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A Survey on the Assessment of the Public's Perception of Solar Energy as an Alternative Energy Source in Dar ES Salaam Tanzania

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Abstract: ***Solar energy is considered to be an alternative sustainable energy source in the urban environment. The main aim of this study is to learn what the general public thinks about solar energy. This study's main source of inspiration was the dearth of prior research in the area.***

The questionnaire were prepared to screen for the prevalence of solar energy system users. In total, 100 36 samples were examined for the purposes of this study.

The findings revealed that among the respondents, 36, 3636% currently use 36% currently use solar energy for a variety of reasons, including 50% cost savings, 22% environmental sustainability, 17% solar power reliability, and 11% grid access. The findings show that 64 respondents do not currently use solar energy due to a number of reasons, including We found that out of 100 respondents, 70% were aware of the potential benefits of solar energy and only 30% were not. Our study found that 65 respondents' families had an income of less than one million TZS per month. Therefore, Based on the results it can be concluded that for the general public in the Dar es salaam region, income was acknowledge as a barrier to switching to solar energy as an alternative energy source.

The potential of using solar energy in urban areas is highly dependent on urban morphology which affects the level of solar irradiance received by individual buildings. It leads to inefficient design of neighborhoods in terms of solar energy potential. The present study investigates the potential of exploiting solar energy in Dar es Salaam, Tanzania by using numerical modelling of solar irradiance on building roofs and façades.

It is shown that there is substantial solar irradiance received by building roofs in all four study neighborhoods and urban morphology has considerable effects on annual solar irradiance. Solar irradiance of different orientations of tilted roofs and façades is subject to seasonality of the solar azimuth angle. It is suggested that such abundant solar energy sources would provide solutions to accommodate the increasing energy demand and to improve living quality in urban areas due to the rapid urbanization of the city.

Keywords: Solar energy, Survey 2023, Alternative source, Dares salaam, Tanzania

I. INTRODUCTION

Solar energy is widely considered to be a sustainable and readily available energy source in urban environments. As about 54% of the world's population resides in urban areas, an enormous amount of energy is used, and a large proportion of greenhouse gases are released at the same time.

In particular, the urban population in developing countries is expected to vastly increase in the next few decades (United Nations, 2014).

In Africa, it was estimated that a 1% increase in urbanization leads to a 14% increase in charcoal consumption, in turn leading to increased air pollution and emissions of greenhouse gases and thus a contribution to global warming (World Bank, 2009). It results in the urgent need for the exploitation of solar energy in order to mitigate the impacts of fossil fuel consumption and improve the living quality of urban areas (Pearce, 2002).

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Pic.courtesy. Worldatlas

In developing countries in Africa, the use of electricity has been increasing in the last decade. For example, in urban areas of Tanzania, the proportion of the urban population having access to electricity has increased from 39% in 2005 to 52% in 2009 (Shkaratan, 2012).

In particular, the annual electricity consumption of high-income households is over 360 kW/h and is expected to increase due to the rapid economic development in Tanzania (Hosier & Kipondya, 1993). Half of Tanzania's charcoal is used in Dar es Salaam, mostly for urban household energy, with an increase of 70% in 2009. On the other hand, the limited access to grid electricity in rural areas leads to an overall 6% of the total population having access to grid electricity in Tanzania (Bauner, Sundell, Senyagwa, & Doyle, 2012). Tanzania's electricity generation, which is mainly based on hydropower and natural gas, is sensitive to variations in precipitation rate and fossil fuel prices, and consequently, power failures are common. To cope with this, many industries, hotels, shops, and private households have installed their own diesel

-driven generators, especially in Dar es Salaam (Bauner et al., 2012). This leads to increased emissions of toxic and greenhouse gases, and the cost to install and operate these generators is a large burden on the economy. There is thus an enormous demand for more reliable electricity generation, which can potentially be accommodated by the exploitation of solar energy in the urban environment.

One of the problems associated with the exploitation of solar energy in urban areas is the high-rise and compacted urban form, which prevents solar radiation from reaching building surfaces (Yun and Steemers, 2009). It reduces solar energy potential since solar irradiance is the most crucial parameter in photovoltaic (PV) systems. Several studies have previously examined the relationship between solar energy potential and urban morphology. Compagnon (2004) quantified the potential of façades and roofs for PV electricity production in Switzerland by numerical simulations of solar irradiance. It was shown that different building layouts with the same density exhibit large variations in solar energy potential on building facades, suggesting that solar availability can be increased even in dense urban areas. Cheng et al. (2006) analyzed the effect of urban form and density (in terms of plot ratio) on the PV potential of the building envelope. Vertical randomness in building height is found to be more favorable at lower site coverage since it provides better solar access to building façades. Sarralde et al. (2015) further used a number of descriptors of urban morphology to describe various urban forms, which are parametrically analyzed for their corresponding solar energy potential. By modifying specific descriptors of an existing neighborhood, they found that the availability of solar irradiance in building façades can be increased by 45%. Therefore, careful design of urban neighborhoods is very important to optimizing solar energy potential in urban areas.

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A wide range of tools have been developed to simulate solar irradiance at both building and urban scales (Compagnon, 2004; Lindberg, Holmer, & Thorsson, 2008; Šúri et al., 2005; Šúri et al., 2007). High-resolution digital surface models (DSM) are used to estimate the availability of solar radiation for extensive areas due to their computational efficiency using 2.5-dimensional raster-based calculations. These models have been widely used to determine the solar energy potential of roofs with various geometries (Hofierka and Kanuk, 2009; Nguyen and Pearce, 2012). The recent model developed by Redweik et al. (2013) provides estimations of wall irradiances by calculating diffuse and direct irradiances on the ground, roofs, and walls for individual hours on a high-resolution DSM. The present study aims to examine the solar energy potential of different urban settings in Dar es Salaam, Tanzania. Four typical urban settings with different building geometries (building height and coverage) are chosen to compare the effect of various urban morphological parameters on the availability of solar radiation on both the roofs and façades of buildings. Findings of the present study form part of the project entitled "Efficient use of land and energy in Dar es Salaam, Tanzania: Urban planning and climate adaptation", which aims to develop a set of planning recommendations for sustainable, climate-sensitive urban planning in Dar es Salaam, Tanzania.

A. Statements of the Problem

Using Solar energy as alternative source of energy is crucial for daily activities in households and institutions. However there is a concern regarding the lack of public awareness and education about solar energy. Lack of financing options for solar installations and poor quality of solar products and costs hinder the widespread adoption of solar energy in Tz. The study aims to address the barriers and challenges to widespread adoption of solar energy in TZ.

Pic. Courtesy. Worldatlas

B. The General Objective.

To investigate and understand how people in Tanzania perceive and view the adoption and utilization of solar energy as an alternative source of energy, with the aim of identifying any barriers, challenges, or opportunities for its widespread use.

