



International Journal of Development and Sustainability

Online ISSN: 2186-8662 – www.isdsnet.com/ijds

Volume 1 Number 2 (2012): Pages 545-562

ISDS Article ID: IJDS12092103



Knowledge, attitudes and practices on the contribution of solar energy to sustainable tourism development: Empirical evidence from Zimbabwe

Alick Mhizha *, Golden Mandebvu , Shepherd Nyaruwata, Dorothy F. Zengeni

Faculty of commerce, University of Zimbabwe, Zimbabwe

Abstract

This study sought to examine the knowledge attitudes and practices of leaders in the tourism industry with regards to the possible contributions solar energy could provide to sustainable tourism development in Zimbabwe. This is in light of the fact that, this form of renewable energy could be harnessed for the benefit of tourism development throughout the country in view of the chronic shortages of electricity. An accidental sample of 25 leaders in the tourism industry running operations along a selected tourism route was surveyed to fulfill the objectives of the study. Their responses to a series of questions were reviewed comparatively to derive conclusions, which form the basis for recommended strategies and action plans. The research concluded that accurate information about the potential of solar energy needs to be disseminated to practitioners in the tourism industry for them to consider it as a viable alternative source of power. It is also recommended that government and other stakeholders in the energy sector step up efforts to make solar energy resources more readily accessible in the country.

Keywords: Solar energy, Sustainable tourism development, Environmental conservation

*Copyright © 2012 by the Author(s) – Published by ISDS LLC, Japan
International Society for Development and Sustainability (ISDS)*

Cite this paper as: Mhizha, A., Mandebvu, G., Nyaruwata, S. and Zengeni D.F. (2012), “Knowledge, attitudes and practices on the contribution of solar energy to sustainable tourism development: Empirical evidence from Zimbabwe”, *International Journal of Development and Sustainability*, Vol. 1 No. 2, pp. 545–562.

* Corresponding author. E-mail address: amhizha@commerce.uz.ac.zw

1. Introduction

The conversion of sunshine into a major source of energy by many countries that have realised this potential still remains a puzzle to Zimbabwe a country that boasts approximately 2871 sunshine hours annually and approximately 7.9 sunlight hours for each day (<http://www.zimbabwe.climateps.com>). Research has shown that the tourism sector and indeed all other sectors in the economy still need to invest in solar energy. Practitioners in the energy fraternity agree that solar energy is still highly underutilized in Zimbabwe, despite the abundance of sunlight (Hove et al., 2007). Having hosted the Solar Summit in September 1996, the country seems to have benefited very little from the high quality and immense amount of information exchanged during that great event. The objective of this research was to establish the extent to which tourism and hospitality players in Zimbabwe appreciate the potential benefits that could accrue from the adoption of solar energy as a source of power to support their operations. Through the establishment of tourism and hospitality practitioners' knowledge, attitudes and practices with respect to solar energy utilization the researchers sought to investigate the gaps that have hindered progress in solar energy development in Zimbabwe. The research comes at a time when the Ministry of Energy and Power Development is putting in place mechanisms to promote solar energy use countrywide. Findings from such an exercise should help inform strategy formulation and implementation by different stakeholders in the energy sector.

2. Literature review

The tourism industry has witnessed phenomenal growth since the end of the Second World War. International tourist arrivals have grown from a total of 25 million in 1950 to 685.5 million in 2000 and reached a total of 982 million in 2011 ([unwto.org](http://www.unwto.org)). According to the World Travel and Tourism Council (WTTC) 2011 report, the sector contributed 9% of the GDP of the world economy and accounted for 8% of global employment in 2010 (www.wttc.org).

The growth of the tourism industry is closely linked to increased energy consumption by the different components of the industry, for example accommodation, air transport and tour operations. Given that at present the tourism industry derives some 75% of its energy from fossil fuels (Romo, 2009) this is a major challenge for the industry. The growth of the industry results in the increase of carbon dioxide emissions which increases the greenhouse gases which are a major contributor to global warming and climatic change. Recent studies indicate that the tourism sector contributes 5% of global greenhouse gases (Simpson et al., 2008).

Tourist attractions in many developing countries are located outside the major economic hubs and are therefore off the main electricity grid lines. Given the dominance of small and medium size enterprises in the industry the demand for electricity in these peripheral locations is uneconomic to justify the extension of grid lines to where the operations are located. Solar energy would therefore be the most viable and appropriate form of power for such businesses.

Despite the global need to reduce the level of carbon dioxide emissions, fossil fuels have retained their dominance as the world source of energy due to a number of factors. For example in 1971 fossil fuels made up 86% of global energy supply with non-fossil fuels making up the balance of 14%. By 2009 fossil fuels' contribution had only slightly been reduced to 81% with non-fossil fuels making up 19% of the total world energy (International Energy Agency, 2012). These developments are also reflected in energy use in the tourism industry, which is still dominated by the use of fossil fuel especially in the transport sector.

However the International Energy Agency (IEA) has made concerted efforts to encourage the development and use of renewable energy across the different economic sectors including tourism. This has resulted in the substantial increase in solar energy use, which registered a 14% growth in 2010 compared to the previous year (IEA www.iea-shc.org, IEA SHC Solar Update, Vol. 56, June 2012).

The need to accelerate the growth of solar energy has resulted in IEA developing a 2050 roadmap for the development of solar energy which is hoped will result in solar energy contributing to 16% of global energy by that year. Whilst there has been a noticeable growth in solar energy capacity, the growth has mainly been concentrated in very few regions of the world. China has witnessed the most phenomenal growth of the sector and accounted for 60.1% of the installed capacity in 2010.

