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Green technology and policies towards sustainability among selected institutions in the Philippines

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Abstract

Climate change has been considered a challenge all around the world, affecting its entirety. This study provides a case analysis for institutions practicing Zero Carbon technologies among selected institutions in the country. The study had limited data due to the community quarantines for the COVID-19 Pandemic since March 2020, making a significant difference in data analysis and comparison. Correspondence and literature reviews were done to gather data for these institutions. The results presented excellent research and practices of these institutions in promoting the utilization of Zero Carbon technology. Results showed that the companies have been successful in promoting the green practice and a huge boost in helping the battle against pollution in the Philippines through its 3R ways: Reduce, Reuse, and Recycle. It is further recommended that other institutions do these practices to promote sustainability and alternative energy without compromising its economic benefits.

Keywords: Sustainability; Green practices; Zero-carbon technology; Sustainable development

1. Introduction

Mitigating the worsening climate change problem is a daunting challenge, and solving its causes has become a common goal worldwide. It affects society to a large extent, and with it comes the need to expand efforts to restore a livable world that future generations can enjoy for themselves. Countries have made many efforts to avoid the increasingly severe problems brought about by climate change. This, in turn, has pushed governments to seek carbon reduction practices and technologies that help reduce carbon emissions. However, using low-carbon output technology as a suitable substitute for various carbon production practices and technologies is complicated [1]. Analyzing each country's carbon emission reduction practices could further broaden researchers' understanding of the outcomes and impacts of adopting technologies that help mitigate the effects of climate change. One of the major global problems regarding the environment is human pollution. Using fossil fuels further increases the presence of greenhouse gases in the atmosphere and is proven to be one of the leading contributors to environmental degradation. The Zero Carbon Resort (ZCR) project aims to solve the problem of rising energy consumption demand; a large amount of carbon dioxide (CO2) emissions generated by the tourism industry in the Philippines; reduce the company's costs through three steps: reduce energy consumption, replace inefficient technologies, and Redesign buildings and systems. We will implement carbon dioxide-neutral resources and green technologies in small and medium hotels and resorts and create added value by establishing best practices. In addition, training courses will stimulate local production and use of renewable resources and improve the capabilities of local engineers, managers, architects, and consultants.

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1.1. Use of Green Technology

Greenhouse gasses that humans produce have continuously ravaged the environment, especially the ozone layer, and negatively affected the status of the Earth. This is why global warming has become as dangerous as it is today, resulting in environmental health and security as the prime topic in international and local politics. With the threat becoming more apparent, policymakers worldwide have looked to various low-carbon technologies to help reduce reliance on fossil fuels and decrease greenhouse gas emissions [1]. This has resulted in the increase of activity in the field of politics and governance regarding environmental policy and regulation. An example is an increase in incentives from the government to sectors and industries that convert to renewable or zero-carbon technologies in their economic processes and activities. Renewable incentives in the United States and Europe are available for wind, solar, small-scale hydro, biomass, and other renewable energy sources [2]. This government incentives program effectively coaxes the various sectors and industries to convert to renewable or zero-carbon technologies as this may also provide them with many safety nets. Examples of these possible incentives are certain exemptions or tariff reductions from acquiring energy sources. Renewable incentives work best if electricity producers face an internalized price for natural gas emissions that are sufficiently high to discourage the use of coal both for short-term and longer-term investment horizons [2]. Although not limited to this example, the intervention of politics towards the topic of energy production has been done in many governments worldwide, including the Philippines.

Despite the benefits of such government-sponsored incentives for sectors and industries to convert to renewable or zero-carbon technology, they must not implement these as regulations and the new norm for power plant construction as this would result in the integrity and quality of these power plants suffering. Regulatory and fiscal policies can also get in the way of energy efficiency improvements, as building codes that the government would pass or implement to regulate may set minimum construction standards [1]. This may result in the quality of the construction meeting only the bare minimum and may impact the effectiveness and efficiency of these power plants in generating, harvesting, and distributing power. The governments should persuade the sectors and industries to convert independently, not force them to convert to renewable technology to avoid this concern.