C. The Specific Objectives

1) Assesses the use of solar energy using the SWOT method (strength, weakness, opportunities, and threats).
2) Investigating the awareness level of solar energy among Tanzanian citizens.
3) Analyzing the advantages and disadvantages of using solar energy in Tanzania.
4) Examining the elements affecting public acceptance and readiness to adopt solar energy.
5) Determining what obstacles and difficulties might be standing in the way of Tanzanians using solar energy extensively.
6) Making suggestions to help Tanzanians better understand and use solar energy as a substitute source.

D. Hypothesis

1) Solar energy protects the environment and offers an alternative to the production of coal and oil.
2) Solar power offers lower electricity costs.
3) Solar energy has the potential to encourage energy independence and culturally appropriate economic development while also providing low-income residents with affordable heat and energy as well as green jobs for the unemployed.

E. Justification of the Project

According to estimates from several studies, coal and natural gas account for more than 60% of the fuel used to generate electricity globally.

Therefore, a crucial part of combating climate change on a large scale is reducing emissions from the energy sector. The push for the adoption of renewable energy sources like solar and wind has been a key component of the solution to reducing emissions from the production of energy.

While the direct reduction of GHG emissions through the development of solar and wind infrastructure is well understood, research on the best practices for putting this infrastructure in place is just getting started. Therefore, the discussion surrounding an energy transition now includes the significance of public perceptions and support for renewable energy projects.

F. Limitations

Due to a lack of funding, a researcher must travel to various locations in order to collect various types of data. Funds are needed for stationary tasks like typing, printing, and binding. Some parts of the research are irrelevant to certain contents because people are reluctant to provide precise information about it.

The researcher's ability to learn about research firsthand is constrained. In some locations, research permits are secured; without authorized law and regulation, no precise information, questionnaire can be collected. Due to the fact that most of us collect questionnare during the day and that this can occasionally conflict with class schedules, having little time to collect data becomes a barrier.

II. REVIEW OF LITERATURE

A. Introduction

Solar energy is considered to be the most important sustainable source of energy in different countries around the world. Adenle (2020) analyzed the challenges in meeting the 2030 goals of sustainable energy, particularly in developing African countries using solar energy technology.

Adenle came up with an idea based on the achievement of Millennium Development Goals through the adoption of solar energy (Adenle 2020). In the adoption of solar energy as a sustainable source of energy, sometimes there are a variety of inefficiencies. (Aly, et al., 2018) comes with findings on the major barriers that seem to be a major problem in adopting solar energy in Tanzania. They come with the result that, when implemented, may reduce or eradicate the risk of being energy dependent in the country. In 2020, Li and Huang worked on the expansion of solar energy in China based on policy and challenges to handle the proposed policy. The outcome of their work was based on suggestions to the country to adopt policies that would emphasize the expansion of solar energy in China, resulting in better environmental preservation so as to reduce the risk of global warming.

B. Significance of the Study

Kulworawanichpong and Mwambeleko, (2015) worked on finding relief on the cost of electricity after identifying 24% of the population having access to electricity and 93% of households in rural areas lacking electricity; therefore, they suggested that in order to reduce the cost, a stand-alone solar photovoltaic system should be designed in rural areas to eradicate the risk of a shortage of energy in rural areas.

Inappropriate energy structures in a country hinder sustainable development and the rapid development of society. The energy demand in society is increasing at a credible speed. Li-qun et al. (2010) analyzed that steady and maintainable electric power provides the development momentum of a country`s industrialization and development of solar energy, as regarded by the government and ordinary people in China.

Mekhilef, et al. (2011) they insisted the government of Malaysia develop solar energy as one of the most significant sources of energy in the country. The environmentally friendly factors and contributions to lower carbon emissions made it the best choice for future energy power generation.

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Samatar et al. (2023) come with findings that due to unfamiliarity, lack of energy awareness, high initial costs, and lack of infrastructure, the utilization of solar energy is limited in Somalia.

Khare et al. (2023) found that population growth and technological improvements are driving up energy demand all over the world. Due to the significance of sunlight,the demand for solar energy for electrification has exploded. Adoption of solar energy is important for the sustainable development of the country.

Kabir et al. (2017), analyzed that solar power technologies are a key solution fulfilling a worldwide increasing demand for energy due to population growth and highlights the barriers such as economic hindrances and low solar cell efficiencies. Rosati et al. (2019), analyzed the impact of seasonal thermal energy storage design on the dynamic performances of a solar heating system serving a small-scale Italian district composed of residential and school buildings. The findings helped to enhance the utilization of solar energy in any season of the year.

Heffron et al. (2021) did their work on justice in solar energy development; this study helped solar energy developers perform their duties in a comfortable situation. Apart from various studies on solar energy in different countries around the world, this study will help to analyze the perception of solar energy as an alternative source of energy in Tanzania.

C. Critical Study

Despite the fact that norms and general awareness have a favorable impact on consumer behavior, informational messages should be the cornerstone of promotional campaigns, according to a Kaldellis et al. (2012) study. Aly et al. (2019), who identified a number of barriers, including institutional, monetary, and technological ones.

According to Djurisic et al. (2020), consumer attitudes and perceptions of renewable energy sources are more significant than consumer awareness of these sources.

Our perceptions of renewable energy sources may change depending on our awareness, as shown by the statistical significance of the interaction between awareness and perception, which is 7.6%, which is also 5%.

III. RESEARCH METHODOLOGY

A. Introduction

The analysis's goal was to examine how public behaved in relation to the use of solar energy and to pinpoint the factors that were affecting their attitude. The investigation's main objectives were to learn more about people's awareness of solar energy and to identify the aspects of their perceptions and attitude that influence and affect how they respond when it comes to solar energy as an alternative source of energy.

B. Research Design

For this study, a research method based on questionnaires was used to collect data.

We used the R package for graphical representation. A set of relationships between one or more independent variables and one or more dependent variables, both either continuous or discrete, has been examined using a variety of statistical techniques known as IBMSPSS.

C. Target Population

This research was done in the Tanzanian administrative ward of Kwembe, which is found in Dar es Salaam's Ubungo District. Men and women, both over and under the age of 18, were both included in the study.

D. Location of Study

The research was conducted in the Dar es Salaam Region as a case study with reference to households and institutions. Research was conducted in Dar es Salaam areas around Kwembe ward to analyze how solar energy is used as an alternative source of energy. Kwembe (Kata ya Kwembe in Swahili) is an administrative ward and district capital of the Ubungo District of the Dar es Salaam Region in Tanzania.

The ward is bordered to the north by the wards of Mbezi and Kibamba, and to the east by the wards of Kinyerezi and Pugu in the Ilala District. To the west the ward is bordred with Kisarawe District’s the Kiluvya and Kisarawe wards of Pwani Region.