The key areas of solar energy application in the tourism industry are the accommodation sector, the transport sector, amenities, conference and incentives sector and tour operations.

2.1. The contribution of solar energy to sustainable tourism development: case studies

Energy consumption has become the leading cause of raising environmental awareness in the past few years because of greenhouse gas emissions and dependence on petroleum products. From a tourism industry standpoint, energy use encompasses, fuel to reach the destination, energy used by the property to keep it running and the amount of energy needed to construct the property. Tourism has grown at a significant rhythm in the past decades. According to the World Tourism Organisation statistics, it is foreseen that in 2012 statistics will reach one billion international tourist arrivals across the world, reaching two billion in the year 2030 (World Tourism Organisation 2012 statistics). This growth, which surely has positive effects, can lead to serious environmental impacts owing, among other factors, to the immoderate consumption of energy resources, the increase in polluting agents and the production of waste. In light of such developments, the energy question requires serious reconsideration with the fundamental principles of sustainable development in mind. It would be an erroneous assumption to think that an infinite quantity of energy and resources are available, that it is possible to renew them quickly, and that the negative effects of the exploitation of the natural order can be easily managed (EWTN news July 27 2012). The types of renewable energy which can be used, which have been used by some countries and have been proved to work include solar heating, electricity produced from wind and biomass heating.

Solar energy has been used in a number of countries as a renewable and environmentally friendly source of energy. The following cases are examples of success stories in the application of solar energy in the tourism industry.

In Spain, in a city called Avila which is at 1126 m above sea level and sits at the highest elevation of all provincial capitals in Spain the use of solar energy has been effectively mainstreamed. According to the Spanish National Institute of Statistics, Ávila received 533.918 travellers and 988.091 overnight stays during the year of 2009. In the province of Ávila, there are 113 hotels, 7 spas, 14 campgrounds, 724 facilities belonging to the agro-tourism (rural houses) and 475 restaurants. It is quite remarkable that a high percentage of tourism facilities are utilizing renewable energy such as wood biomass and solar energy (World Tourism Organisation statistics 2012). The Fabrica Cabrera Rural Tourism Centre was the first tourist accommodation in Spain and the peninsula that was heated by renewable energy. The centre has the following features:

- The rooms were built with the correct orientation to the south.
- In order to maximize solar catchments: All rooms have large windows.
- Dark colours were used in the solar catchment areas.

India has discovered that the tourism industry is growing at a rate of 15% annually and its consumption of energy is continuously growing. India has embraced the use of solar energy through the installation of Solar Water Heating systems and other renewable energy technologies. The government of India further launched a unique initiative titled Campaign on Solar Water Heating and other Renewable Energy Technology in the Hospitality Sector under the programme on Solar Water Heating Systems (Government of India March 2012). The following hotels in India use solar energy:

- i. Spice Village, Indukki, Kerala
- ii. Trident, Jaipur, Rajasthan
- iii. Raj Vilas, Jaipur, Rajasthan
- iv. Apple Country Resort, Manali, Himachal Pradesh

In the Mediterranean, tourism is also growing and is imposing a modern way of life resulting in the utilization of more energy than any other industry. The major problem was insufficient electricity supply. Solar vehicles are being used in the golf terrains of Cyprus Island (Evanthie 2008). The largest solar thermal system is located in Crete Island and it powers 70% of the total hotel demand for hot water (Waldman, 2004). Other countries where solar energy is being used include Ireland, Italy, USA, Canada, China, New Zealand and other Western Asian countries (Commission on Sustainable Development Ninth session April 2001). In Africa solar energy is used mostly in South Africa, Mauritius, and Tunisia. In Kenya it is now being incorporated in so many hotels (Husted, 2007).

2.2. Role of solar energy in environmental conservation in tourism development

The tourism industry is dominated by the use of fossil fuels. These include oil, gas, coal and wood. The growth and expansion of the tourism industry since the end of the 2nd World War has witnessed a dramatic increase in the use fossil fuels by the sector as the energy needs of the airline and accommodation sectors increased in response to increases of tourists to be serviced. The net result has been a general increase of the negative impact of tourism on the environment.

At present the tourism sector accounts for 5% of global greenhouse gases (Simpson et al., 2008). The main contributors of the emissions are transport (75%) and accommodation (21%) (ibid p. 420). Emissions of greenhouse gases have been identified as a major contributor to climatic change. Table 1 below shows the estimated carbon dioxide emissions from different sectors of the tourism industry in 2005.

Table 1. Estimated Carbon Dioxide Emissions

	CO ₂ (Mt)
Air transport	615
Car	420
Other transport	45
Accommodation	274
Activities	48
TOTAL	1302
Total World	26400
Share (%)	4.9

(Source: UNWTO, 2005, www.onecaribbean.org)

Climatic change has major effects on the sustainability of tourism destinations as well as sustainability of the business enterprises in the affected areas. The impacts of climatic change on tourism include the following:

- Retreating polar environment and loss of skiing destinations
- Coral bleaching resulting from increases in water temperature and hence loss of marine tourism destinations
- Sea level rises resulting from melting of glaciers and icecaps leading to beach erosion and loss of popular destinations
- Frequency of unusual weather phenomena e.g. tropical cyclones, hurricanes, flooding , droughts and wildfires
- Loss of biodiversity

The International Energy Agency recently warned that the world risks the possibility of experiencing a 6°C temperature increase by the end of the century if no meaningful adaptations to carbon dioxide (CO₂) are adopted worldwide.

