

Influencing Factors On the Effect of Consumers' Intention to Willingness to Pay for Solar Photovoltaic Energy as Alternative Source of Energy in The Selected Municipalities and Cities of Batangas Province: A Test of Moderation

Rodel A. Jandusay^a

jandusay1808@gmail.com

College of Business Economics Accountancy and Management, De La Salle Lipa

Lipa City, Batangas, Philippines

Abstract

As the choice for solar energy may well be a complex and multidimensional task influenced by a combination of factors, it requires careful balance for decision-makers to recognize these factors. The focal point of a well-thought-out decision is the impact of the consumers' consideration of factors affecting their willingness to pay (WTP) for solar photovoltaic in Batangas Province. This paper used a framework that presents a construct on organized behavior with regard to convictions about solar photovoltaic establishments to get consumers' energy from solar energy. Results are based on gathered data from 182 tenants in municipalities and in cities of Batangas which includes Padre Garcia, Bauan, Lipa, Rosario, and Tanauan. The research results illustrate how influencing factors such as attitude, subjective norm, and perceived behavioral control affects the relationship between consumers' intention and willingness to pay for solar photovoltaic and their conviction around solar photovoltaic. The objective is to identify key influencing factors on the effect of consumers' intention to willingness to pay for solar photovoltaic energy as an alternative source of energy in the selected municipalities and cities of Batangas Province. Research results indicate that the relationship between consumer intention and willingness to pay is not moderated by attitude, while subjective norms, perceived behavioral control, belief, and environmental concern moderate the relationship between the two.

Keywords: *Solar Energy. Solar Photovoltaic Energy. Consumers' intention. Willingness to pay. Structural equation modeling. Batangas Province.*

I. INTRODUCTION

A. Background of the Study

The primary origin of solar energy is the sun, which refers to the conversion of sunlight into thermal or electrical energy. Solar energy is considered the most abundant and environmentally friendly form of renewable energy. Through solar technology, this energy can be harnessed for various applications, including generating electricity, illuminating interiors, and heating water for residential, commercial, and industrial purposes.

As mentioned by Jaxa-Rozen and Trutnevite (2021), over the last decade, the implementation of solar photovoltaic (PV) technology has regularly surpassed predictions. Long-term PV prospects, however, remain highly unpredictable, with recent global projections ranging by two orders of magnitude in installed PV capacity by 2050. The use of solar energy can lessen the effects of

climate change, which is one of the top environmental issues that the world is dealing with. Current warming has resolutely postured exceptionally surprising challenges to man and the environment and will continue to do so in the long term. Directly, a few independent adjustments are taking place, but a more proactive adjustment arrangement is considered to guarantee feasible improvement.

Similarly, according to Alimi et al. (2022), solar and wind technologies are anticipated to become the dominant energy sources by 2025, with solar energy generation accounting for 60% of new capacity installations. This projection appears highly plausible as long as concerns regarding reliability, accessibility, and performance are consistently monitored and addressed. The installation of solar photovoltaic (PV) modules, both in large-scale utility systems and residential rooftop systems, has experienced significant exponential growth in recent years. This growth can be attributed to various factors, including the well-established affordability, scalability, and long-term warranties associated with solar PVs, as well as the continual decline in the leveled cost of electricity (LCOE) for solar PV systems worldwide.

The benefits of solar energy are immeasurable, with numerous advantages that continue to attract an increasing number of homeowners who choose to illuminate their homes using solar power. One notable advantage of solar energy over fossil fuels is its lower environmental impact. Unlike fossil fuels, which produce greenhouse gases that pollute the air and water, solar energy stands in stark contrast. Additionally, solar energy is not only beneficial for larger-scale applications but also for residential purposes. The presence of multiple solar panels in residential areas further contributes to the advantages of solar energy in those regions. Moreover, utilizing solar energy also helps conserve water resources. As part of the growing organization of the Institute of Integrated Electrical Engineers of the Philippines, Inc., chapters like those in Southern Luzon are having a "Bigay Liwanag" project. Laguna, Cavite, and Batangas Chapters choose a needed community to grant solar lighting panels like streetlights and indoor lighting. The aforementioned community is located in mountainous areas or on islands that are completely inaccessible to utility companies for power supply.

Governments ought to lend their support to renewable energy initiatives in rural areas by implementing suitable policies, allocating ample financial resources, and offering low-interest loans (Shahsavari and Akbari, 2018; Eidi et al., 2021). In a study conducted by Fatima et al. (2021), several key factors influencing the generation of renewable energy were identified. The lack of effective governance, challenges in adapting to renewable energy sources, and governmental energy policies emerged as significant barriers to the development of renewable energy generation. Conversely, factors such as available resources, approaches to power production, demand for renewable energy, the investment environment for renewable energy projects, economic returns associated with renewable energy initiatives, environmental impacts, and public acceptance were identified as crucial drivers in facilitating the growth of renewable energy generation.

The cost is, for the most part, determined by the type of house, roof, and size of the solar system. The cost of solar panels in the Philippines can run from as low as 150,000 to more than 1,000,000. This price range is valid for different regions in the Philippines, including Cebu and Metro Manila. Small Affordable Houses (400,000): Most commonly, a solar-powered PV system for reasonable houses incorporates 5 solar panels compared to a 2kW framework. The establishment zone would be around 12 m². The estimated toll of the solar panel system would expand from 150,000 to 210,000, which is adequate for a little dome that expands 224 kWh of power per month. Medium-cost Houses: For medium-cost houses, regularly introduce around 10 solar panels in a 4 kW system that will be sufficient to cover a normal month-to-month energy utilization of 448 kWh. The framework, with an establishment zone of 17 m², takes a toll of around 300,000–420,000. Expansive high-cost houses: housetop solar systems for high-cost houses shift broadly. A normal framework would incorporate around 38 solar panels (15 kW) with an established area of 86 m². This fetches anywhere from 900,000

to 1,260,000 because of the higher number of boards and bigger establishment zone. For extremely large houses, an installation can go up to 75 solar panels (30 kW) and cost as much as 1,800,000 (Solar AI Technologies, 2022).

