data sets using the utility maximization framework.	Factors that significantly impacted the selection of energy-efficient equipment by individual families were the number of years that household heads spent in education, income levels, spending, the average age of households, and the frequency with which electrical power triples daily. Households' income and appliance use varied significantly across preexisting socioeconomic classes, necessitating regulatory guidance.
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.

Summary table of review articles

Conclusion

In conclusion, the studies conducted by Appiah and her colleagues, Baidoo and colleagues, 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, Baidoo's study highlights the importance of understanding household energy conservation practices, particularly in urban areas such as the Cape Coast Metropolis, where energy usage patterns significantly impact environmental sustainability. 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.

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