One of the mitigatory measures against global warming which have been adopted by both countries and business enterprises is the use of solar energy. At international level the International Energy Agency (IEA) embarked in 1977 on The Solar Heating and Cooling Programme whose main focus is to:

- Accelerate the pace of technology development,
- Promote standardization
- Enhance national R&D programs
- Encourage national specialization (<http://www.setcom-project.eu>, 21/09/2012).

The programme has helped to encourage countries and business enterprises to focus on solar energy as an alternative source of energy. Within the tourism sector regional organizations in Europe and the Caribbean region have introduced programmes that aim at incentivising the private sector to adopt renewable energy sources in their activities. For example the EU's Sustainable Energy in tourism dominated Communities (SETCOM) which was implemented during the period 2008-2011 has helped to increase awareness on the benefits of solar energy. The report points out that:

“Main objective of the SETCOM project has been to foster the development of sustainable energy in tourism in the 10 participating European countries: Greece, Spain, Italy, Slovenia, Latvia, Germany, France, Austria, Finland and Portugal” The main targets for the programme are:

- Raising awareness of substantial energy topics among tourism companies, local administration and tourists within the participating communities
- Setting up energy action plans for the participating communities
- Raising awareness for the topic ‘sustainable energy tourism’ Europe wide. (<http://www.setcom-project.eu>, 20/09/2012).

At enterprise level the tourism industry is experiencing a slow but steady adoption of solar energy in a number of activities. The hotel sector has taken a lead in the adoption of solar energy (Hotel Energy Solutions 2011 report, Global Solar Hotel Network). The major areas of solar energy use in the hotels include:

- Heating and cooling systems for buildings
- Water heating systems
- Smart lighting systems

The increasing importance of solar energy in the hotel sector can be seen by the changing energy strategies that are being adopted by major hotel groups like the Marriot and the Hyatt. For example the Marriot hotel group aims to reduce energy and water consumption by 20% by 2020. (<http://www.marriott.com> 2011-2012 Sustainability report, <http://www.hyatt.com> 26/09/2012).

3. Methodology

3.1. Research strategy

The researchers employed the survey research strategy and the questionnaire technique to gather data to fulfil the study's objectives. Surveys gather data by asking questions relevant and focused to respondents.

3.2. Data gathering technique: Questionnaire

The questionnaire was informed by key issues affecting solar energy development in developing countries as cited in the literature reviewed prior to the study. The research instrument comprised two sections with close ended questions. This was necessary to enable the research team to generate results which could easily be generalised to the population when using a random sample.

The first part of the questionnaire had eleven questions. The first three questions focused on respondents' demographic characterisation in terms of designation, length of service and age. The second part of the questionnaire had seven questions based on 7 variables or statements informed by the literature. Attitudes on the 7 statements were measured on a five-point Likert scale with possible answers ranging from Strongly Agree (1) to Strongly Disagree (5). The questionnaire was distributed to a convenience sample of 25 respondents in Rusape, Nyanga, Mutare, Chimanmani and Masvingo. The last part of the questionnaire consists of three (3) direct questions requiring yes, no or not sure as answers.

3.3. Population, sampling technique and sample size

Managers and or supervisors in tourism and hospitality establishments along the tourism route Rusape, Nyanga, Vumba, Mutare, Chimanmani and Masvingo constituted the targeted population. The team distributed the questionnaire to a convenience sample, which is those present as the team travelled around. In accidental or convenience sampling, as its name suggests, sampling units are selected out of convenience, for example, in clinical practice, researchers are forced to use clients who are available as samples, as they do not have many options (Singh, 2007). The team of researchers took advantage of a tour they conducted with a group of pilgrims from Nepal, Switzerland and the Democratic Republic of Congo. They distributed the questionnaire to the respondents they met or who were willing to take part in the study as they travelled along hence the sample can be regarded as accidental or convenience. The challenge with accidental sampling is that it is a non-probability sampling technique. In *non-probability sampling* the probability of selecting population elements is unknown (Kothari, 2004). Thus results generated from non-random samples cannot be generalised to the population but would still be useful as exploratory scientific evidence to make tentative decisions including policy formulation. The results of this study are based on the 25 questionnaires returned to the researchers.

3.4. Data analysis

Data generated by the study were inputted into the Statistical Package for Social Sciences (SPSS) and analysed using percentages, descriptive statistics (i.e. mean scores and standard deviation), reliability tests and factor analysis. The data analysis process enabled the researchers to draw conclusions and

recommendations which call for protracted action from Government and stakeholders in the energy sector while proposing areas for further in-depth research.

4. Research findings

The views and perceptions of Zimbabwean tourism businesses were reviewed using a self administered questionnaire on a sample of twenty five (25) respondents drawn from tourism and hospitality operations in Harare, Rusape, Nyanga, chimanimani and Masvingo. The following table summarises the findings from the research which have been interpreted in light of the background information and the Zimbabwean context.