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(Source. Courtesy. Wikipedia https://en.m.wikipedia.org/wiki/Kwembe)
Coordinates: 6°48′27.72″S 39°4′54.48″E

Country : Tanzania
Region :Dar es Salaam Region
District : Ubungo District
Total Area :60.4 km2 (23.3 sq mi)
Population (2012) :56,899
Demonym : Kwembean
Tanzanian Postal Code : 16111

E. Sample and Sample Size

There were 170 Dar es Salaam residents who participated anonymously in the sample. From June 2023 till 31st of July 2023, the survey was carried out. One hundred valid out of 170 total distributed questionnaires—or 58.8%—were found to be valid. Questionnaires that were incomplete or incorrectly completed were not taken into account. Based on an analysis of earlier studies that addressed the same issue, the questionnaire was created Alsabbagh,(2023).

F. Methods of Data Collection

In this study, the following methods were used to collect data: questionnaires and interviews, which were used to gather quantitative data in Kwembe ward in Ubungo Dar es Salaam, Tanzania.

Given the long-term consequences of the present study, the sample structure is suitable for the research. The advantages of switching from conventional to renewable energy sources will most significantly benefit people based on their income. Therefore, the present study investigated the personal income of the respondents. In addition, there are 100.0% women in the population.

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IV. DATA ANALYSIS AND INTERPRETATION

Data was collected by preparing questionnaire and the people were randomly being requested to fill them. For the study, a sample size of 100 has been taken into consideration including adolescent girls, boys and families. The main statistical tools used for the analyses of data in this project are:

- Pie Charts
- Bar Diagrams

1) Q1.Gender of the Respondents?

a. Male

b. Female

Table 4.1. Gender of the Respondents

Gender of the Respondent			Frequencies	Percentage
Male			57	57%
Female			43	43%
Total	100	100%		

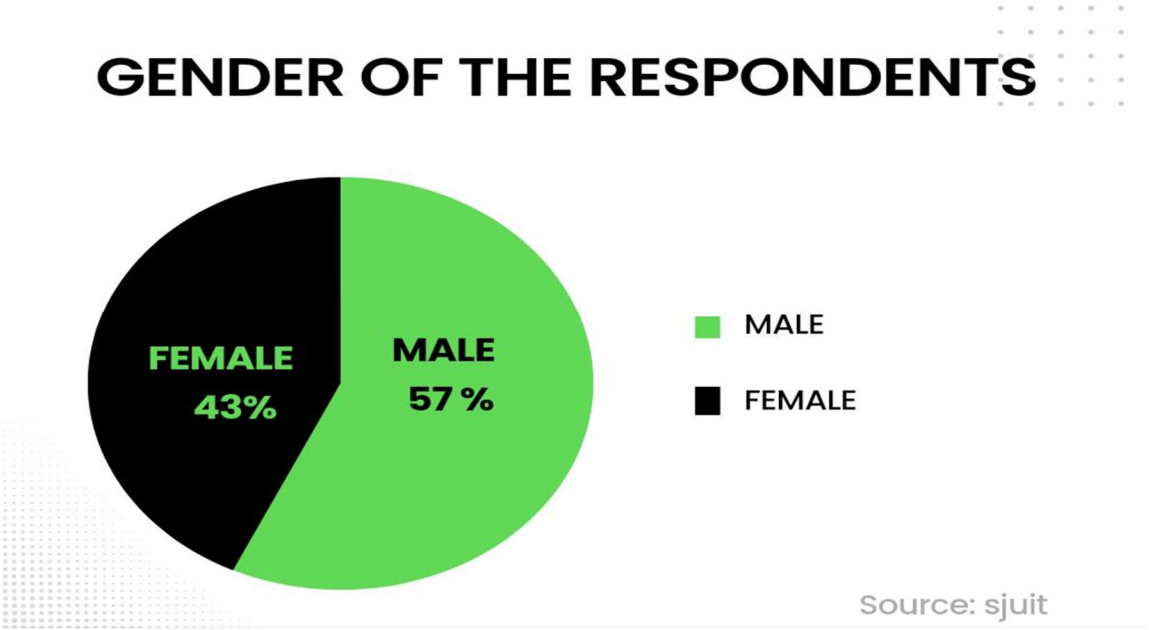

Fig.4.1.Gender of the Respondent

Analysis: Figure 4.1 and table 4.1 shows that amongst 100 respondents on whom survey was conducted 50% are male and 50% are female.

2) Q2.Age of the Respondents?

a. Above 18

b. Below 18

Table 4.2.*Age of the Respondent*

Age of the Respondents	Frequencies	Percentage
Above 18	86	86%
Below 18	14	14%
Total	100	100%

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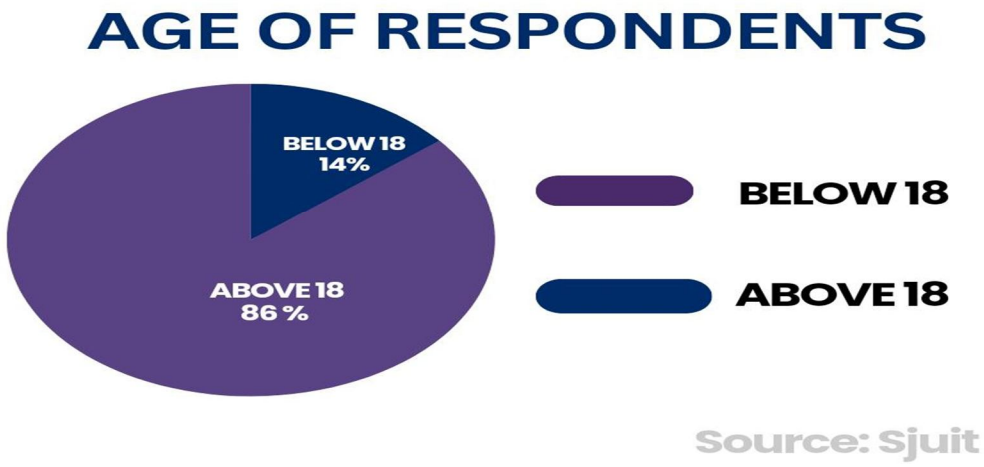

Fig. 4.2

Analysis: According to our research, out of 100 respondents, 86% are crossed their 18 years, while only 14% are not.

3) Q3.Occupation of the Respondents?

Table. 4.3.Occupation of the Respondents

Occupation of the Respondent	*Frequencies*	*Percentage*
Students	22	22%
Teacher	10	10%
Business man	08	8%
Vendor	04	4%
Farmer	03	7%
Cooker	05	5%
Driver	04	8%
Shop keeper	02	2%
Ceo	01	1%
Pastor	02	2 %
Bank agent	01	1%
HR	02	2%
Civil servant	05	5%
Police	04	4%
Trader	04	4%
Pharmacist	02	2%
Engineer	05	5%
Peasant	01	1%
Waitress	01	1%
Secretary	01	1%
House wife	03	3%
Entrepreneur	01	1%
Total	100	100%

Analysis: Questionnaire was prepared and circulated. Its collected from Different groupn of Occupations listed as Table 4.3.