Global warming and climate change are ultimately the results of the build-up of massive amounts of greenhouse gasses produced by either natural or artificial activities, causing the global temperature increase. The massive build-up of the greenhouse gasses traps too much heat that comes from the sun resulting in climate change. As mentioned before, greenhouse gasses are produced by natural means, but never as close to the amount of those that are produced by artificial processes or activities. The industrial sectors are one of the significant contributors to the production of greenhouse gasses as well as the operations that are done to generate electricity and heat to power cities and societies, such as the harvesting of natural gasses and the burning of coal to generate heat and power. The use of fossil fuels, such as coal and natural gasses, is the main contributing factor to the deterioration of the environment and the growing concern of climate change due to the increase in the emission of greenhouse gases [3]. Not only are natural gasses and coal sources of energy emit greenhouse gasses, but they are also non-renewable energy sources, which means they are limited.

1.2. Sustainability

Sustainability is the continuous development of what the present needs but will not affect the future negatively. Sustainability has its roots in social justice, conservatism, internationalism, human rights, and other movements in the past, as such sustainable practices support ecological, human, and economic aspects. As sustainability presumes there are limited resources, it is expected that they should be used wisely, with concerns about its future consequences and needs. With this in mind, the United Nations (UN) had called for a general assembly in which Sustainable Development Goals (SDG) is brought out to the community as a call for change and betterment of the future generations [17]. The general assembly was held on July 25-27, 2014, in New York City to discuss and propose these goals to their members. The proposal contained 17 plans that focus on sustainable development issues primarily related to health and education, safety, combating climate change, ending poverty and world hunger, making cities sustainable and developed, and protecting the natural environment.

As SDGs need to be achieved by 2030, every nation that signed the proposal is mandated to propose projects in line with the SGDs to achieve them. According to the latest report of the UN, the country that has the most SDGs accomplished as of 2021 was Finland, with 5 SDGs completed (SDG: 1, 4, 6, 7, and 8), and the least SDGs accomplished is the Central African Republic with 2 SDGs specifically SDG: 8 and 13 [4]. People must learn to be cooperative and initiative in helping in any way they can to accelerate the progress of achieving these goals. One of the best ways for people to assist the state in achieving the SDGs is to be aware and educated about the goals that can make young people play a crucial role in educating others, take the initiative in finding a way to contribute to society in achieving the goals, take hold of the leaders accountable for the lack of action. Lack of action per se can be seen through the policies the government

proposes and implements for their constituents. This implementation occurs from the state, the Local Government Units (LGUs), and the people. As the state offers an action, the LGUs must apply it to their area by making a version of the central policy dependent on their locale. Thus, each LGU has its way of handling a specific procedure but, at the same time, contributes to achieving the original one.

1.3. Sustainability and Green Technology

Following the Sustainable Development Goal Index (SDGI) — the financing for the development office and the division for sustainable development of the UN that aims at financial assistance for the developing countries – through its environmental component, the connection between green technology and sustainable development can be established as the primary purpose of aiming for sustainability is for survival, not just of the present but also for the future generations. Added to this, change needs to occur, as natural sources are now becoming scarce due to continuous development wherein the environment takes the consequences.

To reverse the damage brought out, humans lean into green technology. Green technology, which is also known as clean technology, refers to any creation or innovation that is environmental-friendly. The inventions related to this do not use fossil fuels as an energy source – thus showing fewer damages to the environment and human health – and usually focus on the economic sector. The financial sector was the main focus of green technology, knowing that most highly developed countries emit the most carbon dioxide and use the most natural resources. As sustainable development is associated with minor environmental damage and is driven by policies that consider future generations, green technology is suggested to be employed there [5]. To be accepted as green technology and be produced on a broader scale, it first has to pass the seven criteria listed below:

- System Independence: The technology can stand independently to do its specific job.
- Image Modernity: People should know that this technology can be trusted, seeing it advanced.
- Individual Technology vs. Collective Technology: A careful assessment in which technology applies to a certain number of people – the bigger the benefitted people, the lesser the cost.
- Cost of Technology: This focuses on the affordability of owning the technology being proposed.
- Risk Factor: Testing the pros and cons of the technology to ensure no one will get hurt using it.
- Evolutionary Capacity of Technology: Focuses on the ability of the technology to keep up with the time, wherein it could still be helpful in the future.
- Single-Purpose and Multi-Purpose Technology: Knowing what the other abilities of the technology are or is it focused on one action only [6].