Table 2: Solar Energy as a Source of Power

		SA	A	N	D	SD
Q1	Solar energy would be a cheaper source of power for the tourism industry	11	3	0	11	0
		44%	12%	0%	44%	0%

SA: Strongly Agree, A: Agree, N: Neutral, D: Disagree, SD: Strongly Disagree

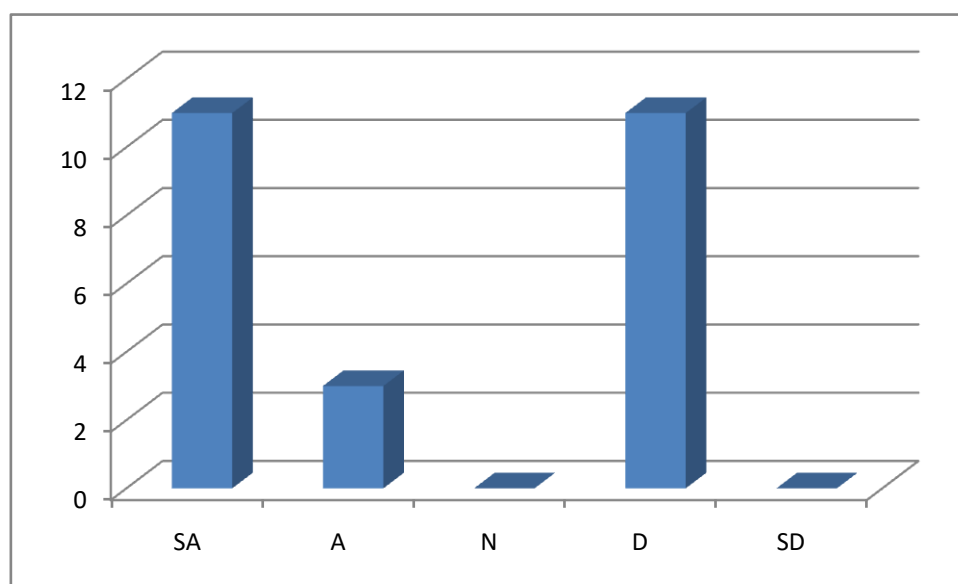


Figure 1. Solar energy as a source of power

Responses to this question show that although research proves that solar energy is a cheaper source of power some people still doubt its capacity to replace conventional power sources which pollute and damage the environment. The general conclusion here is that more education and knowledge sharing is required for businesses to fully appreciate its significance in generating cleaner power for business operations.

Table 3. Accessibility of Solar Energy Resources

		SA	A	N	D	SD
Q 2	It is difficult for your organisation to access funding for solar energy resources.	13	4	3	5	0
		52%	16%	12%	20%	0%

SA: Strongly Agree, A: Agree, N: Neutral, D: Disagree, SD: Strongly Disagree

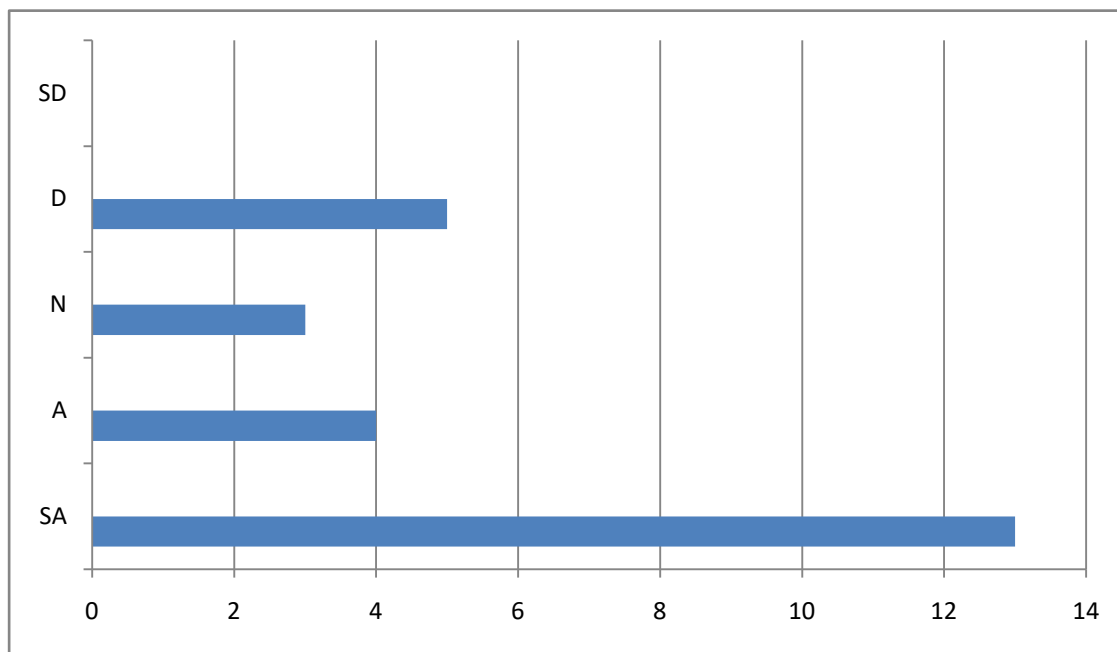


Figure 2. Accessibility of solar energy resources

From the knowledge that respondents have about solar energy, more than 50% of the respondents concur that it is difficult for their organisations to access funding for solar energy resources. It is a fact that due to the prevailing economic climate in Zimbabwe, characterized by liquidity challenges it has become quite cumbersome for businesses to access loan facilities from banks. The pattern of responses to this question

point to the need for Government to intervene and make funds available for the development of solar energy projects in the business sector.

