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Preference on Renewal Energy by Operators of Tourist Standard Hotels in Kathmandu, Nepal

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ABSTRACT

Although renewable energy sources are viable alternatives, their uptake by hotel owners is still uneven and frequently constrained. Preference mostly depends on the availability and cost of the renewable energy. This article aimed to study; firstly, the operator's preference, renewable energy pattern, renewable energy of tourist standard hotels in Kathmandu, Nepal; secondly, to find the barriers in using renewable energy; third, to find out the expectation in policy reformation from the government to increase the use of renewable energy in the hotels. Data collected from 30 hotels through a convenience sampling method showed that preference for renewable energy is 80% for Electricity and 2% only for solar energy. Hotel operators agreed that using renewable energy in the hotel will save their time and cost, and expected the concessional rate as well as subsidy from the government on renewable energy with expectation of policy reforms. All hotel operators mentioned that renewable energy like hydropower electricity was easily available and there were less barriers in use of renewable energy being in Capital City. However, barriers depend on the affordability, availability, geographical location also. Result may differ in different location. Only 2% preference for solar energy is good future research questions.

Keywords: Renewal Energy, Preferences, Adoption, Tourist Accommodation, Green Hotels, Sustainability

JEL Classifications: L83, Q01, Q20, Z32

1. INTRODUCTION

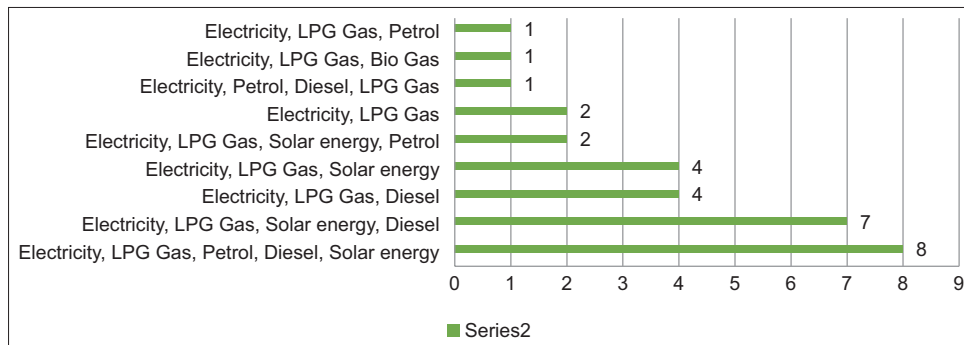
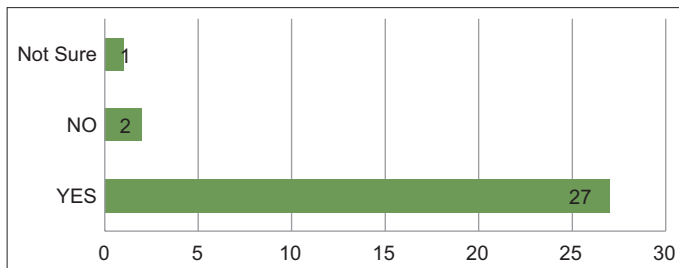
Nepal is centrally located within the greater Himalayan range, self-important a distinctive collection of recently formed mountain chains. Nepal has a relatively compact land area that hosts an exceptional array of ecosystems, encompassing diverse flora and fauna. This ecological richness is attributed to the significant altitudinal variations arising from towering mountains, deep river valleys, lowland plains, and the influences of the summer monsoon and dry winter (Tiwari et al., 2019).

After 1950, the nation was opened to foreigners climbing Mount Everest successfully in 1953, (Bhandari, 2004; 2010). Nepal received unprecedented global media coverage that aided in the development of the nation's tourism industry. When the government started keeping track of the incoming tourists, who

numbered 6,000 that year, the institutionalization of tourism officially began in 1962.

Among the ten most popular tourist destinations in the world, Nepal is a paradise. Mountain climbing and trekking are two reasons to visit Nepal. The Himalayan Mountains, Nepal's unspoiled natural beauty, and its numerous cultures and traditions are all over the place. Numerous ethnic groups exist, each practicing its distinctive art and religion (Badal and Kharel, 2019).

The Kathmandu Valley is Nepal's largest urban area and home to the country's capital city. With rapid population growth and increasing economic activity, the Valley's demand for energy (particularly fossil fuels) has grown faster than the rest of the country. (Shrestha and Rajbhandari, 2010).

Figure 1: Easily available energy**Figure 2:** Happy with available energy

The emphasis was felt on a “public-private partnership-driven full-fledged green economy” that focuses on sustainable energy and transportation, agribusiness and forestry, water and water-related disasters, tourism, and hospitality (Mahat et al., 2019). Nepal relied on the import for the vast majority of fossil fuels in refined form from import. While hydropower, solar power, wind power, and other renewable energy sources seemed to have great potential, geographical, technological, political, and economic challenges which hindered their sustainable harnessing. The use of renewable energy technology has a significant potential to reduce the import of expensive fossil fuels, create employment opportunities, protect the local environment, and improve the quality of life in developing nations (Surendra et al., 2011).

To meet its energy needs, Nepal, a wholly landlocked nation, depends on other nations. The traditional energy supply system, including imported fossil fuel and imported hydropower generation technology, is completely necessary for the economics of energy. The Nepalese people are in desperate need of a decentralized, sustainable energy supply system. This essay aims to outline the opportunities for business owners in Nepal’s sustainable development of energy resources (Choudhary and Patil, 2015).

Ghimire and Kim (2018) revealed that there were 22 barriers in renewal energy adoption in Nepal and main barriers were policy level, social, economic, administrative, geography, technology.

Nepal suffered from an energy crisis time and again. Several challenges have risen in the energy sector, including incomplete and excessively expensive hydropower projects, and insufficient. The outdated energy infrastructure, losses in transmission and distribution, energy theft, ineffective energy management, a deficiency in energy conservation measures, inefficient equipment, unsustainable energy pricing structures, and inadequate regulations in the energy market (Poudyal et al., 2019).