In 2018, the average price range for solar panels in the Philippines, including installation, ranged from Php 70/watt to Php 100/watt. There has been a significant surge of interest and excitement surrounding solar energy. As of April 2018, according to the Department of Energy in the Philippines, the total installed solar capacity in the country reached 20,515 megawatts, which is typically sufficient to provide electricity to millions of households (Solaric, 2018).

According to Irfan et al. (2020), several factors influence the willingness to pay, including the type of renewable energy, the socio-economic profile of consumers, and their energy consumption patterns. While there is relatively less variability in willingness to pay estimates compared to the characteristics of the study design, caution is advised when interpreting and applying willingness to pay findings in policy-making, as these factors can have a significant impact on the results.

The readiness to pay more for green power within the UK may be clarified by people's manners. Including attitudinal mechanisms essentially moved forward the exactness of anticipating U.S. households' readiness to pay for green energy. Circumstances had a significant impact on households' intentions to hold renewable power. In a study of Swedish families, positive manners were the most predictive of purchasing solar panels. Circumstances toward sun-powered PV energy are generally favorable, which contributes to the development of housetop PV establishments (Sun et al., 2020).

Reflecting on the prevailing energy situation both nationally and globally, which has been influenced by the crisis in Ukraine, there is now a renewed emphasis on promoting products that rely on renewable energy sources. By doing so, the government can achieve a reduction in energy consumption from traditional fossil fuel sources while increasing the utilization of renewable energy sources. This shift not only allows citizens to lower their energy bills but also contributes to overall economic development (Nikoli-Risti et al., 2021).

Perceived behavioral control (PBC) refers to individuals' confidence in their ability to carry out a specific behavior. It directly influences their intentions and indirectly affects their behavior. When it comes to willingness to pay (WTP) for renewable energy (RE), PBC is linked to consumers' beliefs about the ease or difficulty of paying for RE. To engage in buying, installing, and utilizing renewable energy technology, consumers need access to the necessary resources (Irfan et al., 2020).

Research findings offer compelling evidence that second-order normative beliefs have a significant impact on energy conservation, surpassing the influence of first-order personal beliefs. The results indicate that these second-order normative beliefs play a vital role in fostering energy conservation efforts, which holds great significance for policymakers aiming to mitigate the adverse effects of climate change (Jachimowicz et al., 2018).

It was observed that consumers' attitudes positively moderate the relationship between their interest and willingness to pay (WTP) for renewable energy (RE). The significant factors driving this positive relationship are the long-lasting social and financial benefits offered by renewable power technologies (RPTs). This can be attributed to the limited efforts made by the government to raise awareness about environmental concerns, individual responsibilities, and the crucial role individuals can play in environmental improvement (Irfan et al., 2020).

In 2008, the Philippine government enacted renewable energy legislation aiming to achieve multiple goals by 2030. These objectives included increasing the capacity of renewable energy sources, reducing the country's dependence on coal-fired power generation, achieving energy self-sufficiency, enhancing energy accessibility, reliability, and flexibility, lowering energy costs, boosting

the economies of all islands, and promoting overall improvements in people's lives, employment opportunities, and the environment. (Solar Magazine, 2022).

Photovoltaic (PV) is a progressively important energy innovation. Choosing energy from the sun offers many common benefits. It can be an unimaginably clean energy source, and few other power-generating technologies have as little of a characteristic impact as photovoltaics. Since it subtly produces control from light, photovoltaics produces no examined defilement or unsafe misuse. Moreover, it does not require fluid or vaporous powers to be transported or combusted. In expansion, since its energy source, sunshine is free and bountiful, PV systems can offer, for all intents and purposes, urge-to-urge electric power.

Solar energy in the Philippines makes sense. A dependency on fossil fuels in countries rich in renewable energy sources is not the result of a single cause. However, it can be the cause of a continued decline in people's quality of life. As each of the islands modernizes and urbanizes, not incorporating renewable energy systems into city and suburban plans simply means contributing to the pollution problem the country already battles, promoting respiratory problems in citizens, and crippling the economy due to a higher cost of living. Once installed, solar energy systems save money, lower pollution, and pay for themselves in the end with free energy (Buskowitz Energy, 2018).

Filipinos endure customary blackouts, indeed, without the event of tropical storms and other extraordinary climate occasions. Our nation is additionally known to have the highest power costs among Southeast Asian countries. The power within the Philippines is costly and untrustworthy. One reason is the control system's dependence on imported coal and diesel. In 2020, coal accounted for 57% of the increase in the control era within the nation, with coal overwhelming oil as the greatest energy source. With the Philippines depending on imported coal and diesel to control up to half of the nation, control rates are made helpless by importation costs and rising world advertising costs. Coal plants have not even met the newly-mandated allowable outages set by the Energy Regulatory Commission (ABS-CBN News, 2021). For the research gap of the study, in Batangas province, consumers are experiencing high prices in their monthly electricity bills from utility companies like BATELEC I, BATELEC II, MERALCO, FIRST BAY, and IBAAN ELECTRIC CORPORATION.

According to Kargar Dehbidi et al. (2020), ensuring the provision of clean, reliable, affordable energy services while also prioritizing security and environmental preservation are crucial aspects of sustainable development. Oates (2019) highlighted the significance of innovative solar projects that cater to low to moderate-income families, offering them access to affordable, clean, and resilient energy solutions.