Table 4. Promotion of Solar Energy Use

		SA	A	N	D	SD
Q 3	The Government needs to spearhead promotion of solar energy use	19	4	0	2	0
		76%	16%	0%	8%	0%

SA: Strongly Agree, A: Agree, N: Neutral, D: Disagree, SD: Strongly Disagree

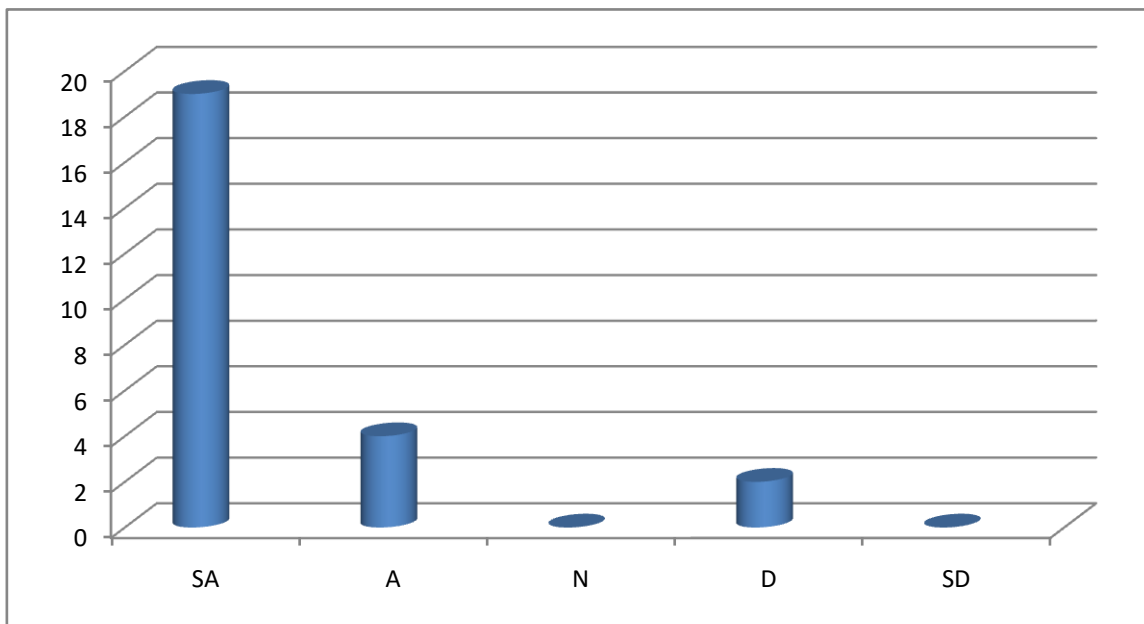


Figure 3. Promotion of solar energy use

92% of the respondents felt that government needs to spearhead the promotion of solar energy use in the tourism industry. This view in light of the lack of information and availability of solar energy resources is quite a noble one. Government could revive the momentum inspired by the country’s hosting of the World

Solar Summit in 1996 to make information, knowledge and resources for solar energy available for businesses and other stakeholders around the country.

Table 5. Availability of information

		SA	A	Neutral	D	SD
Q 4	There is adequate information about solar power options in Zimbabwe.	0	7	2	14	2
		0%	28%	8%	56%	8%

SA: Strongly Agree, A: Agree, N: Neutral, D: Disagree, SD: Strongly Disagree

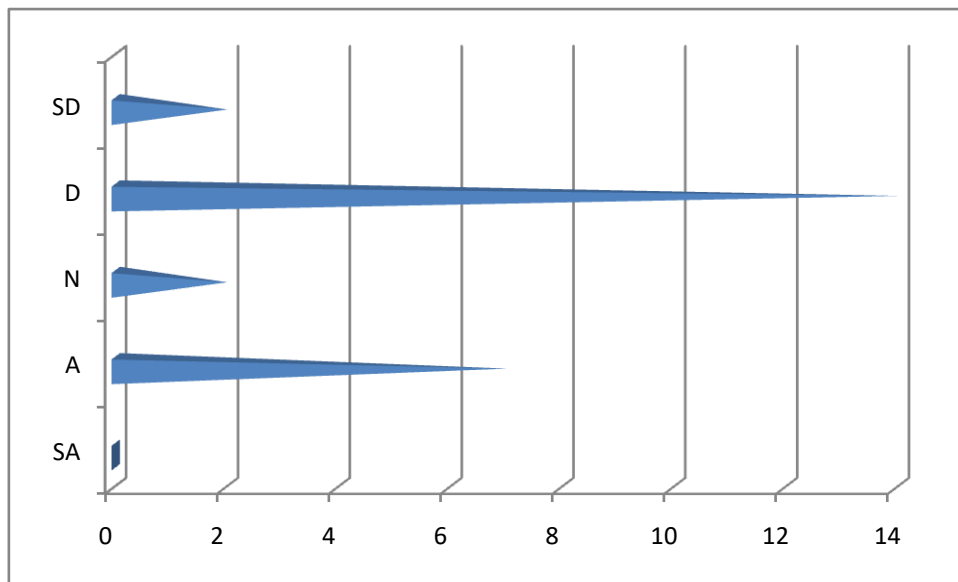


Figure 4. Availability of information

64% of the respondents disagreed with this statement while only 28% agreed. Following the trends in this sample, stakeholders in the energy sector need to consider reviewing the strategies they are using to market solar energy products. Rather than assume that the business sector is already aware of the potential benefits of a shift to solar power stakeholders need to be more vigorous in their lobbying and advocacy campaigns in order to achieve greater impact.