4) Q4. Family income of Respondents?

a. Above 1M

b. Below 1 M

Table 4.4.Family Income

Family income of Respondents	Frequencies	Percentage
Below 1 million(Tsh)	65	65%
Above 1 million (Tsh)	35	35%
Total	100	100%

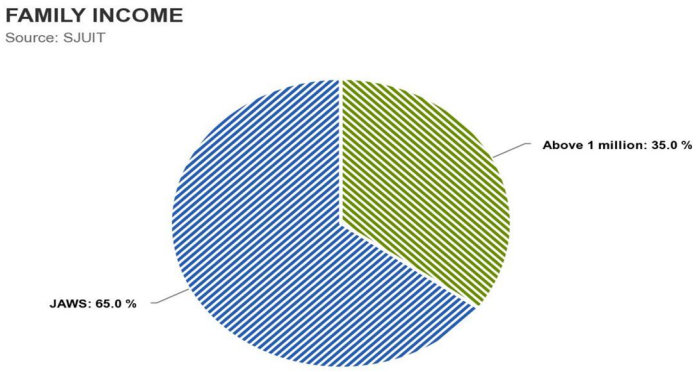

Figure 4.4.shows family income of respondents

Analysis: For the present study, 100 samples in total were examined. 65 respondents had a family income that was less than million a month, according to our research. A total of 35 respondents out of 100 were observed that their families made more than 1 million TZS. The information below is frequency-based data collected through questionnaires and interviews. The results are presented in the Fig. 4.4, Table 4.4.

5) Q5.Are you Currently using solar energy?

a. Yes

b. No

4.5. Awareness Of Usage Of Solar Energy

Current usage of solar energy			Frequencies	*Percentage*
Yes			*36*	*36%*
No			*64*	*64%*
Total	100	*100%*		

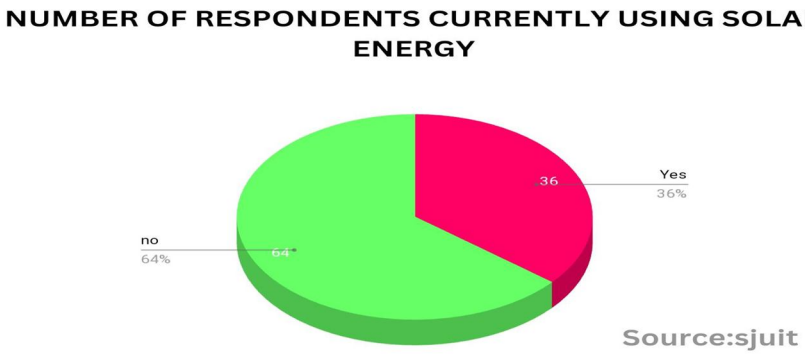

Fig. 4.5. Number of respondents currently using solar energy

Analysis: According to the findings, 64 respondents are not currently using solar energy and 36 respondents using solar energy.

6) *Q6. If you answered "Yes" to question 5, what is the primary reason for using solar energy?*

a. Cost savings
b. Environmental sustainability
c. Lack of access to the grid
d. Reliability of solar power
e. Other (please specify)

4.5.1 Currently Using Solar Energy

Reason for current usage	Frequencies	Percentage
Cost saving	18	50%
Environmental sustainability	8	22%
Lack of access to the grid	4	11%
Reliability of solar power	6	17%
Total	36	100%

Table 4.5.1 Awareness of advantages of solar energy

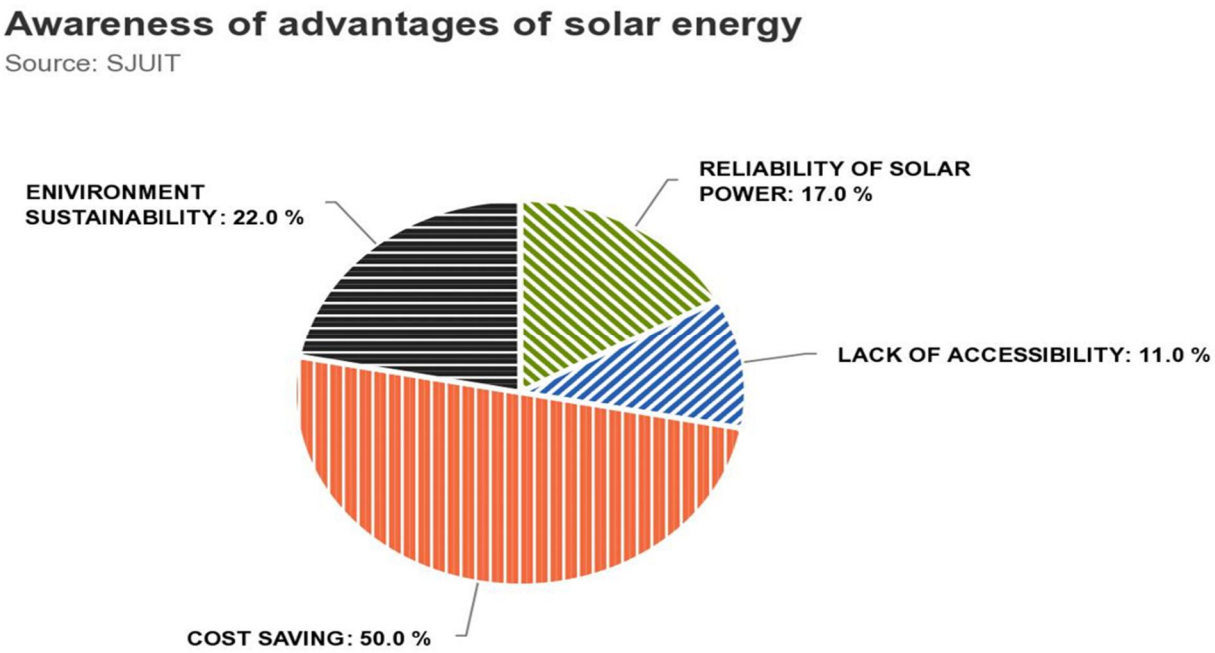

Figure 4.2.1 Awareness of Benefits of Solar energy

Analysis: The results showed that among the 36 respondents, a majority (36%) currently use solar energy for a variety of reasons, including 50% cost savings, 22% environmental sustainability, 17% solar power reliability, and 11% grid access. The list of factors and the proportion of respondents who took part in the questionnaire and interview during data collection are shown in the table below. The results are presented in the Table 4.5.1 and 4.5.2 Fig.