B. Research Frameworks

Conceptual Framework

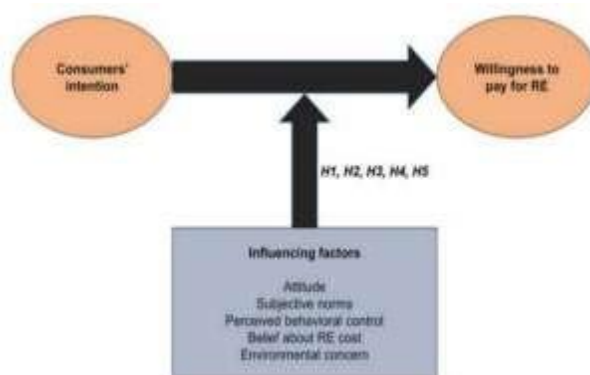


Figure 1. Conceptual Framework

Source: "The influence of consumers' intention factors on willingness to pay for renewable energy: a structural equation modeling approach" (Irfan, Rheman, & Li, 2020).

This study adopted the framework of Irfan, Rheman, and Li (2020) in their study entitled "The Influence of Consumers' Intention Factors on Willingness to Pay for renewable energy: a structural equation modeling approach," as illustrated in Figure 1.

Attitude (ATD) plays a crucial role in the Theory of Planned Behavior (TPB), representing an individual's assessment of a particular behavior as positive or negative. In this study, attitude specifically pertains to consumers' favorable or unfavorable views on the use of solar energy. The results of this research indicate a significant association between consumers' attitudes, their intentions, and their willingness to pay (WTP) for solar photovoltaic energy. Moreover, attitude emerges as a powerful predictor of consumers' intentions to adopt solar energy and exerts a positive impact on their willingness to purchase environmentally friendly vehicles.

Operational Framework

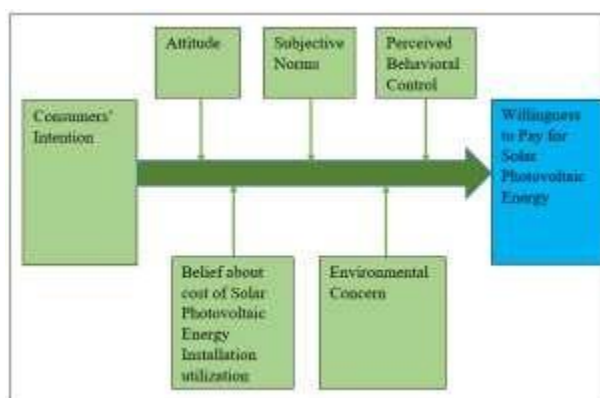


Figure 2. Operational Framework

The researcher developed the operational framework for this study, building upon the framework established by Irfan, Rheman, and Li (2020). The main objective was to assess consumers' willingness to pay for solar photovoltaic energy (SPE) by considering factors such as attitude, subjective norms, perceived behavioral control, beliefs about the cost of SPE installation and utilization, and environmental concerns. The researcher believes that these factors collectively influence consumers' intention to pay for SPE.

Sun and Wang (2019) proposed a set of four items that can be used to assess consumers' intentions. These items include willingness to pay more for solar PV technology, willingness to switch to a green version of a product, willingness to switch to solar PV technology for ecological reasons, and consideration of buying solar PV products. Attitudes toward solar PV energy are generally positive on a global scale, which contributes to the increasing adoption of rooftop PV installations (Sun, Wang, Huang, & Ho, 2020). Additionally, Lopes et al. (2019) discovered a positive relationship between subjective norm beliefs and households' attitudes toward energy conservation. The concept of perceived behavioral control plays a specific role in shaping individuals' intentions and indirectly influencing their behaviors. Compliant intentions will not happen in case an individual does not have the capability to perform a behavior. Peoples believe that solar panel installation cost is expensive. This is due to a lack of information particularly about the benefits. The use of solar power rather than fossil power to produce power significantly decreases the impact greenhouse gases have on the environment. In any case, while solar vitality has proven to have a positive effect on the environment; there has been much talk about the "greenness" of solar panels.

C. Objectives of the Study

Based on the available information, the goal is to identify key influencing factors on the effect of consumers' intention to willingness to pay for solar photovoltaic energy as an alternative source of energy in the selected municipalities and cities of Batangas Province. It also outlined a proposed conceptual model centered on the insights obtained from the review of the literature. Consumers' willingness to pay for solar photovoltaic panel installation is influenced by factors such as attitude, subjective norms, perceived behavioral control, belief about cost, and environmental concern.

D. Hypotheses

To address the objectives of the study, the following null hypotheses were tested:

Ho1: Consumers' intention does not significantly affect with a willingness to pay

Ho2: Attitude does not significantly moderate the relationship between the consumer's intention and willingness to pay

Ho3: Subjective norms do not significantly moderate the relationship between consumer's intention and willingness to pay

Ho4: Perceived behavioral control does not significantly moderate the relationship between the consumer's intention and willingness to pay

Ho5: Belief about Solar Photovoltaic Energy does not significantly moderate the relationship between consumer's intention and willingness to pay

Ho6: Environmental concern does not significantly moderate the relationship between the consumer's intention and willingness to pay

II. MATERIALS AND METHODS

A. Research Design

This research employed the descriptive research design. It describes consumers' intention, and willingness to pay, followed by moderating factors including attitude, subjective norms, perceived behavioral control, belief about solar photovoltaic Energy and environmental concern. The problem addressed in this study was the lack of a comprehensive understanding of consumers' intentions and willingness to pay for solar photovoltaic (PV) energy as an alternative source of energy in the selected municipalities and cities of Batangas Province. The study aimed to investigate the factors influencing consumers' intention to adopt solar PV energy, their perceived benefits and barriers, and their willingness to pay for the installation and maintenance of solar PV systems. By examining these factors, the study sought to provide insights that can inform the development of strategies to promote consumer acceptance and uptake of solar PV energy, contributing to the transition to cleaner and more sustainable energy sources in Batangas Province.