Table 6. Solar energy versus conventional power sources

		SA	A	Neutral	D	SD
Q 5	It is more expensive to acquire and install solar energy resources than to use conventional power sources	15	9	0	1	0
		60%	36%	0%	4%	0%

SA: Strongly Agree, A: Agree, N: Neutral, D: Disagree, SD: Strongly Disagree

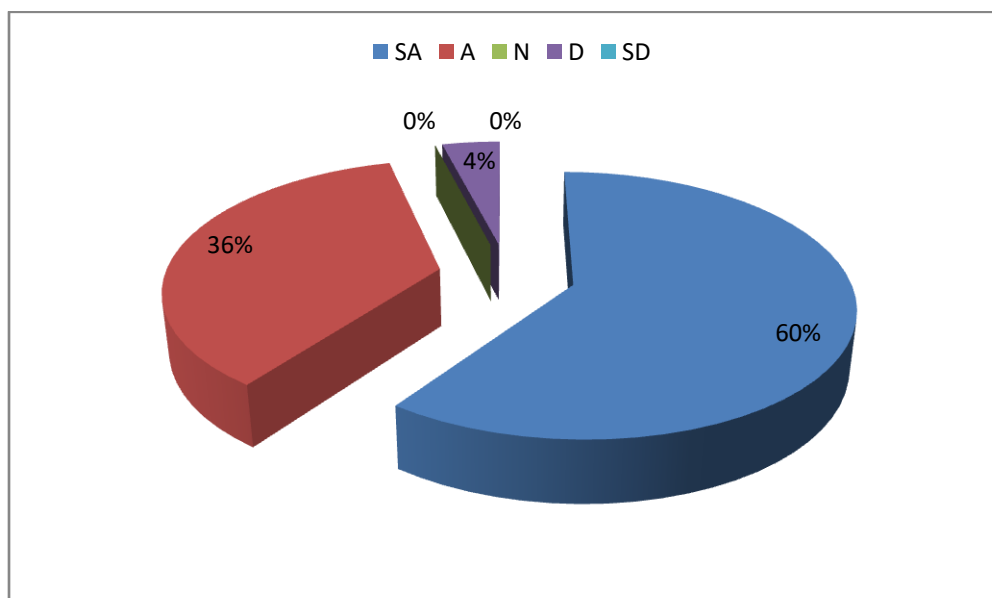


Figure 5. Solar energy versus conventional power sources

60% of the respondents concurred with this statement, possibly explaining why some 44% thought that solar energy would not be a cheaper source of power in the tourism industry. If it is more expensive for one to install solar energy resources than it is to acquire conventional sources it means that business practitioners would be reluctant to adopt it.

Table 7. Availability of solar energy resources and equipment

		SA	A	Neutral	D	SD
Q 6	Solar energy equipment and resources are not readily available in Zimbabwe.	12	4	5	4	0
		48%	16%	20%	16%	0%

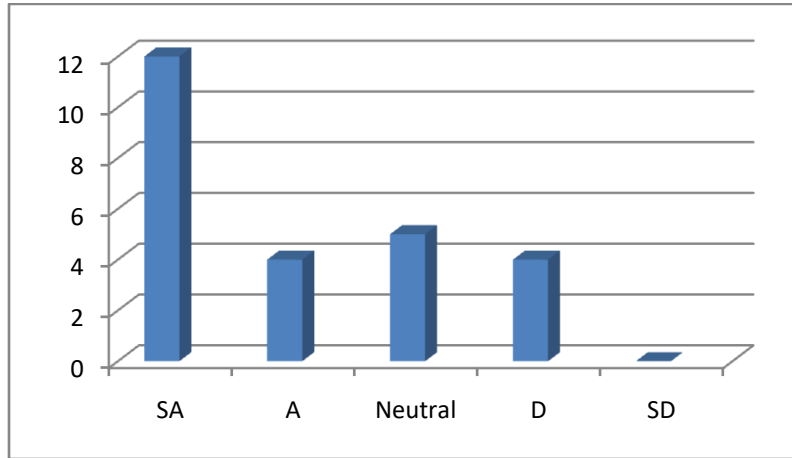


Figure 6. Availability of solar energy resources and equipment

84% percent of the respondents agreed that solar energy resources are not readily available in Zimbabwe. This was echoed by primary data from the random interviews conducted which revealed that the majority of businesses that are using solar energy products acquire them from South Africa and Botswana. Some respondents indicated that for those resources that are available locally, the cost is quite inhibitive due to the pricing challenges in the country’s economy. This is one area that Government, through the responsible Ministry could play a central role in order to enhance efforts towards the adoption of cleaner energy sources in the business sector.

Table 8. Accessibility of solar energy equipment and resources

		SA	A	Neutral	D	SD
Q 7	Solar energy equipment and resources are easily accessible in Zimbabwe.	0	0	6	15	4
		0%	0%	24%	60%	16%

Though 24% of the respondents were neutral on this question 66% disagreed, confirming the response rate in question eight (8). The general conclusion is that more needs to be done to ensure that solar energy equipment and resources are easily accessible in the country. Accessibility in this case could either be linked to the lack of capacity to finance solar energy projects on the part of businesses, the limited nature of the product range on offer or poor distribution of suppliers. In light of the advantages of solar energy and considering the amount of sunlight the country receives in a year, stakeholders need to appreciate that the economy stands to benefit significantly from the mainstreaming of solar energy in the country’s business sector.