7) *Q7. If you answered "No" to question 5, what are the main reasons for not using solar energy? (Choose all that apply)*

a. Lack of awareness about solar energy benefits
b. High upfront costs
c. Limited availability of solar products or services
d. Concerns about the reliability of solar power
e. Other (please specify)

4.5.2 Currently Not Using Solar Energy

Currently not using solar energy	Frequencies	Percentage
Lack of awareness about solar energy benefits	16	25%
High upfront costs	25	39%
Limited availability of solar products	14	22%
Concerns about reliability of solar power	9	14%
Total	64	100%

Table 4.5.2: Respondents are not using solar energy

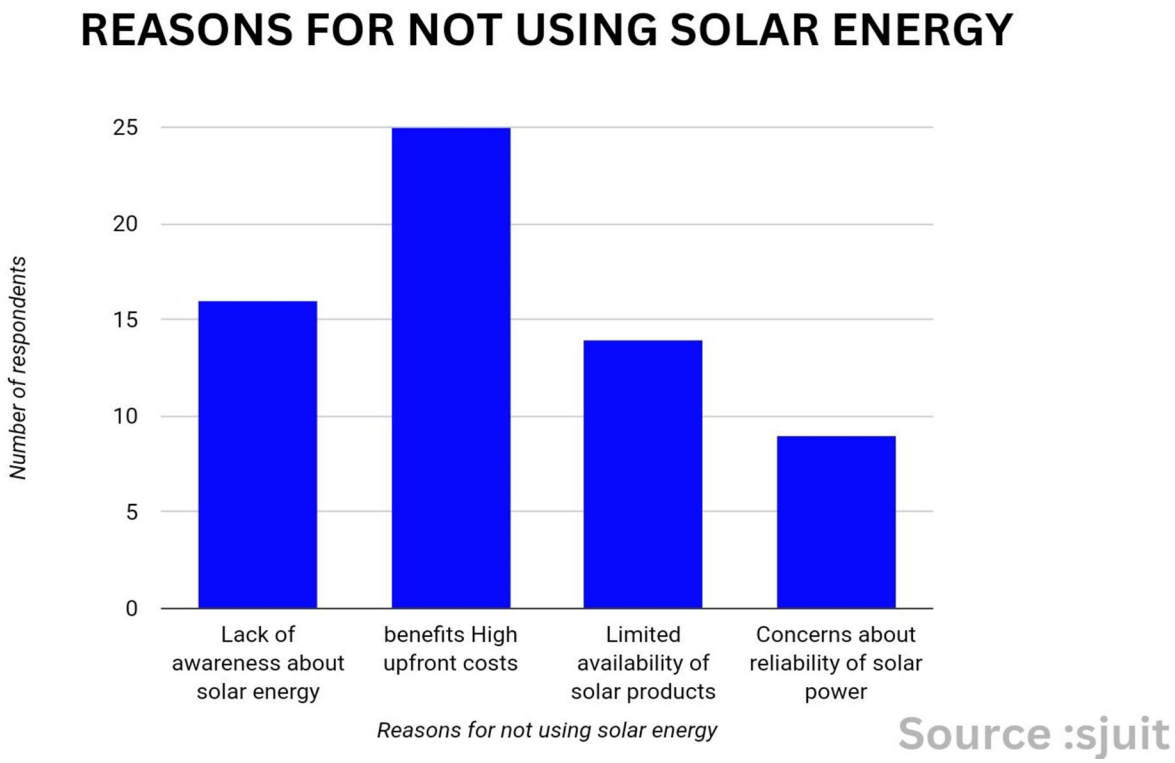

Figure 4.5.2. Respondents are not using solar energy

Analysis :According to the findings, 64 respondents are not currently using solar energy due to a variety of factors, including 2 high upfront costs, 16 a lack of knowledge about solar energy, 14 a lack of solar product availability, and 9 worries about the dependability of solar power. The results are given in Table 4.5.2. Fig. 4.5.2.

8) Q8. Are you familiar with the potential benefits of solar energy in Tanzania?

a. Yes
b. No

4.6.People Familiar With The Potential Benefits Of Solar Energy

Familiar with potential benefits	Frequencies	Percentage
Yes	70	70%
No	30	30%
Total	100	100%

Table: 4.6. Respondents are aware of the benefits of solar energy

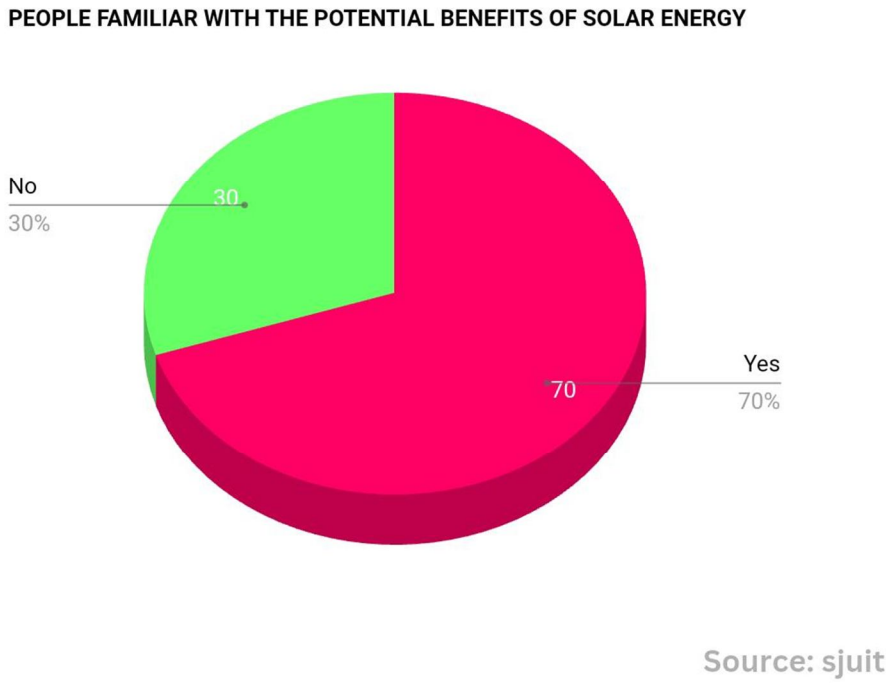

Figure 4.6.Respondents are aware of the benefits of solar energy

Analysis: According to our research, out of 100 respondents, 70% are aware of the potential advantages of solar energy, while only 30% are not. The Respondents' participation in knowing about potential solar energy benefits is shown in the table below. (Table 4.6); (Fig. 4.6).

9) Q9.Which of the following benefits of solar energy do you find most compelling? (Choose all that apply)
a. Reduced electricity costs
b. Environmental friendliness
c. Energy independence
d. Reduced reliance on fossil fuels
e. Increased energy access in remote areas
f. Other (please specify)

4.7. Benefits Of Solar Energy Most Compelling

Benefits most compelling	Frequencies	Percentage
Reduced electricity costs	30	30%
Environmental friendless	23	23%
Energy independence	20	20%
Reduced reliance on fossil fuels	10	10%
Increased access in remote areas	17	17%
Total	100	100%