In order to maximize the economic benefits of Tourist arrivals while limiting the related negative environmental impacts, the government should concentrate on sustainable tourism management policies. Study showed that energy consumption have negative impact on tourist arrivals, highlighting the importance of improving energy efficiency and energy diversity (Nepal et al., 2019).

There is significant potential to shift energy consumption away from fossil fuels and toward renewable energy in transportation, heating, and lighting in hotels and restaurants. This could add value to the industry by lowering energy supply costs, increasing operator self-sufficiency, and reaping the benefits of being labeled as “green” or “eco-friendly” tourism (Khadgi et al., 2022).

Energy is the boon to economic development and it was felt that the fundamental course of the global energy transition involves the successful shift from a fossil fuel-based energy system to a low-carbon one. Energy from renewal source could only be sustainable. Numerous studies showed that how renewable energy is developing (Li et al., 2022; Ghimire et al., 2019) and the renewal energy scenario was evaluated by Pazheri et al. (2014) and Zhang et al. (2017) also discussed the most recent developments in lowering the cost of renewal energy.

Studies addressing energy-related issues in tourism are numerous, like Becken et al. (2001) calculated the total energy consumption and efficiency from various sources. Further several authors have compared the energy usage of various attraction and activity types (Becken and Simmons, 2002), travel options (Becken et al., 2003, Becken and Simmons, 2013), accommodation types (Becken et al., 2001; Warnken et al., 2004) Several studies on the use of tourism energy have been done at the international (Gössling, 2002; Hall et al., 2016), national (Becken et al., 2001; Dalton et al., 2009) and destination levels (Gössling et al., 2002).

The hotel sector, in particular, is well known for its energy-intensive operations, and it contributes significantly to energy use and carbon emissions. Although renewable energy sources are viable alternatives, their uptake by hotel owners is still uneven and frequently constrained. This casts doubt on the industry’s capacity on the environment and make the transition for a sustainable future. Hoteliers still prefer to use fossil fuels due to easy availability. Preference mostly depends on the availability and cost

of the renewal energy. There are no clear rules, vision, or future implementation plan from the government to replace fossil fuels with renewable energy. This study explores all the above issues and identifies the gaps for future studies. The study; firstly focus on the Hotel operator’s preference, renewal energy pattern, on renewable energy of tourist standard hotels in Kathmandu, Nepal; secondly, to find the barriers in using renewable energy; third, to find out the expectation in policy reformation from the government to increase the use of renewal energy in the hotels; and lastly, to explored the variables influencing hotel owners’ preferences for renewable energy in the form of educational, economic, market, and policy levels. There is no such kind of studies done on Hotels

of Kathmandu, Nepal focusing on the variables determining the preference of renewal energy in hotels.

1. What is the most preferable renewable energy used by the hoteliers of tourist standard hotels of Kathmandu?
2. What is the pattern of using renewal energy by Hoteliers?
3. What are the barriers in using the renewal energy?
4. What are the expectations from the hotel owner’s point of view for future betterment in using renewable energy by tourist standard hotels of Kathmandu, Nepal?

Further previous studies were explored more about renewal energy adoption in different countries and its impediments which has been elaborated in literature review sections.

Table 1: Demographic information

Gender	Frequencies (%)	Education	Frequencies (%)
Male	25 (83.33)	Intermediate	14 (46.67)
Female	5 (16.67)	Bachelor	13 (43.33)
Sum	30	Master	3 (10)
Age		Position of Hotel operator	
20-30	18 (60)	Owner	9 (30)
31-40	7 (23.33)	Manager	21 (70)
41-50	5 (16.67)	Sum	30
Sum	30		

Table 2: Use of various renewal and non renewable energies

HydroElectricity, LPG Gas, Solar energy, Diesel	7
Electricity, LPG Gas, Petrol, Diesel, Solar energy	5
Electricity, LPG Gas, Solar energy	5
Electricity, LPG Gas, Diesel	3
Electricity, Petrol, Diesel, LPG Gas	2
Electricity, LPG Gas, Solar energy, Petrol	2
Electricity, LPG Gas	2
Electricity, LPG Gas, Kerosene, Petrol	1
Electricity, Petrol, Diesel, Solar energy, wood	1
Electricity, LPG Gas, Solar energy, Petrol, Diesel, wood	1
Electricity, LPG Gas, Wood, Solar energy	1

Table 3: Aspect of cost and time

Context/Score	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5	Not responded
1. Using renewable energy like Hydro electricity/ solar will save my time and cost.	1 (3.33%)	0 (0%)	5 (16.67%)	23 (76.67%)	1 (3.33%)	0 (0%)
2. Using renewable energy will benefit my hotel.	0 (0%)	2 (6.67%)	5 (16.67%)	21 (70%)	1 (3.33%)	1 (3.33%)

Table 4: Aspect of better performance

Context/score	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5	Not responded
1. Using renewable energy helps me to perform my job on time.	1 (3.33%)	2 (6.67%)	8 (26.67%)	15 (50%)	3 (10%)	1 (3.33%)
2. Using renewable energy makes my job more professional as per International Standards	0 (0%)	3 (10%)	13 (43.3%)	11 (36.67%)	1 (3.33%)	2 (6.67%)
3. Renewable energy make my job easy or take less manpower	0 (0%)	1 (3.33%)	12 (40%)	14 (46.67%)	2 (6.67%)	1 (3.33%)

Table 5: Energy used for cooking

LPG Gas	Electricity, LPG Gas	Electricity, LPG Gas, Diesel	Solar, Electricity	Electricity, LPG Gas, Diesel, solar	Solar, LPG Gas	Electricity
10 (33.3%)	8 (26.7%)	8 (26.7%)	1 (3.33%)	1 (3.33%)	1 (3.33%)	1 (3.33%)

2. LITERATURE REVIEW

The study in Kualalampur by Kasim (2009) explored the mindfulness of small and medium hotel managers in Kuala Lumpur towards environmental management. The study found that external drivers, such as government policy, are essential for renewable energy adoption in hotels. The author also identified research gaps in understanding the roles of management, business culture, and capital in this context. The Greece researcher Zografakis et al. (2011) proved that assessed energy-saving methods in Crete, Greece hotels, emphasizing the need for sustainable energy integration due to rising energy demand. Electricity shortages, especially in peak tourism seasons, led to operational disruptions, relying on generators. This research informs contemporary studies on renewable energy for hotels, urging future research on awareness campaigns, investment programs, and energy-efficient technology promotion.