The primary purpose of creating Green technology is to attain sustainability – lessen the effects of pollution and global warming. Sustainability, on the other hand, aims to use advanced technology in the right way that would help the lifestyle of the people today become more accessible, which, at the same time, does not harm the lives of the people in the future. It can be easily assumed that green technology and sustainability are linked as they both aim to preserve the future while not harming the natural environment.

1.4. Green Technology Policies in the Philippines

Achieving a low-carbon society is a complex task in itself. However, this did not daunt each nation from attaining an ideal environment. In 2006, Japan's Ministry of Environment and the United Kingdom's Department of Environment, Food and Rural Affairs launched a project to promote low-carbon societies [7]. In the first meeting, the Steering Committee presented a framework to coincide with their definition of a low-carbon society using these four points [7, 8]:

- "Take actions compatible with the principles of sustainable development, ensuring that the development needs of all groups within society are met.
- Make an equitable contribution towards the global effort to stabilize the atmospheric concentration of CO_2 and other greenhouse gases at a level that will avoid dangerous climate change through deep cuts in global emissions.
- Demonstrate a high level of energy efficiency and use of low-carbon energy sources and production technologies; and
- Adopt patterns of consumption and behavior that are consistent with low levels of greenhouse gas emissions."

These significant developments have implications for all countries involved in the meeting. For developing countries like the Philippines, it is vital since it can help lead the country to sustainable development as well as having a change

in behavior and lifestyle. Before 2009, the Philippines had laws that catered to different environmental issues but lacked addressing climate change [9]. As the Republic Act, 9729 was signed (Climate Change Act of 2009), plans for climate change have been incorporated into the national and local levels of the government. The federal government has devolved responsibilities for incorporating these plans into the various local government units in the country.

In terms of importance politically, as stated by [7], it has become a part of sustainable development in developing countries. By enacting and implementing policies bestowed upon the local government, the result would occur in the localities and at the national level. In Quezon City, it became their goal to resolve environmental issues by creating the Environment Policy Management Council. Through collaboration with different institutions, the Quezon City local government has actively participated in World Bank's Carbon Finance Capability Building (CFCB) Program and the Ecological, Economy, and Social Responsibility (ECOS). They promoted waste management to households and schools around the city and implemented ordinances such as SP 1917 in 2009. In the other case study on Makati City, it is stated that they have been strictly implementing the Solid Waste Management Act and the Traffic Management Code.

"Since 2004, Makati City has been an active participant in ICLEI's Cities for Climate Protection Campaign, which aims to 'build a worldwide movement of local governments which adopt policies and implement measures that achieve measurable reductions in local greenhouse gas emissions; improve air quality, and enhance urban livability & sustainability.' The city government addresses mitigating climate change through three (3) major programs: (a) Solid Waste Management, (b) Energy Efficiency, and (c) Urban Greening" [9]. Thus, it became a goal for every city to promote a low-carbon environment to combat the long-term effects of climate change. According to the Doraemon plan by Japan, a low-carbon society will prove to be an effective method of economic growth and sustainable development as it relies on the use of an environmental-friendly technology and the promotion of the efficient use of natural resources incorporated into the advancing technological sphere [7].

Economically, the Philippines rely too much on the electrical and electronic equipment industry as the Bulk of its economy [10]. Manufacturing is regarded as one of the most environmentally unfriendly industries, and the E&E industry is no different. With technological advancements happening rapidly, enterprises are forced to follow the flow. As a result, these industries are needed more than ever. "Electronics, computers, and associated software have transformed society. In addition to providing the basis for the information revolution, electronics enable many of society's vital support systems, including those that provide for such necessities as food, water, energy, transportation, health care, telecommunications, trade, and finance" [11]. Nevertheless, firms have already ensured that their equipment is environmentally friendly and emits less carbon. With an industry that makes up the bulk of the country's economy, a low-carbon society would help it develop because economic growth goes together with sustainable development.

2. Materials and Methods

The study was conducted for six months, from January 2020 to June 2020. Data were gathered thru fieldwork, email correspondence, and ocular observations in the area. Secondary data were also retrieved from the institutions' webpage, as well as journal articles about the practice of Zero Carbon Resorts. However, due to the COVID-19 Pandemic and community quarantines imposed by the National Government, fieldworks were postponed, and most of the data were gathered through email correspondence and the institutions' websites. The institutions involved in the study were: Riverview Resort in Calamba City, Laguna; The Orchard Golf & Country Club in Dasmariñas City, Cavite; Victoria Group of Hotels; and Oakwood Premier Joy-Nostalg Center Manila in Pasig City, Metro Manila. The study has also limited the availability of data from Riverview Resort and Victoria Court Group of Hotels due to the enhanced community quarantine and the latter losing some of its branches which made a significant difference in data analysis and comparison.