Table 4.7: Benefits of solar energy

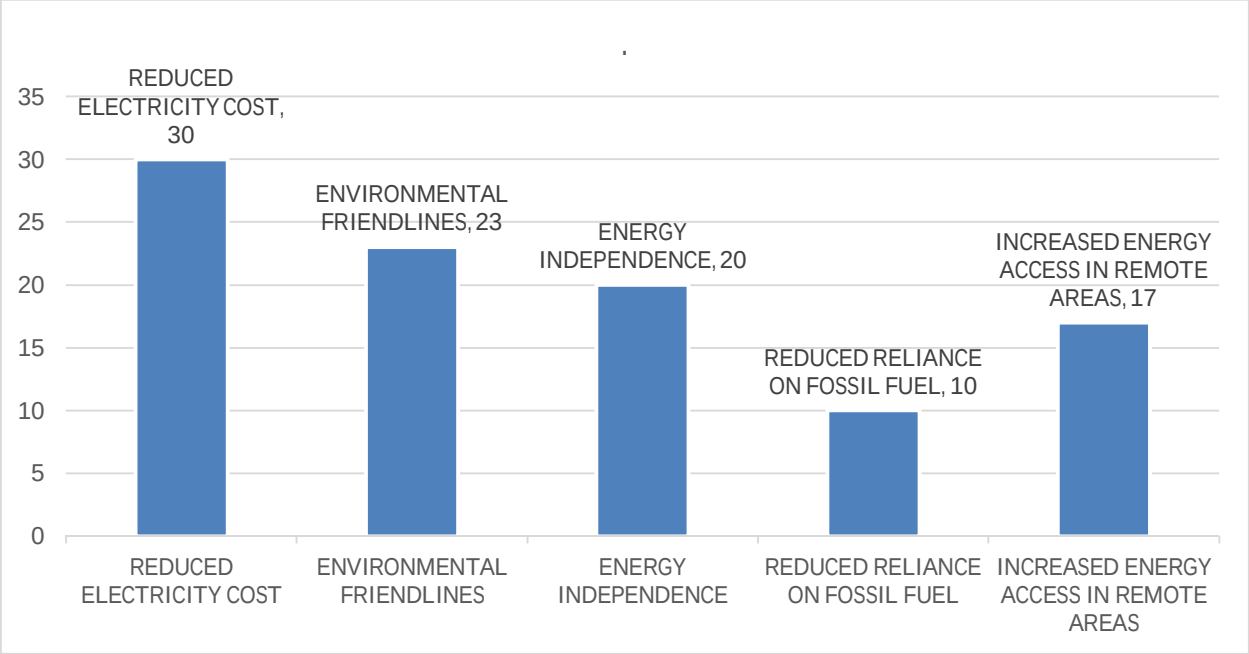

Figure 4.7.Benefits of solar energy

Analysis: Out of 100 respondents, 30% said solar energy lowers electricity costs, 23% said solar energy is environmentally friendly, 20% said solar energy is a dependence on alternative energy, 17% said there is a need for greater energy access in remote areas, and 10% thought there should be less reliance on fossil fuels. Table. 4.7. and Fig. 4.7.

10) Q10.What are the major barriers or challenges to widespread adoption of solar energy in Tanzania? (Choose all that apply)

a. Lack of financing options for solar installations
b. Limited technical expertise for installation and maintenance
c. Insufficient government policies or regulations supporting solar energy
d. Limited availability of quality solar products
e. Lack of public awareness and education about solar energy
f. Other (please specify)

E4.8.Major Barriers Or Challenges To Widespread Adoption Of Solar Energy

Challenges	Frequencies	Percentage
Lack of financing options for solar installation	31	31%
Limited technical expertise for installation and maintenance	19	19%
Insufficient government polices supporting solar energy	14	14%
Limited availability of quality solar products	23	23%
Lack of public awareness and education about solar energy	13	13%
Total	100	100%

Table 4.8: Challenges to widespread adoption of solar energy

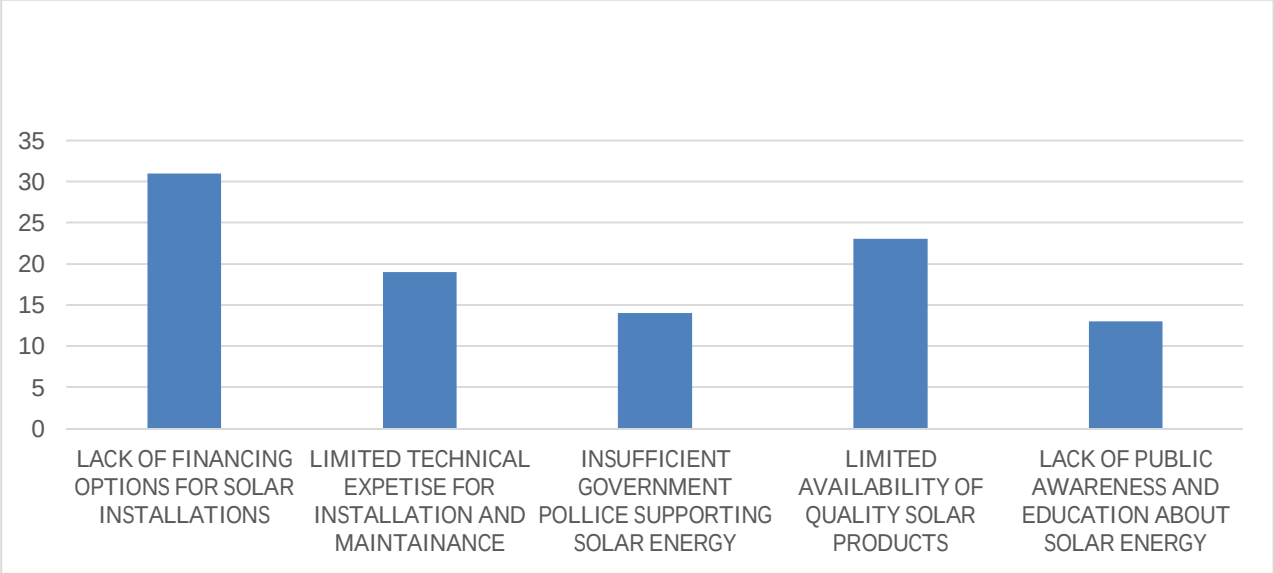

Figure 4.8 Major challenges to widespread adaptation of solar energy

Analysis: The findings indicated that, out of 100 respondents, 31 had insufficient financing options for solar installation, 23 had limited access to high-quality solar products, 19 had insufficient technical know-how for installation and maintenance, 14 had insufficient government policies to support solar energy, and 13 had insufficient levels of public knowledge and education about solar energy.(Table. 4.8 and Fig. 4.8)

11) *Q11.Have you considered installing solar panels or using solar power in the future?*

a. Yes

b. No

4.9. Installing Solar Panels Or Using Solar Power In The Future

Using solar power in future	Frequencies	Percentage
No	19	19%
Yes	81	81%
Total	100	100%