The Chinese researchers Fukey and Issac (2014) conducted research in Chinese hotels, revealing a shift towards mandatory green practices due to the significant environmental impact of

Figure 3: Types of energy used by the hotel

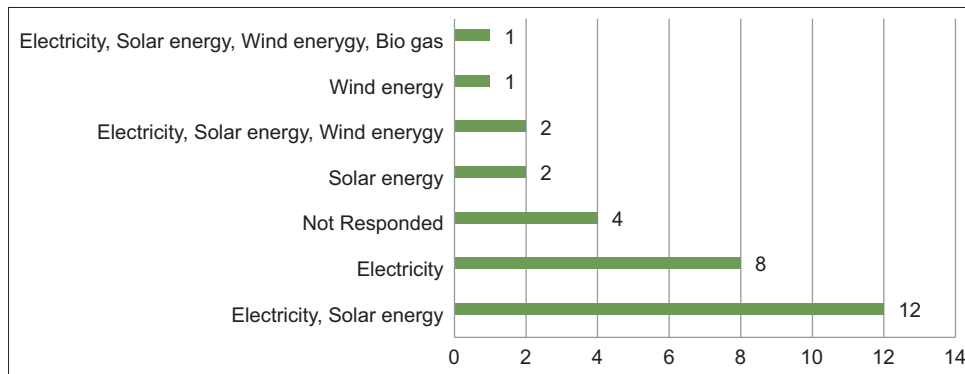


Figure 4: % of energy used The result shows 80% electricity, LPG 15% and 3(10%) said very expensive

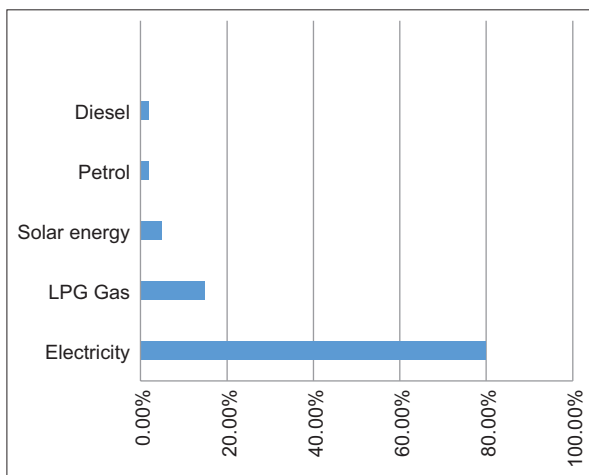
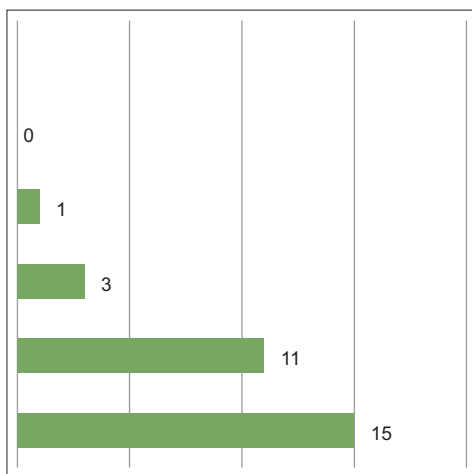


Figure 5:Energy rate in hotel Out of 30 respondents 15(50%) said expensive 11(36.67% said reasonable, Solar 2% and other fossil fuels



hotel operations. Their initiatives, including programs, seminars, and educational outreach, contribute to environmental awareness, which influences preferences for renewable energy adoption. The research from EU region Mahachi et al. (2015) assessed a technical support project’s outcomes in 200 hotels across different EU regions, validating a strategic methodology for renewable energy technology promotion in small and medium-sized hotels. While enriching the literature on renewable energy

Table 6: For Room heating using multiple Energy

Electricity	Electricity, diesel	Electricity, solar	Electricity, solar, diesel
14 (46.7%)	8 (26.7%)	5 (16.67%)	3 (10%)

adoption in Southern European hotels, the study neglected the perspectives of non-hotel stakeholders and lacked cross-country comparisons.

Sharvini et al. (2018) and Navratil et al. (2019) examined energy demand and non-fossil energy growth in China, Japan, Malaysia, and Indonesia. They noted pricing disparities affecting renewable energy investment and limited adoption of solar and wind technologies in hotels due to high costs and environmental constraints. The study highlighted issues of knowledge gaps and inadequate technology, hindering renewable resource development. High energy generation and investment costs, along with financial stability concerns, further impeded renewable energy promotion in the absence of supportive policies.

Sardianou and Kostaki (2019) to find out the barriers in implementation of renewal energy in Creten Hotel Industry the largest Greek island and the fifth largest island in the Mediterranean Sea with regard to expenses on energy as well as annual profit of the hotels. Finding showed that hoteliers consider economic, institutional and human-related factors as barriers for investing on (RES) Renewal Energy Source. Economic Human and Author stressed that, Policymakers should take into account the fact that hotels with varying financial and energy performances have different perceived barriers to adopting renewable energy sources (Nepal, 2008). This study is relevant to this research as it informs us about the barrier in choice of renewal energy by hoteliers together with expenses and annual profit of the hotel. Understanding the barriers in advance will helpful to further guide the research methodology to find out factors affecting the choice of renewal energy by hoteliers. Despite the barriers, hoteliers need to have a choice of renewal energy. This study further suggests us determining factors for the choice of renewal energy. However, Research was country specific effectiveness of incentives towards the adoption of RES investments in the hotel industry.