The study utilized the Institutional Analysis Framework as its basis, which provides the cycle of how institutions can adapt to what is happening in the environment for better or worse. Ostrom [12] explains that in analyzing institutions, it is essential to take note of the individual: the one who acts on behalf of the organization and uses the social arena (a place where actors exchange information, solve the conflict, interact, and others). Institutional analysis is also about understanding how institutions' decision-making affects their long-term behavior. Another thing to note in the conduct of institutions is that they can set a culture based on their collective goals and actions. Nutt-Powell et al. [13] argue that innovation breaks the already existing norms of an institution, therefore, emphasizing the importance of information and interaction.

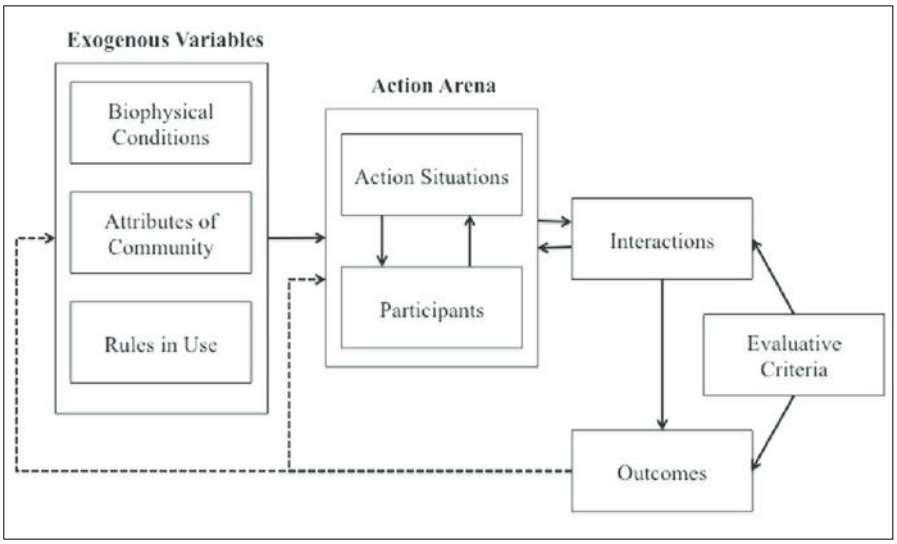

Figure 1 Institutional Analysis Framework [12]

Since the study has utilized four institutions, the framework will be used on how they cope with the challenges (in this case, climate change) for their economic benefit and sustainability. Exogenous variables may include the rising temperature of the environment and different environmental laws in terms of the jurisdiction and local government they are affiliated with. The action arena is where the institutions adapt or find alternatives regarding the changes from their exogenous variables; this is where they replace their traditional practices and technology for a better environment-friendly institution. The interactions serve as the implementation of how efficient the actions were made from the action arena; this is where institutions will be able to get their evaluative criteria for improving services which will then reset the framework from the start beginning from the exogenous factors.

3. Results and Discussion

The overall result of the method adopted by the institutions successfully promoted green practices and helped the Philippines fight pollution. All companies have adopted different ways, but the results of all forms are successful in energy conservation, adhere to environmentally friendly methods, and promote the three Rs of reduction, reuse, and recycling.

3.1. The Riverview Resort, Calamba City, Laguna

The Riverview Resort in Laguna laundry only has towels left on the floor and changes bedding every two days. The company refills its shampoo, shower gels, and lotions bottles instead of buying new bottles. Dual flush toilets and no water urinals are provided in every room. The management orders proper segregation of wastes. The company uses eco-friendly AC units with 40% energy-saving inverters. The company highly encourages using local and recycled materials, if possible, like bamboo straws, bamboo leaves, and recycled towel bathmat. The management does not provide plastic water bottles or other disposable plastic products. Rainwater is collected and used in the resort's flora and fauna. At Riverview Resort, the use of disposable plastic is prohibited, and the use of natural lights in the lobby and common areas is highly recommended.