B. Locale of the Study

The survey was conducted in five municipalities or cities of Batangas Province including Padre Garcia, Bauan, Lipa, Rosario and Tanauan. Estimations were based on essential information from 182 tenants and respondents in the five aforementioned municipalities and cities by employing a purposive sampling procedure.

C. Respondents of the Study

Using Power Analysis, respondents are equal to 182, that follows 0.15 effect size, 0.05 alpha error, at 0.953 power at 11 predictors. The questionnaire was distributed online to a reasonable number of participants from two (2) cities and three (3) municipalities of Batangas. Respondents are male and female whole age category are 18-25, 26-35, 36-45, 46-60 and above 60.

D. Sampling Design

The researcher used purposive sampling to collect data for the study as it is challenging to locate primary data sources that meet the researcher's requirements due to pandemic restrictions and target location. To gather the data, the researcher conducted an online survey. Prior to this the researcher referred to the Office of Research and Publication's Ethical Guidelines for Online Survey Design. Data collection was administered from March to April 2023.

E. Research Tools and Instruments

The study used both primary and secondary data, where primary data were collected from respondents by using a well-structured questionnaire. The researcher used a modified standardized instrument. The questionnaire contains a total of 39 items and is divided into seven sections; the demographic information section which includes, cities/municipalities, age, gender, income, educational level, and occupation, seven (7) questionnaires each for Consumer Intention, Attitude and Subjective Norms, five (5) questionnaires each for both perceived behavioral control and beliefs and lastly, four (4) questionnaires for both behavioral control and willingness to pay. The survey questionnaire used a five-point Likert scale with equivalents: 1- Strongly Disagree, 2- Disagree, 3- Neither Disagree nor Agree, 4 – Agree and 5 – Highly Agree.

F. Data Analysis and Interpretation

Hierarchical modeling was used in the study. Think of the lowest-level units—the smallest and most numerous—as structured into a hierarchy of gradually higher-level units. This is the fundamental concept behind hierarchical modeling, often referred to as multilevel modeling, empirical Bayes, random coefficient modeling, or growth curve modeling. Because complicated survey data are typically modeled using clustered or multistage sample designs when the population has a hierarchical structure, hierarchical models are frequently relevant. The population's hierarchical structure is taken into account because it has an impact on the sample design and, consequently, the characteristics of the employed estimator. The questionnaire is adopted from the study of Irfan, Rheman, and Li (2020), entitled "The Influence of Consumers' Intention Factors on Willingness to Pay for renewable energy: a structural equation modeling approach". The variable is consumers' intention, and moderating factors are attitude, subjective norms, perceived behavioral control, belief about solar photovoltaic installation, and environmental concern. There are five (5) response categories: strongly disagree, disagree, neither disagree nor agree, agree, and highly agree. The collection of data was administered from the first to the third week of March 2023. Survey questionnaires were distributed randomly in the above-mentioned municipalities and cities. Aside from online surveys, pen and paper surveys were also utilized. In the online survey, pre-qualifying respondents was done to ensure that the participants came from the specified locale of the study.

G. Ethical Considerations

The study also made sure that respondents knew their rights and that answering the survey was voluntary. No personal benefits were guaranteed for the respondents. However, benefits accrue to those who find the research valuable for their organizations. The study also had in place ways to treat the responses with the utmost confidentiality, and the results would only be utilized for the stated purposes. The researcher believed that participation poses no anticipated risk, harm, discomfort, or inconvenience whatsoever.

III. RESULTS and DISCUSSION

A. Demographic Profiles of Respondents

In terms of age, gender, income, education, and occupation, as well as the city or municipality where they resided, the respondents' demographic profiles were assessed.

Table 1. Demographic features of the respondents with a percentage

Demographic Features	Possible Options	Responses	Percentage (%)
City/Municipality	Lipa City	30	16.5
	Municipality of Bauan	41	22.5
	Municipality of Padre Garcia	66	36.3
	Municipality of Rosario	23	12.6
	Tanauan City	22	12.1
Age	18-25	4	2.2
	26-35	40	22
	36-45	104	57.1
	46-60	33	18.1
	Above 60	1	0.5
Gender	Male	134	73.6
	Female	48	26.4
Income	Less than Php 10,000	0	0
	Php10,000 – Php 20,000	1	0.5
	Php 20,001 – Php 30,000	8	4.4
	Php 30,001 – Php 40,000	10	5.5
	Above Php 40,000	163	89.6
Education	Primary	0	0
	High School	3	1.6
	College Degree	158	86.8
	Graduate Program	21	11.5
Occupation	Government Jobs	9	4.9
	Own Business	27	14.8
	Jobs in Corporate or Private Companies	139	76.4
	Others	7	3.8

Table 1 shows the demographic profile of the respondents in terms of their city and municipality is presented in the table above. 36.3% of respondents reside in the municipality of Padre Garcia, while 22.5% reside in the municipality of Bauan, according to the findings. Presently, 16.5% of respondents reside in Lipa City, 12.6% in the Municipality of Rosario, and 12.1% in the City of Tanauan.