Dhirasana et al. (2020) study on hotels of Queensland of Australia to elaborate for recognizing the hotel energy system with an

Table 7: Multiple energy used for laundry

No Laundry service	Electricity	Diesel	Solar	Electricity, Solar	Electricity, Diesel
15 (50%)	8 (26.67%)	4 (13.33%)	1 (3.33%)	1 (3.33%)	1 (3.33%)

Figure 6: Preference for renewal energy

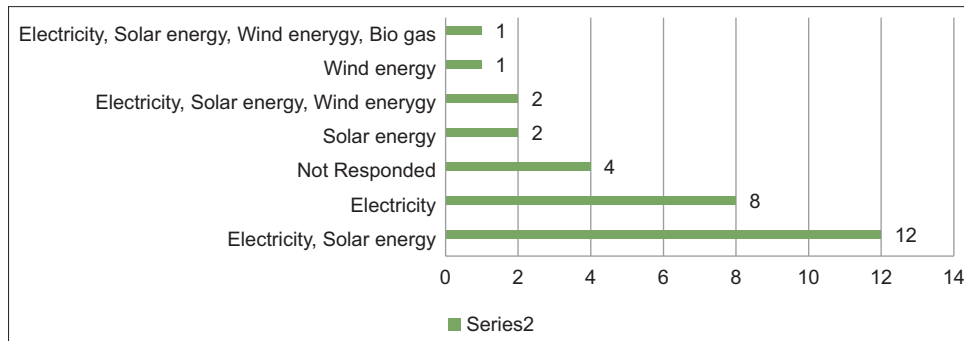
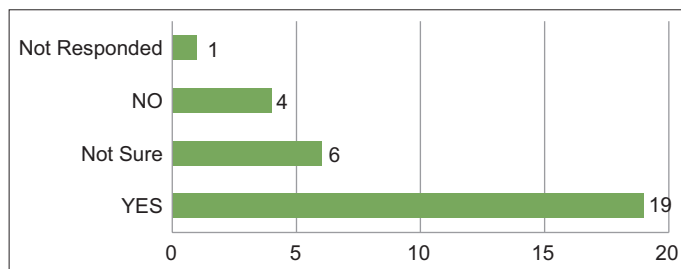


Figure 7: Energy Mix



emphasis on the factors promoting and impeding renewal of energy Technology adoption in the sector. Author elaborated that the adoption of renewable energy in hotels around the world has been hampered and driven by a variety of factors, according to researchers working on the subject. The study further highlighted, how the interaction of hotel owners’ and managers’ perceptions of visitor behavior, incentive policies, technological advancements, and electricity grid prices could either helped or hindered the use of renewable energy in Queensland hotels. The findings of showed that Renewal Energy Technology adoption by hotels is influenced by a variety of factors, including incentive policies, hotel owners’ and managers’ perceptions of Renewal Energy Technology, visitor behavior, technological advancements, and electricity grid prices. The research is relevant for the current research as it discussed about Renewal Energy adoption and reason for the same. The research further showed the path to the future researcher that details research on policy level gap on adoption of renewal energy can be done as adoption of Renewal Energy Technology and new renewal Energy Innovation highly depends on Government policy on Renewal Energy.

The study from Portugal Silva (2022) investigated the perception and attitudes of hotel operators in Portugal toward renewable energy adoption. Despite a positive outlook on renewables, adoption rates were low due to unfavorable market conditions. Motivations for adoption included cost reduction, attracting eco-conscious customers, and environmental benefits. High equipment costs and lack of government subsidies hindered adoption. The study calls for improved education, government incentives, and regulatory mechanisms. It also suggests future

research on adoption factors, cross-country comparisons, and innovation in urban and rural accommodations. Australian researcher Dhirasasna et al. (2020) explored factors influencing renewable energy adoption in Queensland hotels, including owner and manager perceptions, incentives, technology, and grid prices. Their findings underscore the multifaceted nature of renewable technology adoption and its reliance on government policies. This research informs future studies on policy gaps in renewable energy adoption.

3. METHODS

3.1. Study Area

Study area is touristic destination of Kathmandu: It is located between latitudes 27o 32 13” and 27o 49 10” north, and longitudes 85o 11 31” and 85o 31 38” east, with a mean elevation of about 1,300 meters (4,265 feet) above sea level and is the Nepal’s capital City and is the most populated urba area(Thapa et al., 2019). It is Nepal’s most developed and populated region. The majority of headquarters are in Kathmandu Valley, Nepal’s economic center, temples with different architecture, pagoda styles, and a golden shrine on top are very popular (Rayamajhi, 2016).

3.2. Research Design and Data Collection Technique

For data collection purposes, well-structured questionnaires were developed which was tested content validity by experts through IOC. The questionnaires were prepared in English, however it was translated in Nepali Native languages to ensure the maximum participation and understanding.

3.3. Population and Sample Size

Out of the total population of 113 tourist Standard Hotels of Kathmandu, 30 were selected for questionnaires pilot study with convenience sampling (Stratton, 2021).

3.4. Data Collection Tools

Well tested survey questionnaires were submitted on self-present (which was validated by 3 experts through IOC) to the hotel operators and were clarified the about the renewal energy whenever required. The research has been conducted using Excel software.

3.5. Independent Variables

3.5.1. Economic level

- Renewal energy cost and its implementation: Hotel operators may take renewal energy cost as expensive and may also consider installation cost as an extra burden to them. Further maintenance cost and after-sales with technical know-how.
- Renewal energy affordability: This variable is analyzed whether Hotel operators can afford the renewal energy or not.

3.5.2. Policy level

Policies and incentives of renewal energy: This variable discusses Hotel operators' expectations from the government on renewal energy.

3.5.3. Market level

Easy availability/Marketability of renewal energy: These variables study whether the hotel operators perceive that renewal energy is easily available or not.

3.5.4. Educational level

Awareness about renewal energy use: Whether hotel operators know about the benefits of using renewal energy.

4. RESULTS ANALYSIS AND DISCUSSIONS

4.1. Demographic Variables

Table 1 shows that 83.33% respondents were male and 16.67% female with age group 60% 20-30 years and 23.3% 31-40 years and 16.67% 41-60 years which shows hotels are operated by young generations. Education level of operators were intermediate 46.67%, Bachelor 43.33% and master 10%. Hotels were operated by 70% manager and 30% owners themselves.