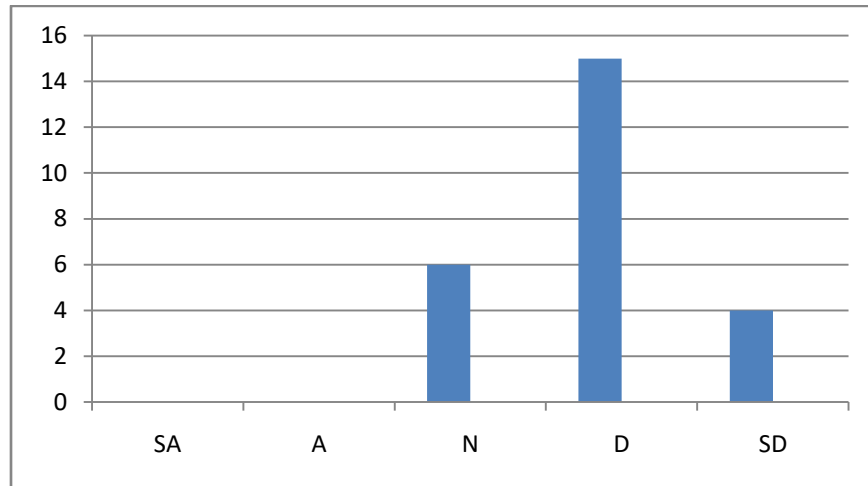


Figure 7. Accessibility of solar energy equipment and resources

Table 9. Use of solar energy in the organisation

		Yes	No	Not sure
Q 8	My organization uses solar energy for power	2 8%	23 92%	0 0%

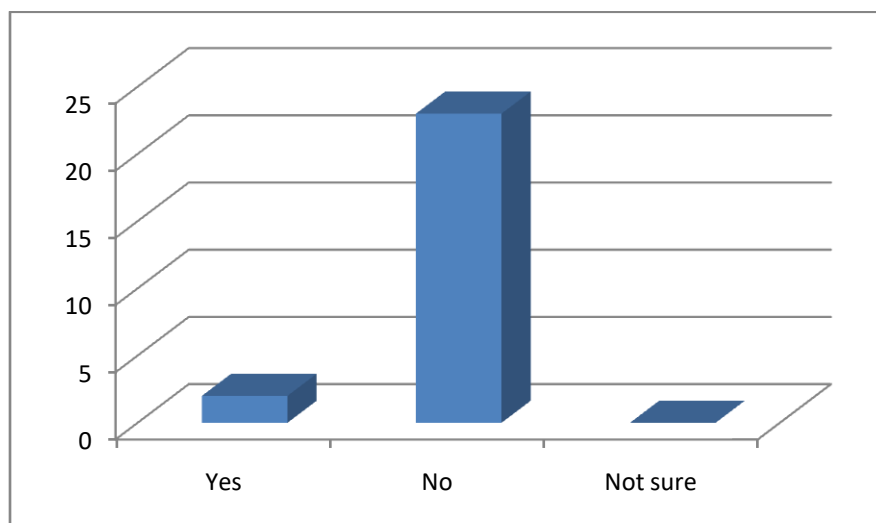


Figure 8. Use of solar energy in the organisation

92% of the respondents confirmed that their organisations did not make use of solar energy. This is quite alarming, considering the amount of solar energy available throughout the year across the country. Further research is required, to establish the reasons for this low uptake of a widely believed cheaper source of energy.

Table 10. Adoption of solar energy

		Yes	No	Not sure
Q 9	My organization is considering introduction of solar energy	3 12%	1 4%	21 84%

SA: Strongly Agree, A: Agree, N: Neutral, D: Disagree, SD: Strongly Disagree

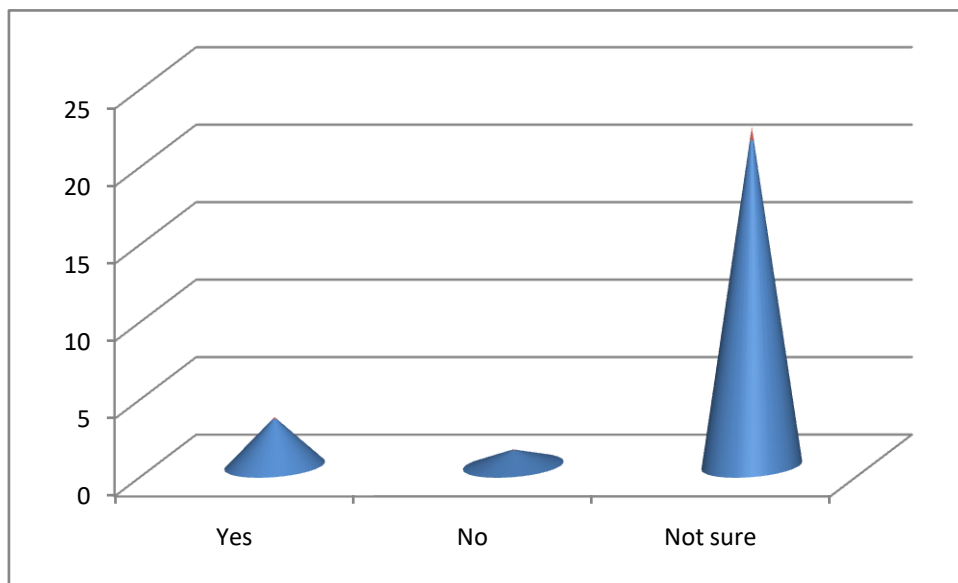


Figure 9. Adoption of solar Energy

The greater percentage of respondents was not sure if their organisations were considering the adoption of solar energy in their operations. This may be due to a number of reasons but what it could generally mean is that solar energy is not a top priority for the tourism industry in Zimbabwe.