This shows more consumers in Padre Garcia are available and interested in solar photovoltaic panel installation at the time of the survey or data gathering. The age distribution of respondents is depicted in the table presented above. 57.1 percent of the total samples fall between the ages of 36 and 45, while 22 percent fall between the ages of 26 and 35. Additionally, 18.1% of respondents are between the ages of 46 and 60, 2.2% are between the ages of 18 and 25, and 0.5% are over the age of 60. Ages 36–45 are millennials and so-called Gen X, who do have their own businesses and jobs in corporate or private companies with a salary above PHP 40,000. The above table depicts the gender-based demographic profile of the respondents. As opposed to this, 73.6% of the total respondents are male and 26.4% are female. The income distribution of the respondents is presented in the table provided. The majority of respondents (89.6%) have an income exceeding Php 40,000, while 5.5% have incomes ranging from Php 30,001 to Php 40,000. These figures indicate that a significant proportion of the respondents have a salary above Php 40,000, which suggests that they have the financial capacity to consider installing solar photovoltaic panels. The educational backgrounds of the respondents are depicted in the table that is located above. In this survey, 86.8% of respondents have at least a bachelor's degree; 11.5% are currently enrolled in graduate school (either a master's or a doctoral); and the remaining 1.6% have only completed high school. It shows that interested respondents are graduates with bachelor's degrees with the capability to purchase solar panel photovoltaic panel installation. The demographic profile of the respondents in terms of occupation is given in the table above. Specifically, 76.4% are employed by corporations or private companies; 14.8% are self-employed or work for themselves as entrepreneurs; 4.9% are employed by the government; and the other 3.8% are classified as other occupations. This shows more interest in individuals who are employed by corporations or private companies.

B. Descriptive Statistics

Consumer Intention

In the table below, the consumer intention to pay for solar photovoltaic energy as an alternative source of energy in the selected municipalities and cities of Batangas Province is depicted with a mean of 4.88 and a standard deviation of 0.34. The average score was 4.88, and the standard deviation was 0.34. The statement that responded, "I have a positive intention that solar energy has several advantages over traditional electricity," was found to have the highest levels of support, with a mean score of 4.89 and a standard deviation of 0.33. These findings have been emphasized as the most prominent. In a similar vein, the statement that respondents "intend to use solar energy if the government provides subsidies" reflects the same highest mean of 4.89 as previously.

Table 2. Consumer Intention

Indicator	Mean	Standard Deviation
I have a positive intention that Solar Energy have several advantages over traditional electricity	4.89	0.3308
I have a positive intention to use Solar Energy in the future	4.88	0.3372
I intend to use Solar Energy if government provide subsidy	4.89	0.3066
I intend to use Solar Energy if banks provide loan and financial assistance	4.87	0.3887
I am planning to spend more money on Solar Energy than traditional electricity	4.86	0.3902
I have a positive intention that other people should utilize Solar Energy at their homes	4.88	0.3512
I have a positive intention that my act of using Solar Energy will be appreciated by the community	4.86	0.3851
Average	4.88	0.3379

With a mean of 4.89, the majority of respondents or participants support the idea of transitioning to solar energy and believe it can provide solutions to various energy-related challenges. It also indicates a potential positive reception for policies, initiatives, and investments aimed at promoting and expanding the use of solar energy.

According to the findings presented above, the vast majority of respondents certainly plan on working with solar energy in the near future, provided that the government continues to subsidize such endeavors. This demonstrates that Solaric (2018) is absolutely

correct when they say that the benefits of solar energy are innumerable and that because it has so many positive effects on the environment and the community surrounding it, the number of customers who are switching to using solar energy to light up their homes is growing each and every day.

Attitude

According to the findings presented below, the customers' attitude toward paying for solar photovoltaic energy as an alternative source of energy in the selected municipalities and cities of Batangas Province has a mean of 4.88 and a standard deviation of 0.34. This is based on the average of both scores. The highest findings have remarked that "I have a positive attitude that solar photovoltaic energy is a clean source of energy" and "I have a positive attitude that solar photovoltaic energy has pleasant effects on society," with both a weighted mean of 4.89 and a standard deviation of 0.33-0.34, respectively. This indicates that respondents have a favorable perception of these two aspects of solar photovoltaic energy.

Table 3. Attitude

Indicator	Mean	Standard Deviation
I have favorable attitude towards Solar Photovoltaic Energy installation	4.87	0.3742
I have a favorable attitude that utilizing Solar Photovoltaic Energy installation is beneficial	4.87	0.3742
It is wise to utilize Solar Photovoltaic Energy at my home	4.87	0.3742
It would be pleasant to utilize Solar Photovoltaic Energy at my home	4.87	0.3649
I believe that green electricity is safe than traditional electricity	4.87	0.3591
I have a positive attitude that Solar Photovoltaic Energy is a clean source of energy	4.89	0.3408
I have a positive attitude that Solar Photovoltaic Energy has pleasant effects on society	4.89	0.3308
Average	4.88	0.3464

With a mean of 4.89, it suggests that the respondents or participants have a positive perception of solar PV energy's ability to contribute to a more sustainable and environmentally friendly energy system. They may view it as an important solution to mitigate climate change, improve air quality, and reduce reliance on non-renewable energy sources.

It is pertinent to note that respondents have a favorable attitude toward the utilization of solar energy because it is a source of energy that does not pollute the environment and has a significant impact on society. This is consistent with what Mendez (2021) asserts, which states that one of the outstanding advantages of solar energy over fossil fuels is that, in comparison to fossil fuels, it has a less detrimental influence on the environment. As a result, respondents have a more positive attitude toward solar energy due to its lower costs, guaranteed power supply, clean and responsible electricity, promotion of development, and promotion of mental and physical relaxation.

Subjective Norms

In the selected municipalities and cities of Batangas Province, consumers' perception on subjective norms have a mean of 4.85 and a standard deviation of 0.50, based on subjective norms. With a mean score of 4.87 and a standard deviation of 0.25, the highest findings indicate that "people who are important to me believe I should use solar energy in my home." It is followed by statements that emphasize, "I will use solar energy if my family members advise me," "I will use solar energy if my coworkers advise me to use," and "neighbors' participation in using green energy motivates me to use solar energy," with both statements receiving the same mean score of 4.85.