4.2. Renewal Energy Preference and Use

The figure 1 shows the easily available energy for use in the hotels. Most of the hoteleirs stated that Hydroelectricity, LPG Gas, Petrol, Diesel and solar energy are easily available.

Table 8: Multiple types of energy used for lighting

Electricity, diesel	Electricity	Electricity, solar, diesel	Electricity, solar
11 (36.67%)	11 (36.67%)	4 (13.33%)	3 (10%)

Table 9: Hotels using various energy for boiling hot water

Electricity, solar, diesel	Electricity	Electricity, solar	Electricity, diesel	Electricity, LPG, diesel	Electricity, BIO GAS	LPG
9 (30%)	8 (26.67)	6 (20%)	2 (6.67%)	2 (6.67%)	1 (3.33%)	1 (3.33%)

Most of the hoteleirs said that Hydroelectricity, LPG Gas, Petrol, Diesel and solar energy is easily available.

4.2.1. Renewal and non Renewable Energies that is used by the hotels

The use of various renewal and non renewable energies are shown in the Table 2. Majority use the renewable and non renewable energy composition like Hydroelectricity, LPG Gas, Solar Energy, Diesel.

4.2.2. Happy with the available energy

Among the 27 hoteliers stated that they are happy with available energy. Figure 2 illustrates the level of satisfaction of hoteliers with the available energy supply. The figure expressed satisfaction with the available energy.

4.2.3. Types of energy used by the hotel

The Figure 3 stated that 12(40%) Hotel operators use Electricity and Solar and 27% use Electricity followed by other renewal energy composition. Figure shows the types of energy used by the hotel.

4.2.4. Composition of Energy used: The result Shows 80% Electricity LPG, 15%, solar 2% and other fossil fuels.

The result from the Figure 4 shows 80% Electricity, LPG 15%, The use of solar is 2% only.

4.2.5. How do you rate energy system used in your hotel?

Like wise in the Figure 5 described that out of 30 hotel operators, 15(50%) respondent said it is expensive 11 (36.67%) said reasonable, 3(10%) said very expensive.

4.2.6. Which type of renewal energy you prefer to use in hotel?

Figure 6 shows that out of 30 respondents, 12 (40%) said they prefer hydroelectricity and solar and 8(26.67%) said only electricity and 13.34% did not responded on this questions.

4.2.7. Do you think Energy mix can be effective in your hotel?

Figure 7 detailed that, out of 30 respondents 19 (63.33%) says energy mix can be effective and 6(20%) says not sure, 4(13.33%) said no.

Figure 8: Expection of support from government

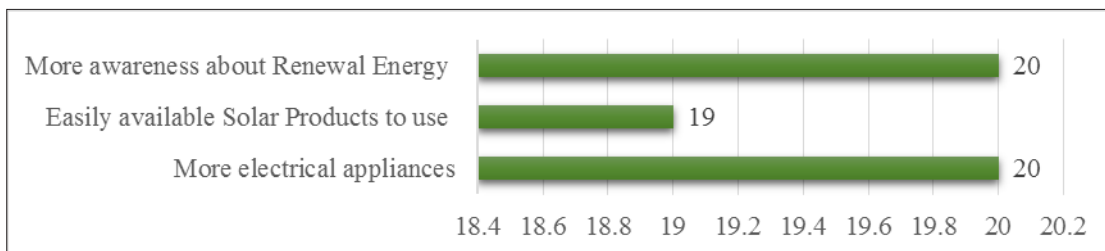


Table 10: Multiple energy used for internet Wi-Fi

Electricity	Electricity, diesel	Electricity, solar, diesel	Electricity, solar
14 (46.67%)	10 (33.3%)	3 (10%)	3 (10%)

Table 11: Multiple energy used for cleaning rooms and electrical appliances

Electricity	MANUAL (broom)	Electricity, diesel
13 (43.33%)	10 (33.3%)	7 (23.33%)

Table 12: Multiple energy used for elevators

No elevator	Electricity	Electricity, diesel	Solar	Electricity, solar, diesel
19 (63.33%)	6 (20%)	3 (10%)	1 (3.33%)	1 (3.33%)

Table 13: Aspect of using renewal energy in the hotel/lodge

Context/score	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5	Not responded
1. From the past 1 year, my hotel experienced problem in acquiring the energy in the hotel	1 (3.33%)	12 (40%)	12 (40%)	5 (16.67%)	0 (0%)	0 (0%)
2. Local authority help in energy crisis time	3 (10%)	6 (20%)	8 (26.67%)	11 (36.67%)	1 (3.33%)	1 (3.33%)
3. My hotel/lodge faced difficulty in using renewable energy in the hotel	1 (3.33%)	20 (66.67%)	5 (16.67%)	3 (10%)	0 (0%)	1 (3.33%)
4. There are barriers of using renewable energy in my hotels? E.g. Cost, Tools, Technology, Lack of space, Awareness, capacity, availability, Transport etc	1 (3.33%)	16 (53.3%)	3 (10%)	10 (33.3%)	0 (0%)	0 (0%)
5. The use of Renewal Energy is difficult for my hotel to afford.	1 (3.33%)	19 (63.3%)	1 (3.33%)	7 (23.3%)	0 (0%)	2 (6.67%)
6. The unreliable supply of Renewal Energy time and again makes the hotel to use alternative energy or non renewable energy.	1 (3.33%)	13 (43.3%)	2 (6.67%)	11 (36.67%)	0 (0%)	3 (10%)