Table 11. Organisation’s plans

		Yes	No	Not sure
Q 10	My organization has no plans to adopt solar energy	2	3	20
		8%	12%	80%

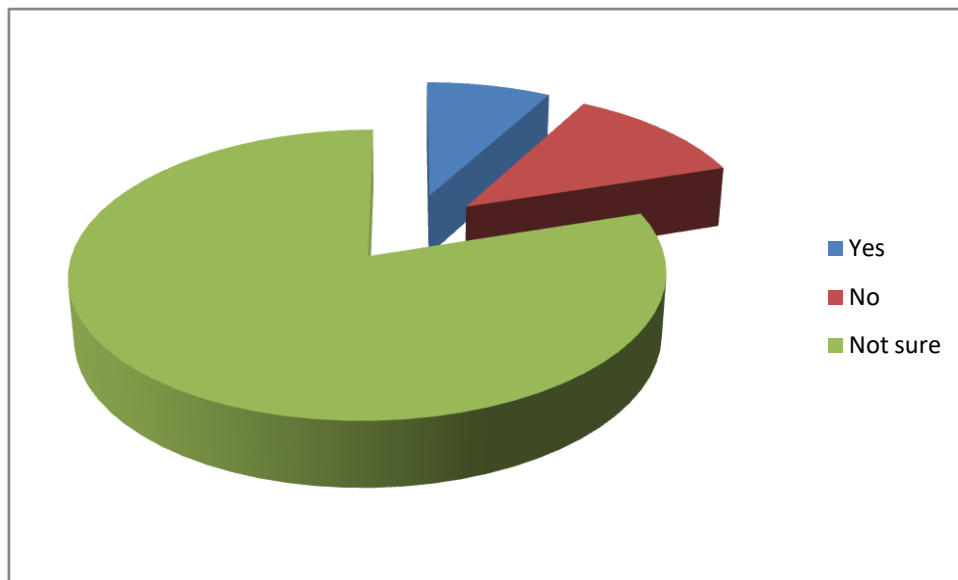


Figure 10. organisation’s plans

In terms of future plans the trend is that the majority of respondents do not see their organisations adopting solar power in the near future. Our conclusion here is that government and other stakeholders need to investigate further, to establish the cause of this and formulate strategies to make solar energy more popular amongst businesses in the Tourism and hospitality industry.

5. Conclusions

- Practitioners in the Zimbabwean tourism and hospitality industry lack up to date and vital information about the effectiveness of solar energy and its capacity to replace conventional energy sources.

- Solar energy resources and equipment are not easily accessible in Zimbabwe, making it difficult for businesses to seriously consider adopting this renewable and cleaner source of energy.
- Some practitioners in the tourism and hospitality sector are not aware of the potential benefits that their businesses could enjoy from the adoption of solar energy.
- Businesses in the tourism and hospitality industry have challenges accessing funds for investment in solar energy resources from the financial services sector.

6. Recommendations

- There is need for further research to establish why businesses have not seriously considered the adoption of solar energy in their value chains, despite various government efforts after the World solar Summit hosted by Zimbabwe in 1996.
- Government needs to revisit its strategies towards the promotion of solar energy use in the tourism and hospitality industry.
- Government and other stakeholders in the energy sector need to scale up solar energy promotional initiatives so as to effectively lobby with the business sector if solar energy is to be a significant source of power in industry
- Government and other stakeholders in the energy sector need to step up efforts to ensure that solar energy resources and equipment are readily available in the country to enhance the adoption and sustainable use of solar powered systems in the tourism and hospitality industry.
- Government and stakeholders in the financial services sector need to consider the establishment of a facility which enables the business sector to access funds for the acquisition and installation of solar energy resources.

References

- Evanthie, M. (2008), *Using Renewable Energy as a tool to achieve tourism sustainability in Mediterranean Islands*, etudes caribeennes, revues.org.
- Hove, T., Mubvakure, B. and Schwarzmuller, A. (2007), Final Report on the Survey on Demand of Solar Water Heaters in the Institutional Sector, available at: http://www.thesundrum.org/downloads/08-Survey%20-%20Final%20Report_conv_opt.pdf (accessed 29 September 2012).
- Husted, H. (2007), "Solar energy and its use today", available at: <http://www.creatingwords.com/work/ghostwriting/solar/SolarEnergyandItsUseToday.pdf>.
- International Energy Agency (2012), "Technology Roadmap, Solar Heating and Cooling", available at: http://www.iea.org/publications/freepublications/publication/2012_SolarHeatingCooling_Roadmap_FINAL_WEB.pdf (accessed 29 September 2012).

Kothari, C.R. (2004), *Research Methodology: Methods and Techniques*, Second Edition, New Age International, New Delhi.

Romo, Z. (2009), "Renewable Energy for Sustainable Development in Mexico", available at: http://www.sener.gob.mx/res/0/RE_for_Sustainable_%20Development_Mx_2009.pdf.

Simpson, M.C., Gössling, S., Scott, D., Hall, C.M. and Gladin, E. (2008), *Climate Change: Adaptation and Mitigation in the Tourism Sector: Frameworks, Tools and Practices*, UNEP, University of Oxford, UNWTO, WMO: Paris, France.

Singh, K. (2007), *Quantitative Social Research Methods*, Sage Publications India, New Delhi.

Waldman (2004), *International experience on Solar Thermal application in the hotel sector*, Xenias European commission for Energy and Transport, Brussels.