Table 4. Subjective Norms

Indicator	Mean	Standard Deviation
People who are valuable for me have the opinion that I should use Solar Energy at my home	4.87	0.3887
I will use Solar Energy if my family members advise me	4.85	0.4874

I will use Solar Energy if my colleagues advise me to use	4.85	0.4759
I will use Solar Energy if my friends also use it	4.84	0.5024
I will use Solar Energy if my relatives advise me to use	4.84	0.5024
I will use Solar Energy if I see peers are also using	4.84	0.5062
Neighbors' participation in using green energy motivates me to use Solar Energy	4.85	0.4642
Average	4.85	0.4653

With a mean of 4.87, this suggests that the collective sentiment of these individuals is encouraging you to consider the adoption of solar energy. Their opinion may be influenced by factors such as their awareness of the environmental impact of conventional energy sources, the potential economic benefits of solar energy, or their personal commitment to renewable energy.

According to the preceding findings, subjective norms are crucial in determining consumers' propensity to pay for solar energy. As hypothesized, respondents are willing to recommend the use of solar energy to their relatives and coworkers. Whereas, according to Solar Magazine (2022), selecting solar energy offers a variety of advantages. Photovoltaics can be an unimaginably pure energy source, and few other power-generating innovations have such a small impact on the environment. Due to the fact that it generates control discreetly from light, photovoltaics produces neither analyzed contamination nor unsafe misuse. In addition, it does not need fluid or vaporous properties to be transported or burned. In addition, because their energy supply, sunlight, is free and abundant, PV systems can provide essentially unlimited electricity. This explains why the majority of respondents are eager to use and recommend the use of solar energy because of the neighborhood's tremendous benefits.

Perceived Behavioral Control

The respondents' perceived behavioral control had a mean of 4.85 and a standard deviation of 0.25, as shown in the table above. With a mean of 4.87 and a standard deviation of 0.25, highest results indicated that "I am fairly certain that I will utilize solar energy in the future." It is followed by the statement "I have the ability to utilize solar energy" with a mean of 4.86 and a standard deviation of 0.25.

Table 5. Perceived Behavioral Control

Indicator	Mean	Standard Deviation
I have the ability to utilize Solar Energy	4.86	0.4042
I have the required knowledge to utilize Solar Energy	4.84	0.4315
I have the resources to utilize Solar Energy	4.84	0.4315
I have full control of utilizing Solar Energy	4.84	0.4315
I am pretty sure that I would utilize Solar Energy in the future	4.87	0.3797
Average	4.85	0.4028

With a mean of 4.87, this suggests that the respondents or participants are not only aware of the advantages of solar energy but also believe that it is a feasible and desirable option for their future energy needs. They have a high level of certainty in their intention to adopt solar energy, which may be influenced by their environmental consciousness, economic considerations, or personal commitment to renewable energy.

The level of behavioral control that respondents perceive they have is a crucial factor in determining whether or not they are willing to make use of solar energy.

According to the statistics presented above, the vast majority of respondents are capable of utilizing and making use of solar energy due to the myriad of benefits it provides. According to Solaric (2022), the benefits of solar include cost reductions, guaranteed power supply, clean and responsible power, the promotion of development, and a sense of mental ease. Installing solar panels results in cost reductions. The majority of people who install solar panels on their homes or businesses do so primarily for the economic benefits.

These benefits include the fact that installing solar panels can drastically cut or even eliminate your electric bills, that installing solar panels can help you avoid rising energy costs, that installing solar panels can increase your property value, and that installing solar panels nets you a great return on your investment. Because of this, the customer is given the ability to continue making use of solar energy in addition to conventional electricity.

Belief about cost of Solar Photovoltaic Energy Installation utilization

The below table presents an assumption regarding the belief of the cost of solar photovoltaic energy installation use with a mean of 4.82, an average, and a standard deviation of 0.47. With a mean of 4.85 and a standard deviation of 0.47, the findings that are most significant have commented that "Solar energy consumption produces additional costs." It is then followed by the statement that "The utilization of solar energy requires high installation costs" with a mean of 4.84 and a standard deviation of 0.46.

Table 6. Belief about cost of Solar Photovoltaic Energy Installation utilization

Indicator	Mean	Standard Deviation
Solar energy consumption produces extra costs	4.83	0.4763
Electricity price will be increased, as Solar energy projects require a high initial capital	4.80	0.5799
The utilization of Solar energy experiences high repair and maintenance costs	4.80	0.5674
The utilization of Solar energy requires high installation costs	4.84	0.4605
Battery replacement in case of using solar PV requires additional costs	4.82	0.4685
Average	4.82	0.4739

With a mean of 4.85, this implies that respondents or participants may have concerns about the initial investment required for purchasing and installing solar panels, as well as ongoing maintenance costs, equipment upgrades, or potential repair expenses. They may also consider factors such as system monitoring, battery storage, or grid connection fees as contributing to the overall cost of solar energy consumption.

The above findings have brought to light the beliefs held by respondents about the costs associated with installing solar energy systems. The majority of them concurred with the statement that it is quite pricey due to the numerous additional fees.

However, this contradicts what Muendes (2021) claims about the benefits of solar energy, which are savings on costs, assured sources of electricity, clean and responsible power, the promotion of development, and mental and physical relaxation. The Solaric (2022) report also emphasizes the fact that using solar energy might result in cost reductions.

Environmental Concern

The environmental concerns of the respondents were presented in the table that was situated above, and it had a mean of 4.88 with a standard deviation of 0.35. The findings with the highest scores indicated that "in my opinion, air pollution and shortages of water are the biggest environmental problems," with a mean of 4.90 and a standard deviation of 0.33. The statement that "I am worried about climate change" follows that, which has a mean score of 4.89 and a standard deviation of 0.36.