Table 14: Aspect of reliability, availability, awareness

Context/score	Strongly disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5	Not responded
1. Using renewable energy makes my hotel able to give better service to guests, making my guest satisfied	0 (0%)	1 (3.33%)	4 (13.3%)	18 (60%)	7 (23.3%)	0 (0%)
2. There are less hindrances in using renewable energy	1 (3.33%)	8 (26.67%)	1 (3.33%)	19 (63.3%)	0 (0%)	1 (3.33%)
3. Renewable energy helps my hotel to provide quick services to guest, and saving time	0 (0%)	7 (23.3%)	2 (6.67%)	18 (60%)	0 (0%)	3 (10%)
4. Renewable Energy in my location is not easily available	0 (0%)	20 (66.67%)	1 (3.33%)	8 (26.67%)	0 (0%)	1 (3.33%)
5. My hotel is not much aware of new technology innovation in Renewal Energy	2 (6.67%)	19 (63.3%)	2 (6.67%)	5 (16.67%)	1 (3.33%)	1 (3.33%)
6. My hotel has no enough space to use renewal energy like solar	2 (6.67%)	17 (56.67%)	5 (16.67%)	5 (16.67%)	0 (0%)	1 (3.33%)
7. Due to lack of Technical know how, this discouraged to use Renewal Energy in my hotel	1 (3.33%)	19 (63.3%)	1 (3.33%)	5 (16.67%)	1 (3.33%)	3 (10%)

Table 15: Aspect of renewable energy cost effectiveness

Context/score	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5	Not responded
1. Renewable energy like Hydro Electricity and solar are more cost effective than petrol diesel, and LPG	0 (0%)	4 (13.3%)	0 (0%)	23 (76.67%)	3 (10%)	0 (0%)
2. Renewable energy saves additional delivery recurring charges.	0 (0%)	1 (3.33%)	4 (13.3%)	22 (73.3%)	2 (6.67%)	1 (3.33%)
3. Renewable energy saves from price fluctuations time and again.	0 (0%)	0 (0%)	7 (23.3%)	19 (63.3%)	3 (10%)	1 (3.33%)
4. The initial investment and recurring cost in Renewal Energy make me discouraged to use for my hotel	0 (0%)	9 (30%)	11 (36.67%)	8 (26.67%)	1 (3.33%)	1 (3.33%)

4.3. Aspect of Cost and Time

4.3.1. Using Renewal Energy like hydroelectricity Electricity/ solar saves my time and cost:

It represents awareness of the hotel operators regarding renewal energy benefits of saving time and cost and 23 hotel operators say they agree to this, one said strongly agree and 5 were neutral about it.

Table 3 shows that aspect of cost and time where 76.67% hotel operators agree that using renewal energy will save their time and cost. 70% agreed that use of renewal energy will benefit the hotel. Which shows greater amount of awareness amongst them.

4.4. Aspect of Better Performance

The Table 4 results the aspect of better performance of the respondents. 50% hotel operators agree that renewal energy helps

Table 16: Expectation from Government on subsidy/concessions on adopting renewal energy

Context/Score	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly agree 5	Not responded
1. I need some concessions/subsidies in solar and electricity usage in hotel	0 (0%)	0 (0%)	5 (16.67%)	21 (70%)	4 (13.3%)	0 (0%)
2. I recommend to use electricity and solar instead of fire wood and LPG Gas for hotel	0 (0%)	1 (3.33%)	1 (3.33%)	24 (80%)	4 (13.3%)	0 (0%)
3. It is easy to use Hydropower electricity for cooking?	0 (0%)	1 (3.33%)	6 (20%)	20 (66.67%)	3 (10%)	0 (0%)
4. It is easy to use solar heater for heating water.	0 (0%)	0 (0%)	3 (10%)	24 (80%)	2 (6.67%)	1 (3.33%)
5. I recommend to use Hydropower electricity and solar energy in all aspects of hotel services	0 (0%)	0 (0%)	2 (6.67%)	26 (86.67%)	2 (6.67%)	0 (0%)

to perform job on time, 26.67% were neutral on this questions, 35.67% agreed that using renewal energy make the job more professional as per internal standard.46.67% agreed that using renewale energy take less manpower.

4.5. Aspect of Energy Use

4.5.1. For cooking

Maximum hoteliers replied they use LPG and electricity, for cooking and followed by Electricity and Diesel. Few replied as Diesel. The study shows that most hotelier relies on cooking for LPG.

Table 5 presents that Energy used for cooking. For cooking 33.3% hotel operators are using LPG Gas, 26.7% using LPG as well as Electricity.Only 3.33% using Solar/Hydroelectricity and other combinations as shown in above table.

4.5.2. For room heating

As shown in Figure 6, Maximum respondents said they use Hydroelectricity followed by Diesel and solar heaters for room heating.

4.5.3. Laundry for washing/drying clothes

The above table 7 illustrates that for laundry, most hotelier prefer to use Hydroelectricity and few use Diesel and solar energy. 50% hotel operators does not use laundry at the hotel on asking they verbally informed, they outsource the service.

4.5.4. For lighting

The table 8 provides result about use of lighting where 36.67% hotel operators use Electricty and Diesl, only 36.67% use only Electricity, 13.33% use Electricity, Solar and Diesel, only 1% use Electricity and Solar.

4.5.5. For boiling water

The table 9 shows statistics for energy used for boiling hot water where hotel operators use different combinations of energy for boiling water. Maximum say they use Hydroelectricity solar and Diesel for boiling water followed by solar heater and diesel, and only 1 said LPG.

4.5.6. For Wi-Fi internet; almost all use hydroelectricity followed by diesel and solar

The table 10 compares an overview of Multiple energy used for internet Wi-Fi. It is found that 46.67% use Electricty for Wi-Fi, 33.33% use Electricity as well as Diesel, 10% use Electricity, solar and Diesel and 10% use Electricity and Solar.

4.5.7. For cleaning

Table11 presents that multiple energy used for cleaning rooms and electrical appliances in there use. Most of the respondent use Hydroelectricity for cleaning, few also use Diesel.

4.5.8. For Elevator

Table 12 displays the multiple energy used for Elevators. It is resulted that 63.33% has no Elevators in their hotel, 23.33% use electricity, 13.33% use Hydroelectricity and Diesel.