Table 4.9.Using solar power in the future

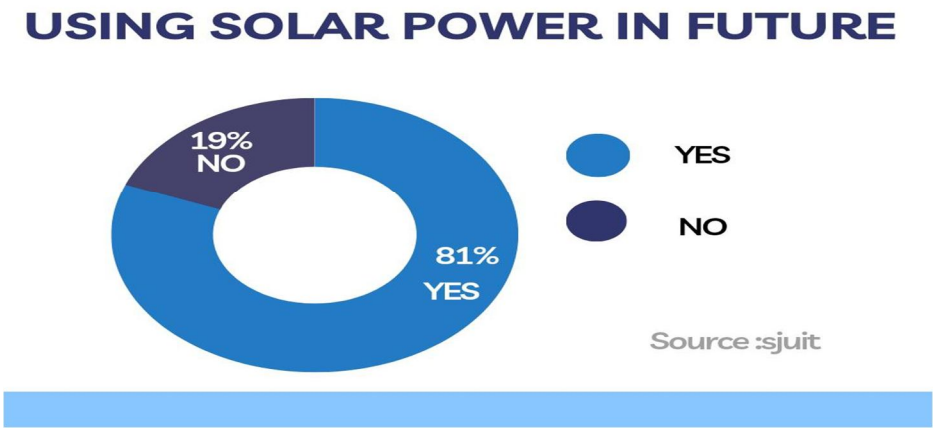

Figure 4.9.Using solar power in the future

Analysis: According to questionaries' results 81% of the Tanzania peoples are Ready to install solar power in future Tanzania and 19% of the Tanzanian they don't have an interest.(Figure. 4.9 and Table 4.9)

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12) Q12. Do you believe the government should play a role in promoting the adoption of solar energy in Tanzania?
a. Yes
b.No

4.10. Government Should Play A Role In Promoting The Adoption Of Solar Energy In Tanzania

Belief about Government solar energy system	Frequencies	Percentage
Yes	92	92%
No	8	8%
Total	100	100%

Table 4.10.Government should play a role in promoting the adoption of solar energy in Tanzania

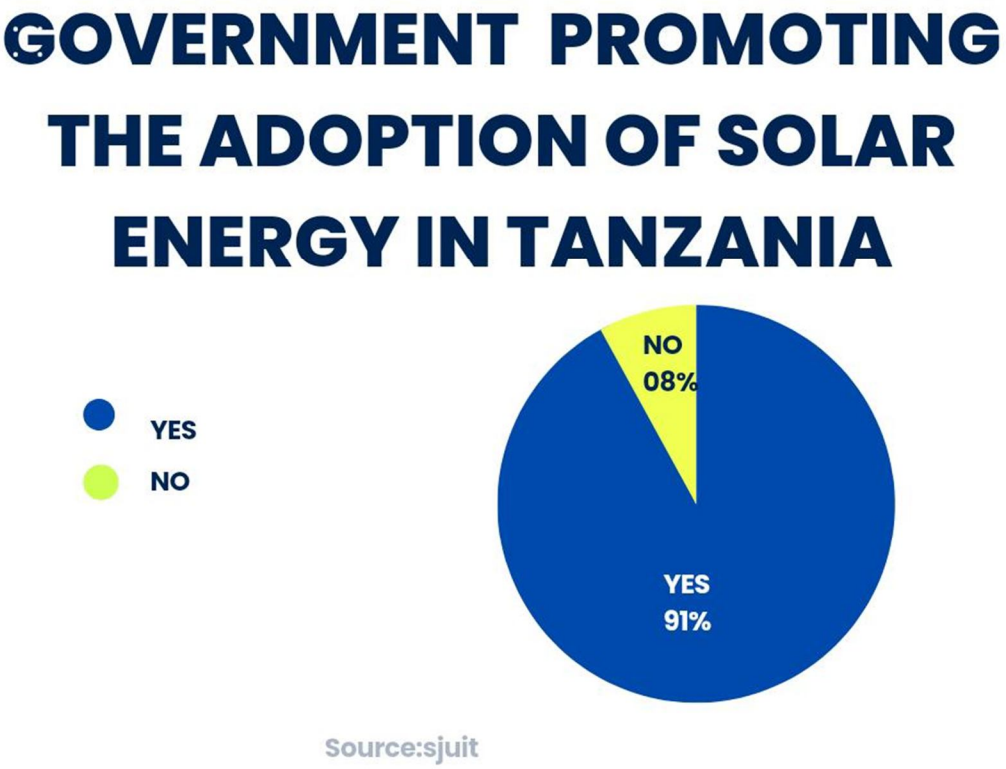

Figure.4.10.Government should play a role in promoting the adoption of solar energy in Tanzania

Analysis: According to our survey 92% of the people thinking Government should play a role in promoting the adoption of solar energy in Tanzania and 8% of the people against this concept.
It shows Table. 4.10 and figure 4.10.

V. RESULTS AND DISCUSSION

The goal of the project was to ascertain how Tanzanian residents in the Kwembe and Mbezi wards perceived using solar energy as an alternative source of energy. The project revealed that there are obstacles and difficulties that citizens in Kwembe wards face when trying to adopt solar energy widely. These obstacles and difficulties include a lack of knowledge and education about solar energy, a lack of financing options for solar energy installations, a lack of readily available high-quality solar products, and a lack of government policies that sufficiently support solar energy. The findings are consistent with the work of Aly et al. (2019), who identified a variety of obstacles, including institutional, financial, and technological barriers.

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The project's findings show that there were negative effects to the adoption of solar energy such as altered daily routines, poor business performance, and decreased productivity. Additionally, the results showed that there may be ways to get around the obstacles that the residents of Kwembe and Mbezi wards face in adopting solar energy. The suggested actions include spreading knowledge about solar energy among the general public and enacting laws to foster its development.

The most convincing advantages of solar energy were revealed by the research, which indicated that using solar energy has a number of advantages, including lower electricity costs and environmental friendliness.

According to a Kaldellis et al. (2012) study, informational messages should be the foundation of promotional campaigns even though general awareness and norms have a positive influence on consumer behavior.

Similar study conducted by Djurisic et al. (2020) showed that consumer perceptions and attitudes toward renewable energy source are more important than consumer awareness of renewable energy source. The statistical significance of the interaction between awareness and perception, which is 7.6%, is also 5%, indicating that our perceptions of renewable energy source may change depending on the awareness itself.

VI. CONCLUSION AND RECOMMENDATIONS OF THE STUDY

A. Conclusion

To address the question, "What are the perceptions to large-scale solar power as an alternative source of energy in Tanzania?" the study adopted a questionnaire-based methodology. The main house-wifes in the Dar es Salaam region were interviewed in questionnaire based interviews as part of a qualitative study. The study went into detail about the perceptions of the repsondents attitude and perceptions to the use of solar power as an alternative source in Tanzania. According to the perception construct, 36.0% of the respondents actually used solar power. The knowledge/awareness construct explains that 70.0% of respondents are aware of the benefits of cost-saving solar energy source. The fact that electricity is insufficient in Kwembe and Mbezi Ward, in addition, supports the conclusions of earlier studies, showing that lack of information and a lack of financing options for solar installations continue to impede the adoption of solar energy. The results show that advertising campaigns are necessary to close the gap, which would eventually lead to a greater willingness on the part of consumers to spend more money on solar energy. And finally, it is suggested that in Dar es Salaam renewable energy source projects are necessary for using solar energy sources that will further advance improvements in the general public's awareness of solar energy.