Table 7. Environmental Concern

Indicator	Mean	Standard Deviation
I am worried about environmental problems	4.88	0.3685
I am worried about climate change	4.89	0.3626
In my opinion, air pollution and shortage of water are the biggest environmental problems	4.90	0.3342
Solar Energy would improve the environment	4.87	0.3939
Average	4.88	0.3502

The vast majority of respondents are concerned about potential environmental issues such as climate change, pollution, and water scarcity that may develop in the future.

On the other hand, the Solaric Study (2022) guarantees that the use of solar energy is beneficial to the surrounding ecosystem. You are able to lessen the impact that you have on the surrounding environment if you switch to solar energy. After introducing a solar panel system on your property, you'll be able to avoid getting carbon-emitting power from the grid and instead draw specifically from your solar panels. This allows you to diminish your general carbon impression. And indeed, when you're not particularly utilizing solar control, you're dodging the requirement for a carbon-emitting plant by sending your solar energy onto the grid. This can be a critical step toward relieving climate change. At the end of the day, an ordinary private solar panel system expels three to four tons of carbon outflows each year, which is proportionate to planting more than 100 trees each year.

Willingness to Pay for Solar Photovoltaic Energy Installation

The below table shows that the willingness to pay for solar photovoltaic energy installation was given a mean of 4.87 on the table that was merely laid out, with a standard deviation of 0.40. The highest findings have elucidated the statements that "energy-saving behavior motivates me to pay for solar energy," "environmental friendliness nature of solar energy motivates me to pay for solar energy," and "reliability of solar energy motivates me to pay for solar energy" with the same mean of 4.87 and a standard deviation of 0.40.

Table 8. Willingness to Pay for Solar Photovoltaic Energy Installation

Indicator	Mean	Standard Deviation
I can afford to pay extra money for Solar Energy	4.86	0.4128
Energy-saving behavior motivate me to pay for Solar Energy	4.87	0.4026
Environmental friendliness nature of Solar Energy motivates me to pay for Solar Energy	4.87	0.4026
Reliability of Solar Energy motivate me to pay for Solar Energy	4.87	0.4078
Average	4.87	0.4001

Because of solar energy's reputation for dependability, energy efficiency, and environmental friendliness, the majority of respondents have indicated that they would be open to using it and paying for it to be installed in their homes. Solar power offers an almost infinite number of benefits. The number of customers who are switching to using solar energy to light up their property is increasing each and every day as a result of the multiple benefits that it provides to the surrounding environment. Solar power, in comparison to fossil fuels, has a significantly smaller adverse effect on the surrounding environment, which is one of the many compelling arguments in favor of this form of energy. Fossil fuels are not environmentally friendly for a number of reasons, one of which is that they release greenhouse gas emissions, which pollute both the air and the water. In this aspect, solar energy is the exact opposite of fossil fuels, which is fantastic news. It stands to reason given that they are also put to use for personal reasons. In addition to this, there are several solar panels available in rural areas, which contributes to the advantages of sun-powered imperativeness in these areas. The use of solar energy can also make a contribution to the reduction of water use (Irfan, 2020).

C. Effect of Consumer Intention and Factors (Moderator Variables) to Willingness to Pay

Table 9 presents the effect of consumer intention on willingness to pay, which addresses Ho1 of the study. Results revealed that the former negatively affects the latter ($\beta = -.220$, $p\text{-value} = .009$). Overall, the result of the regression indicated that consumer intention explained 9.04% of the variance of willingness to pay ($R^2 = .904$, $F = 273.568$, $p\text{-value} > 0.05$).

Table 9. Effect of Consumer Intention and Factors (Moderator variables) to Willingness to Pay

R	R square	Factors	Unstandardized Beta	Std. Error	Standardized Beta	t-value	p-value
---	----------	---------	---------------------	------------	-------------------	---------	---------

.951	.904	Consumer Intention	-.220	.083	-.186	-2.638	.009
		Attitude	.170	.091	.147	1.870	.063
		Subjective Norm	.205	.037	.239	5.515	.000
		Perceived Behavioral Control	.390	.079	.392	4.920	.000
		Beliefs	.058	.034	.069	1.714	.088
		Environmental Concern	.407	.073	.357	5.595	.000

F 273.568; P-value 0.000

This goes to show that though consumer intention is high, it does not mean willingness to pay. It can be inferred that if the consumer has an intention towards a photovoltaic cell, it does not lead to their willingness to pay for it. It is also worth noting that consumers' intentions towards any product are not a precursor to their purchase decision. Any intention or desire towards a product should be backed up by other factors in order for them to finally decide on purchasing it, especially a solar photovoltaic cell.

The findings from Irfan et al.'s (2020) study on the impact of factors influencing consumers' intentions and willingness to pay for renewable energy provide support for this notion. The study employed a structural equation modeling approach and revealed that consumer intention does not exhibit any correlations with willingness to pay.

Also depicted in the above table are the effects of the other factors on the dependent variable. Attitude positively affects willingness to pay; however, the effect is found to be not significant ($\beta = .170$ p-value=.063).

Attitude, which is pleasant to utilize solar photovoltaic energy at home, has no significant effect on willingness to pay, which can be attributed to the fact that consumers' attitudes differ towards their willingness to pay, which can be based upon their mood, purchasing power, etc.

The aforementioned result is contradictory to the Sun, et.al. (2020) which dealt with the study of consumer attitude and purchase intention toward rooftop photovoltaic installation: The roles of personal trait, psychological benefit, and government incentives. According to their study, households' plans to switch to renewable electricity were significantly influenced by attitudes. In a survey of Swedish homes, Hansla, et al. (2018) as cited by Sun, et. al. (2020), similarly discovered that favorable sentiments were the key determinants of purchasing green electricity. Globally, attitudes regarding solar photovoltaic energy are generally positive, which supports the rise in rooftop PV installation. However, Ryan, et. al. (2019) somehow contradicted the idea when he stated that environmental attitudes, for example, influence consumers' willingness to pay for renewable energy technologies. A behavioral experiment utilizing an Amazon Mechanical Turk (MTurk) sample group discovered that customers with high protected values had higher green energy adoption intentions and were more willing to pay a premium.