4.6. Bbarriers in Using Renewal Energy

4.6.1. Aspect of using renewal energy

As shown in table 13, the aspect of using renewal energy in the hotel/ lodge found that 40% disagree in acquiring Renewal Energy 16.67% feels there was proble, 40% remain neutral on this questions. 36.67% agreed that they get help from local authority. 66.67% disagreed to the statement that there was difficulty in using renewal energy, which means there was good supply. 53.33% disagree that ther was barrier and only 33.33% agreed that there was barrir like cost,tools, technology, lack of spage, awareness, avabilit, transport etc. In affordability 63% disagree that ther was any proble, 23.33% agree they had affordability issue. 36.67% agree that due to unreliable supply of Renewal Ergy they switch to non renewable energy, other 43.3% disagree to this statement.

4.6.2. Aspect of reliability, availability, awareness

Renewal Energy helps my hotel to provide quick services to guests, and save time, making my guest satisfied.

Table 14 provides aspect of reliability, availability, awareness of the uses. It is resulted that most of the Hoteliers say they don't have any problem of availability; 8 hoteliers agree to this statement.

4.6.3. Aspect of renewable energy cost effectiveness

The Table 15 displays the aspect of renewable energy cost effectiveness that indicated 76.67% agreed that Hydroelectricity and solar are most cost effective than petrol, diesel and LPG. 73.33% agreed that Renewal Energy saves additional delivery recurring charges. 63.33% agreed that Renewal Energysaves from price fluacturations time and again. 26.67% agreed that initial investment in Renewal Energy make them discouraged to use Renewal Energy.

4.7. Expectation from Government on Subsidy/Concessions on Adopting Renewal Energy

Table 16 presents that expectation from government on subsidy and concessions on adopting renewal energy where it is found that 70%

expected some concessions/subsidies in solar and hydroelectricity use in hotel. 80% recommend to use Hydroelectricity and solar instead of firewood and LPG Gas for hotel. 66.67% agreed that Hydroelectricity is easy to use for cooking. 90% agreed to use solar heat for heating water. 86.67% recommend to use Hydroelectricity and solar energy in all aspects of hotel services.

4.8. What Support you Expect from Government to use Renewable Energy in all Aspect of Hotel

The Figure 8 described the expectation of support from government of the respondents. Among them, 20 replied that government should make awareness campaign about renewal energy, others said more electrical appliances and easy availability of solar products.

5. CONCLUSION AND IMPLICATIONS

The study explore to what extent the renewal energy is used and preferred by hotel Managers/Owners, what is the pattern of energy use in hotel, what was the level of awareness amongst hoteliers about the renewal energy application in hotel operations, expectations from the government about renewal energy subsidy and rates. Study shows that hotel operators were aware of renewal energy, aware of the cost-benefit from renewal energy and mostly they could afford to have renewal energy like electricity and solar. Most hoteliers expect to have subsidies on Renewal energy, cheap rates, more awareness about renewal energy and easy availability of solar products.

This article's new body of knowledge is the preference for renewable energy among operators of tourist-standard hotels in Kathmandu, Nepal. The study found that hotelier's preference is 80% for hydroelectricity and 2% only for solar energy. The article also identified barriers to using renewable energy, such as high costs and limited availability. It highlighted the expectations of hotel owners for policy reformation and government support in increasing the use of renewable energy in hotels. However, being the capital city, result shows less hindrances (barriers) in adopting Renewal Energy by hoteliers as it further depends on the affordability of each hoteliers for initial cost and cost of renewal energy.

The study is limited to 30 tourist standard hotels of Kathmandu, Result may differ if this research is done in some remote locations or other geographical locations where accessibility and availability of renewal energy is not so easy, Hotel operators' capacity to afford and prefer kind of renewal energy may also vary. Hence it is recommended for future research on different geographical locations with higher sample sizes. One recommendation to the Nepali government from this article would be to focus on policy reformation and provide subsidies and concessions to encourage the adoption of renewable energy in hotels. This could include creating awareness campaigns about renewable energy, providing more electrical appliances and easy availability of solar products, and offering concessional rates and subsidies to make renewable energy more affordable for hotel operators.

REFERENCES

Badal, B.P., Kharel, S. (2019), Opportunities and challenges of the tourism industry in the context of a visit to Nepal 2020. Tribhuvan University