B. Recommendations

Based on the existing literature and the research findings, recommendations are proposed to overcome the problem of insufficient electricity by addressing the barriers and challenges to widespread adoption of solar energy. The following are the recommendations that were put forward to overcome the challenges:

1) The government should promote public awareness and education about the benefits and potential of solar energy. This can include educational campaigns, workshops, and community outreach programs that focus on solar energy education and its role in promoting sustainability.

2) The government should reinforce and implement policies that support the growth and adoption of solar energy. This can involve providing financial incentives for solar installations and setting renewable energy targets.

3) Support international cooperation: International collaboration among researchers, governments, and organizations can drive progress in solar energy research and accelerate the adoption of solar as a viable alternative source of energy. Collaborative efforts can include sharing best practices, exchanging knowledge, and aligning policies and regulations.

By implementing these recommendations, the potential of solar energy as an alternative source of energy can be maximized, leading to a more sustainable and diversified global energy landscape.

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APPENDICIES

Appendix 1: Questionnaire for students

Instructions

Dear respondents we are students of department of education at St Joseph in Tanzania . Currently we are doing research on the **SURVEY ON ASSESSMENT OF THE PUBLIC'S PECEPTION OF SOLAR ENERGY AS ALTENATIVE ENERGY SOURCE IN DAR ES SALAAM** The purpose of the study is to identify the impact of People's perception on using solar energy as alternative energy source through different factors and aspects . We kindly request to read each question and give your response to the best of your knowledge , do not ask your friend because all your answer will be correct no wrong answers in this questionnaire .Your answers will be completely confidential. Do not write your name in this paper.

Q1.Gender of the Respondents?

a. Male
b. Female

Q2.Age of the Respondents?

a. Above 18
b. Below 18

Q3.Occupation of the Respondents----------?

Q4. Family income of Respondents?

a. Above 1M
b. Below 1 M

Q5.Are you Currently using solar energy?

a. Yes
b. No

Q6. If you answered "Yes" to question 5, what is the primary reason for using solar energy?

a. Cost savings
b. Environmental sustainability
c. Lack of access to the grid
d. Reliability of solar power
e. Other (please specify)

Q7.If you answered "No" to question 5, what are the main reasons for not using solar energy? (Choose all that apply)

a. Lack of awareness about solar energy benefits
b. High upfront costs
c. Limited availability of solar products or services
d. Concerns about the reliability of solar power
e. Other (please specify)

Q8. Are you familiar with the potential benefits of solar energy in Tanzania?

a. Yes
b. No

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Q9.Which of the following benefits of solar energy do you find most compelling? (Choose all that apply)

a. Reduced electricity costs
b. Environmental friendliness
c. Energy independence
d. Reduced reliance on fossil fuels
e. Increased energy access in remote area
f. Other (please specify)

Q10.What are the major barriers or challenges to widespread adoption of solar energy in Tanzania? (Choose all that apply)

a. Lack of financing options for solar installations
b. Limited technical expertise for installation and maintenance
c. Insufficient government policies or regulations supporting solar energy
d. Limited availability of quality solar products
e. Lack of public awareness and education about solar energy
f. Other (please specify)

Q11.Have you considered installing solar panels or using solar power in the future?

a. Yes
b. No

Q12. Do you believe the government should play a role in promoting the adoption of solar energy in Tanzania?

a.Yes
b.No

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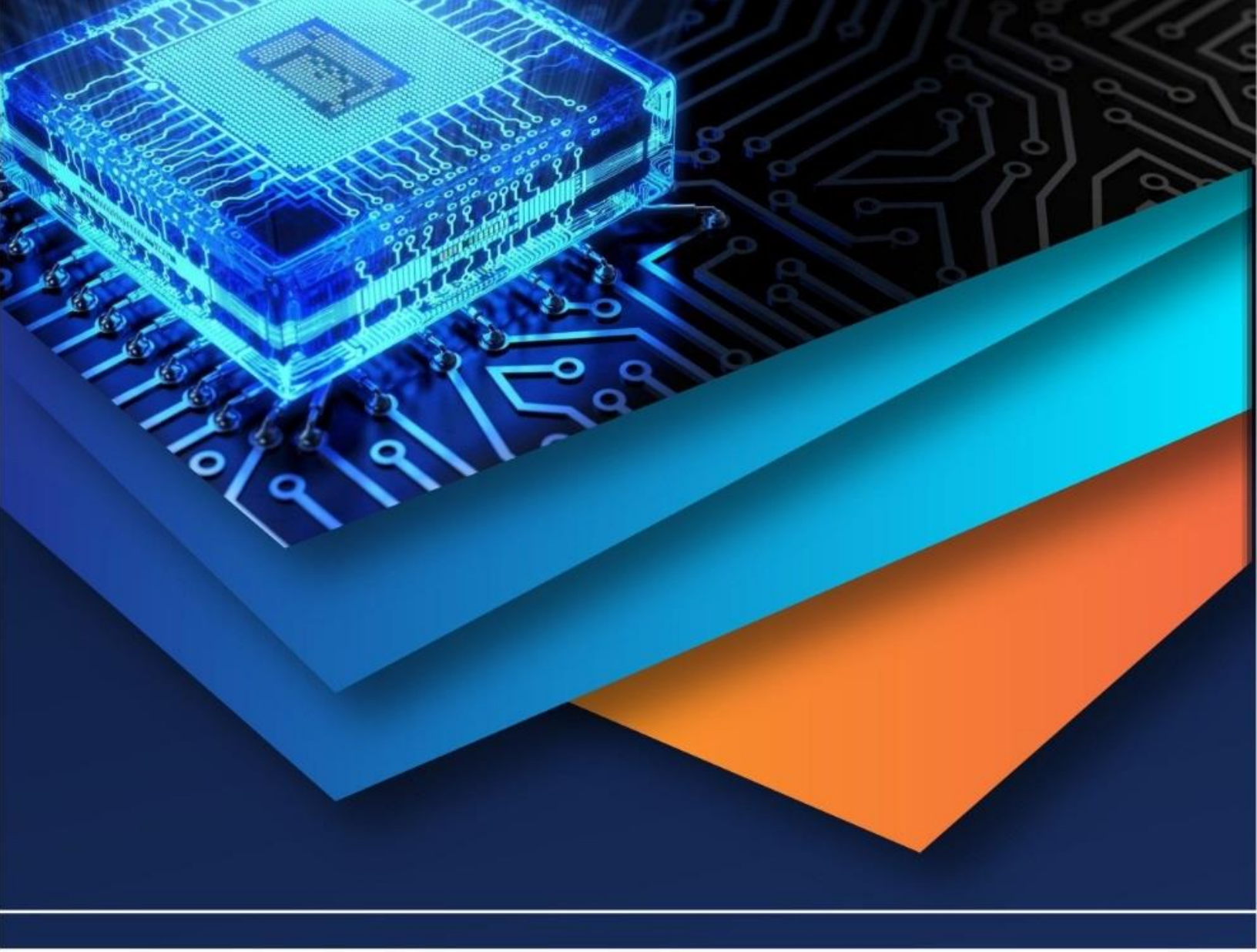

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