3.2. The Orchard Golf and Country Club, Dasmariñas City, Cavite

One of the significant initiatives of The Orchard is its devotion to preserving and enhancing the environment. It's an entire trend to spearhead environmental programs these days, but The Orchard has been at it for years. It has expanded many lakes and streams and built new catch basins to quarantine enough water to make the club less reliant on groundwater in the dry season. It has increased the acreage of the club's environmental-sensitive areas to increase the habitat range of the area's indigenous fauna.

The company vision and mission, according to the department, is to make the Orchard Golf and Country Club the most environmentally responsible and best value golf and country club in the Philippines. It also advocates the following environmental protection drives:

- Wildlife protection in the golf courses
- Solid Wastes Management
- Water Supply Conservation
- Tree planting
- Creeks/Waterways Clean up

The management system and practice of Orchard Golf and Country Club have passed ISO certification. Orchard Golf is certified by SGS UK Ltd and issued by ISO 9001 2008. Orchard guarantees and warrants maintaining and providing its facilities, products, and services following the highest standards. The company has received multiple awards and recognitions for minimizing carbon emissions.

It involves composting, and recycling of materials, the practices of the Orchard inclined in programs are as follows:

Table 1 The 3 R practices of Orchard Golf and Country Club

Resolution		Application	Explanation
AVOID	Avoid the usage of Packaging.	Bought in Bulk with no individual Packaging	Unlike Hotels, Orchard made sure that they could avoid the use of packaging through plastic bottles and support local products of the Philippines. Ms. Ana defines that "Soap making adds another dimension to the labelling issue in that it is the result of a chemical reaction which is the harm in the environment, Organic Products may help to lessen the use of the chemical."
AVOID	Avoid using Plastic Bottles.	Use of deionizer to avoid buying gallons of distilled water	Deionizers are installed in the golf carts so guests can avoid purchasing and bringing bottled water. The deionizer converts the tap water into distilled water.
REDUCE	Water Bottle and Paper Cups	Provided Tumbler for Guest and Employees	Guest and employees were given their tumblers to avoid and reduce the use of paper cups.
REDUCE	Electronic Documents	A computerized system for information and records	All the information of guests and employees is recorded through computers to reduce paper use, and every record is inside computers.
REFUSE	Reusable Tarpaulin	Reus Tarpaulin	To avoid reprinting Tarpaulins, they do not put Actual dates whenever there is an event so that they can use it again in upcoming events.
REUSE	Reusable Ecobag and Water Bottle	Give eco bags and water bottles to members and employees	Ecobags and water bottles were given to members for them to use and reuse
RECYCLE	Composting and Wood chipping	Used as fertilizer	Woods and composted soil were used in the nursery, wherein they grow different kinds of plants and trees.
RECYCLE	Tarpaulin Bags	Recycle as bag	Old and used tarpaulins are made into bags and serve as freebies for guests.
RECYCLE	Foot mat from Old Bath Towel	Reuse old bath towel	They use old bath towels and a foot map to lessen the expenses of buying foot maps.
RECYCLE	Rejected Golf Balls from Driving Range	Use as decoration	Golf balls from the driving range will help define landscape areas.
DISPOSE	Accredited TSD	Proper disposal	They properly dispose of all their waste material

To promote eco-friendliness and lessen material consumption in the facility, the Orchard has developed a plan to help them reduce waste, conserve the environment and lower their expenses. The Orchard has been avoiding the use of single usage of amenities. Instead, they implemented the use of the bulk size of soap. Also, the use of plastic bottles has been changed to the use of deionizer to avoid buying gallons. The management has also implemented to reduce the use of water bottles and paper cups; instead, they provided tumblers for guests and employees. The management also uses electronic documents for guest information and employees to reduce paper use.

3.3. Oakwood Premier Joy-Nostalg Center Manila, Pasig City, Metro Manila

On May 21, 2014, the ZCR project meeting was held to celebrate the success and achievements of the SWITCH-Asia project in the four and a half years since its implementation [14]. The organizer successfully held the closing ceremony at the Hyatt Regency Hotel and Casino in Manila. The award is considered one of the highlights of the conference. Oakwood Premier Manila's Happy Nostalgia Center was selected as one of the top 10 winners. Following the unique 3R Methodology of the protection-"REDUCE, REPLACE AND REDESIGN"- the award is based on the number of implementations for energy, resource, and monetary savings per room. Below are some of their 3R practices:

3.3.1. Reduce

Energy

Generally, 40% of the undesirable hotness that develops in your home comes in through windows. Intelligent window coatings are one way of reflecting hotness away from the property, especially the visitor rooms. Oakwood Premier professes to be an eco-accommodating property by utilizing low emissivity glass boards that permit light entry but lessen the section of hotness. Windows are fabricated using coatings, plastic sheets treated with colors, or dainty metal layers. This implies that it empowers a more productive energy-saving activity by decreasing the energy utilization of the structure's cooling framework by 30%. Oakwood Premier uses sun control films which are best for hotter environments like the Philippines since they can reflect as much as 80% of the approaching daylight. Large numbers of these movies are colored, in any case, and will, in general, diminish light transmission however much they lessen the heat, obscuring the room. What's more, because covered spaces will, in general, emit a cool inclination, visitors will, in general, standardize cooling units.

Oakwood Premier encourages guests to help service and rescue planers by setting up information signs in their suites. Another major factor that Oakwood Premier prioritizes energy saving is its lighting system. Innovative lighting practices and retrofits can reduce lighting power consumption by 50% or more (depending on the starting point) and reduce cooling energy requirements by 10% to 20% [15]. Oakwood Premier has upgraded to light-emitting diode (LED) bulbs that are more energy-efficient than incandescent and fluorescent lamps. The service life of LED bulbs is 35 to 50 times that of incandescent bulbs and 2 to 5 times that of fluorescent bulbs, significantly saving hotels and motels' maintenance costs. Through LED upgrades and other operating expenses, Oakwood Premier has continued to save monthly energy costs.

On the other hand, since foyer lights are on the entire constantly at most lodgings, there's additionally the incredible potential for investment funds in lessening the utilization of those lighting installations. In Oakwood Premier, lighting has darkening capacities, which diminishes by 30% during daytime hours.

To save energy, Oakwood Premier practices the key card framework. It empowers visitors to enact energy frameworks, for example, cooling and lights, by embedding the lodging key card into an opening right inside the entryway. This framework turns off power naturally when visitor rooms are cleared and maintains a strategic distance from futile energy utilization (ex., TV, lights, and so on). Key card frameworks can decrease lighting and cooling costs by 20-30 percent. Hafele Hardware Technology is the critical supplier of Oakwood Premier, which gives electronic access control frameworks to the visitor room.

Water

Guest water usage in rooms and leisure facilities is one of the hotel's most significant operating expenses. To minimize water usage, Oakwood Premier uses faucet aerators to reduce water consumption installed in faucets. The usage of proper faucet aerators is very much a prerequisite in modern times where there are high water bills and environmental wastage due to excessive use of water for household purposes. A faucet aerator (or tap aerator) is often found at the tip of modern indoor water faucets. Aerators can be simply screwed onto the faucet head, creating a no-splashing stream and continually delivering a mixture of water and air. According to the United States Patent by Ruhnke [16], An aerator serves the following purposes:

- Prevent splashing
- They are shaping the water stream from the faucet spout to produce a straight and evenly pressured stream.
- Water conservation and reduction in energy costs
- Reducing faucet noise
- To increase the perceived water pressure (often used in homes with low water pressure.

Another water-saving practice for Oakwood Premier is the installation of water-saving showerheads. Their shower heads work by restricting the volume of water they allow to flow through them and squeezing it through tiny holes. This means the water comes out under more pressure, giving a harder, more massaging showering experience.

3.3.2. Reuse

The use of metal keys for opening hotel rooms is a thing of the past already. Today, most hotels offer vital high-tech cards, allowing guests easy access to their rooms. Modern hotels and resorts are using electronic key cards, but they are usually one-time programmed only and would require reprocessing, which consumes human effort, time, and electricity. In Oakwood Premier, electronic key cards are programmable, making them reusable, thereby conserving effort more so electricity.

The modernized serviced apartment is also practicing the reuse of toiletries containers. They sterilize the outer part of the container bottles and process them for refills when in good condition. As such, there is less production of plastic in factories, thus reducing fuel consumption, emission of smoke, and cost for both industrial manufacturing companies and the hotel itself. Oakwood Premier also makes it a point to put signages in restrooms saying they could reuse bathroom towels to conserve mother nature. In line with the commitment of Oakwood Premier to the environment, change of linens and towels occur only on the third day of guests' stay.