- Journal, 33(1), 67-80.
- Becken, S., Frampton, C., Simmons, D.G. (2001), Energy consumption patterns in the accommodation sector the New Zealand case. *Ecological Economics*, 39(3), 371-386.
- Becken, S., Simmons, D. (2013), Operators' perceptions of energy use and actual saving opportunities for tourism accommodation. *Asia Pacific Journal of Tourism Research*, 18(1-2), 72-91.
- Becken, S., Simmons, D.G. (2002), Understanding energy consumption patterns of tourist attractions and activities in New Zealand. *Tourism Management*, 23(4), 343-354.
- Becken, S., Simmons, D.G., Frampton, C. (2003), Energy use associated with travel choices. *Tourism Management*, 24(3), 267-277.
- Bhandari, K. (2004), Nepalese tourism: Crisis and beyond Nepal's endeavour for tourism recovery. *Tourism an International Interdisciplinary Journal*, 52(4), 375-383.
- Bhandari, K. (2010), Tourism in Nepal: Post-monarchy challenges. *Journal of Tourism and Cultural Change*, 8(1-2), 69-83.
- Choudhary, S., Patil, N. (2015), Green entrepreneurship: Role of entrepreneurs in energy economics in Nepal. *Annual Research Journal of Symbiosis Centre for Management Studies*, 3(1), 166-175.
- Dalton, G.J., Lockington, D.A., Baldock, T.E. (2009), Case study feasibility analysis of renewable energy supply options for small to medium-sized tourist accommodations. *Renewable Energy*, 34(4), 1134-1144.
- Dhirasasna, N., Becken, S., Sahin, O. (2020), A systems approach to examining the drivers and barriers of renewable energy technology adoption in the hotel sector in Queensland, Australia. *Journal of Hospitality and Tourism Management*, 42, 153-172.
- Fukey, L.N., Issac, S.S. (2014), Connect among green, sustainability and hotel industry: A prospective simulation study. *Energy Conservation*, 6(8), 296-312.
- Ghimire, L.P., Kim Y. (2018), An analysis on barriers to renewable energy development in the context of Nepal using AHP. *Renewable Energy*, 129, 446-456.
- Ghimire, S., Mishra, S.R., Sharma, A., Siweya, A., Shrestha, N., Adhikari, B. (2019), Geographic and socio-economic variation in markers of indoor air pollution in Nepal: Evidence from nationally-representative data. *BMC Public Health*, 19, 1-15.
- Gössling, S. (2002), Global environmental consequences of tourism. *Global Environmental Change*, 12(4), 283-302.
- Gössling, S., Peeters, P., Ceron, J.P., Dubois G., Patterson, T., Richardson, R.B. (2005), The eco-efficiency of tourism. *Ecological Economics*, 54(4), 417-434.
- Hall, C.M., Dayal, N., Majstorović, D., Mills, H., Paul-Andrews, L., Wallace, C., Truong, V.D. (2016), Accommodation consumers and providers' attitudes, behaviours and practices for sustainability: A systematic review. *Sustainability*, 8(7), 625-637.
- Kasim, A. (2009), Managerial attitudes towards environmental management among small and medium hotels in Kuala Lumpur. *Journal of Sustainable Tourism*, 17(6), 709-725.
- Khadgi, A., Singh, P.M., Maharjan, S., Joshi, D., Chhetri, R.P. (2022), Renewable Energy as a Catalyser for a Green Recovery From COVID-19 Impacts in Nepal. Available from: <https://prc.org.np/assets/uploads/resource/03dedd93a2a4ff5591e15d4f837b984e.pdf>
- Li, L., Lin, J., Wu, N., Xie, S., Meng, C., Zheng, Y., Wang, X., Zhao, Y. (2022), Review and outlook on the international renewable energy development. *Energy and Built Environment*, 3(2), 139-157.
- Mahachi, D., Mokgalo, L.L., Pansiri, J. (2015), Exploitation of renewable energy in the hospitality sector: Case studies of Gaborone sun and the Cumberland hotel in Botswana. *International Journal of Hospitality and Tourism Administration*, 16(4), 331-354.
- Mahat, T.J., Bláha, L., Uprety, B., Bittner, M. (2019), Climate finance and green growth: Reconsidering climate-related institutions, investments, and priorities in Nepal. *Environmental Sciences Europe*, 31(1), 1-13.

- Navratil, J., Picha, K., Buchecker, M., Martinat, S., Svec, R., Brezinova, M., Knotek, J. (2019), Visitors' preferences of renewable energy options in "green" hotels. *Renewable Energy*, 138, 1065-1077.
- Nepal, R., Al Irsyad, M.I., Nepal, S.K. (2019), Tourist arrivals, energy consumption and pollutant emissions in a developing economy-implications for sustainable tourism. *Tourism Management*, 72, 145-154.
- Nepal, S.K. (2008), Tourism-induced rural energy consumption in the Annapurna region of Nepal. *Tourism Management*, 29(1), 89-100.
- Pazheri, F.R., Othman, M.F., Malik, N.H. (2014), A review on global renewable electricity scenario. *Renewable and Sustainable Energy Reviews*, 31, 835-845.
- Poudyal, R., Loskot, P., Nepal, R., Parajuli, R., Khadka, S.K. (2019), Mitigating the current energy crisis in Nepal with renewable energy sources. *Renewable and Sustainable Energy Reviews*, 116, 109388.
- Rayamajhi, S., Khadka, K. (2016), Sustainable Tourism Development of Kathmandu Case: Kathmandu Valley. Available from: <https://www.theseus.fi/bitstream/handle/10024/104099/final-thesis-1.pdf;sequence=1>
- Sardianou, E., and Kostakis, I. E. (2020). Perceived barriers to invest in renewable energy sources in the Cretan hotel industry. *International Journal of Sustainable Energy*, 39(3), 240-249.
- Sharvini, S.R., Noor, Z.Z., Chong, C.S., Stringer, L.C., Yusuf, R.O. (2018), Energy consumption trends and their linkages with renewable energy policies in East and Southeast Asian countries: Challenges and opportunities. *Sustainable Environment Research*, 28(6), 257-266.
- Shrestha, R.M., Rajbhandari, S. (2010), Energy and environmental implications of carbon emission reduction targets: Case of Kathmandu Valley, Nepal. *Energy Policy*, 38(9), 4818-4827
- Silva, L. (2022), Adoption of renewable energy innovations in the Portuguese rural tourist accommodation sector. *Moravian Geographical Reports*, 30(1), 22-33.
- Stratton, S.J. (2021), Population research: Convenience sampling strategies. *Prehospital and Disaster Medicine*, 36(4), 373-374.
- Surendra, K.C., Khanal, S.K., Shrestha, P., Lamsal, B. (2011), Current status of renewable energy in Nepal: Opportunities and challenges. *Renewable and Sustainable Energy Reviews*, 15(8), 4107-4117.
- Thapa, R.B., Murayama, Y., Ale, S. (2008), Kathmandu. *Cities*, 25(1), 45-57.
- Tiwari, A., Uprety, Y., Rana, S.K. (2019), Plant endemism in Nepal Himalayas and phytogeographical implications. *Plant Diversity*, 41(3), 174-182.
- Warnken, J., Bradley M., Guilding C. (2004), Exploring methods and practicalities of conducting sector-wide energy consumption accounting in the tourist accommodation industry. *Ecological Economics*, 48(1), 125-141.
- Zhang, D., Wang, J., Lin, Y., Si, Y., Huang, C., Yang, J., Huang, B., Li, W. (2017), Present situation and future prospect of renewable energy in China. *Renewable and Sustainable Energy Reviews*, 76, 865-871.
- Zografakis, N., Gillas, K., Pollaki, A., Profylienou, M., Bounialetou, F., Tsagarakis, K.P. (2011), Assessment of practices and technologies of energy saving and renewable energy sources in hotels in Crete. *Renewable Energy*, 36(5), 1323-1328.