3.3.3. Recycle

Oakwood Premier Joy-Nostalg, awarded as the top hotel in Pasig City by TripAdvisor in 2014, has consistently aligned with its goal to be upbeat with modern travelers' needs and demands while taking care of its environment. And by which it continues to promote recycling as a method of preserving and conserving resources. One recycling technique is collecting plastic water bottles from restaurants, staff cafeterias, and offices. These water bottles are reprocessed, sanitized, and reused for guest and employee use. Similarly, they also practice proper waste segregation as mandated by the Department of Environment and Natural Resources.

3.4. Victoria Group of Hotels

The role of green innovations in transitioning the tourism industry toward a sustainable economy is vital. The emerging number of motels in the Philippines is rapidly increasing, and their services are almost as competitive as those of hotels. They are known as the most innovative and the classiest motel in the country because of their first-class amenities. Victoria Court catapults itself as the most efficient motel in the Philippines because of its green practices.

Victoria Court uses heat pumps for hot water generation. This measure contributes to a considerable reduction of their energy cost and, at the same time, provides higher efficiency in their heating and cooling system. Their annual saving is Php 9,170,350/year for using heat pumps alone.

This is equivalent to an emission saving of 181,200 kg CO2. Instead of using individual electric water heaters, which are inefficient, heat pumps are certainly worth the investment. The motel also recovers the waste-cooled air from the heat pumps to cool down the reception area. Recovery of waste-cooled air for the cooling saves them 44,110.98 kWh per year and is equivalent to Php 441,110.98/year. Moreover, unlike conventional air conditioning units, this cooling technique is free of noise.

The practices of the Victoria Group of Hotels have been innovative and competitive because, despite its status as a motel, it has shown its capacity to compete with other hotels. With its green practices and high-class amenities, it has been known as the classiest motel in the country. The green techniques that Victoria Group of Hotels have applied to their system are heat pumps, inverter split type air conditioners, LED Tv in the accommodation rooms, and LED lights and strip lights. The mentioned methods of Victoria Group of Hotels have helped them decrease the bills, campaigned for green practices that would benefit not only the community or the Victoria Group of Hotels but also the environment itself, and helped promote the importance of green practices.

The heat pump's beauty also helps recover the waste-cooled air from the heat pumps to cool down the reception area. Next to the heat pumps is an inverter split-type air conditioner. The inverter split type air-condition saves up to 50% or more energy consumption from previous units. This device saves a total of 153 197.8 kWh per year, equivalent to Php 1,531,978/year. Another practice of Victoria Group of Hotels is using LED TV in the accommodation rooms. This technology is used because it is easier to install and consumes lower energy compared to other types of TV. For lighting, Victoria Court has used LED and strip lights to promote green practices. Using LED lights and strip lights has saved them Php 6,424 per year. In addition to their green practices, the Victoria Group of Hotels has also used showerheads with aerators in the guest rooms. All in all, the Victoria Group saves 424,429.29 kg of CO2 per year.

4. Conclusion and Recommendations

The impact of using zero-carbon technology and implementing its green practices on different companies is beneficial to the company, the community, and the environment. These practices are beneficial to the prevention and control of pollution and also very helpful to the protection of natural resources. The results show that the application and promotion of green methods greatly help the corporate image and reduce the cost of materials and utilities. The shift from a corporate approach to green practices has reshaped the appearance of every company. It promises to provide customers and employees with quality and value-for-money services. The green methods mentioned and practiced by the different companies are highly recommended to be applied and campaigned because of the benefits that can be attained from it, conservation of natural energy, and be a good help in the fight against pollution in the country. Such practices and activities are not only cost-efficient and beneficial to the companies but also helpful to their end-users, suppliers, and the environment. To further improve the existing practices or methods, the other companies should promote and invest in eco-friendly technologies and practice the 3R rule, which is: Reduce, Reuse, Recycle.

It is recommended that zero-carbon technology needs to be further promoted and applied, not only in hotels but also in other institutions that rely on traditional energy sources. This, in turn, will help reduce pollution and further protect our environment while maintaining an economical and profitable market without affecting the quality of services provided to customers. It is worth noting that not only the leading institutions will benefit from it, but the surrounding communities will also benefit, which can further improve the environment and residents.

Compliance with ethical standards

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There is no conflict of interests in the conduct of this study.

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