The second variable, which is the subjective norm, is found to have an effect on the dependent variable. Subjective norms positively affect willingness to pay, and the effect is found to be significant ($\beta=.205$, p-value=.000).

Subjective norms vary depending on the specific research context. It might suggest that individuals' perceptions of social influence play a crucial role in shaping their beliefs and intentions. It could imply that people are likely to conform to social expectations or seek social approval when making decisions related to the behavior being studied. Furthermore, a significant subjective norm finding can have practical implications. For example, in the context of promoting sustainable energy behaviors, such as solar panel adoption, a significant subjective norm suggests that interventions targeting social norms and social influence could be effective in encouraging individuals to engage in the desired behavior. It highlights the importance of social networks, communication, and social support in facilitating behavior change.

Subjective norm is significant that aligns with the idea that using solar panels is socially desirable and supported, they are more likely to be willing to pay for solar panels. Conversely, if they perceive negative social norms or lack of support for solar panel adoption, their willingness to pay may decrease. If an individual perceives that their social circle or society in general values and supports the use of solar energy, they are more likely to feel obligated or motivated to adopt solar panels themselves. For example, people who are valuable for me have the opinion that I should use Solar Energy at my home.

The aforementioned result is supported by the study of Irfan et al. et al. (2020), entitled "The Influence of Consumers' Intention Factors on Willingness to Pay for Renewable Energy: A Structural Equation Modeling Approach." In the study, it was revealed that subjective norms are a significant element determining consumers' intentions about energy and energy conservation. Subjective norms are viewed as the impact of peers, friends, and family members, influencing the willingness to pay for renewable energy. For instance, Lopes et al. (2019) discovered a favorable relationship between subjective norms and households' attitudes toward energy conservation. They also discovered a direct correlation between subjective norms and customer behavior that involves lowering carbon emissions and conserving energy. Hence, Jabeen, et al. (2019) highlighted that the effectiveness of public renewable energy projects is significantly impacted by the creation of new social standards for energy generation.

In a different study titled "The Influence of Subjective Norms on the Use of Heat Pumps in Achieving Sustainable Development," conducted by Ristic (2022), a significant correlation was discovered between subjective norms and consumers' intentions to promote energy conservation and environmental sustainability through the utilization of heat pumps. Similarly, in the research conducted by Alhammami and An (2020), various subjective norms were identified that can impact consumers' willingness to pay (WTP), including the availability of photovoltaic (PV) systems in the local area, additional purchases of lighting protection devices, access to traceable information, and the provision of after-sales service. Bragolusi and D'Alpaos (2021) emphasized the significance of production sites when consumers make product choices, as transportation and installation ease may vary depending on different production locations. Furthermore, Martinez-Cruz and Nunez (2021) highlighted the importance of comprehensive and reliable after-sales support when consumers select household PV equipment.

Next is perceived behavioral control which also significantly affects willingness to pay ($p=.000$). Perceived behavioral control can influence an individual's decision-making process. If they believe that they have the financial means, access to information, and necessary support to purchase and install solar panels, they are more likely to perceive a higher level of control over their behavior. This perception of control can increase their willingness to pay for solar panels. For example, the ability to utilize solar energy and having the resources to do so.

Irfan, et. al. (2020) emphasized that one aspect that may have an impact on consumers' perceived behavioral control is the challenge of using technology. Furthermore, Ghosh and Ghosh (2018) looked at Malaysian customers' intentions with relation to energy-efficient items. According to research data, perceived behavioral control has a favorable impact on consumers' intentions to use these items. In a similar vein, Rehman et al. (2019) investigated customers' intentions for using bioenergy in Pakistan and found that perceived behavioral control is a key factor in consumers' choices.

Belief about cost of Solar photovoltaic energy installation utilization is also a significant predictor of willingness to pay ($p=.088$). Beliefs about the cost of solar PV installation utilization can be shaped by an individual's knowledge and understanding of the technology and market trends. As the solar energy industry continues to grow and technology advances, the cost of solar panels has been

decreasing over time. For example, electricity prices increased as solar energy projects required a high initial capital investment and battery replacement in the case of solar PV required additional costs.

The aforementioned result is supported by the study of Jachimowicz, et. al. (2018) entitled “The Critical Role of Second-Order Normative Beliefs in Predicting Energy Conservation.” It was highly emphasized in the study that the perception of community members that energy conservation benefits the environment influences how much energy is used.

Lastly is the environmental concern was also found to significantly affect willingness to pay ($p=.000$). When individuals have a high level of environmental concern, they are more inclined to take actions that align with their values and contribute to environmental preservation. In the case of solar panels, their willingness to pay may be driven by the desire to support renewable energy and minimize their environmental impact. Environmental concern is a significant predictor of pro-environmental behaviors, including the adoption of renewable energy technologies like solar panels. For example, solar energy would improve the environment, and air pollution and a shortage of water may be the biggest environmental problems.

The study of Kumar and Chopra (2023) also posted issues regarding environmental concerns that are triggered by using photovoltaics. They mentioned in their study that the environmental concerns raised are metal's potential for leaching, exposure to cadmium, and potential for water contamination are among the environmental concerns that have been documented.

Moreover, Kesari et al. (2020) highlighted the importance of government commitment to promoting environmentally friendly products, as it positively influences consumers' likelihood of purchasing solar lighting systems. According to the findings of this study, companies should prioritize addressing environmental concerns in their marketing strategies to attract customers who value suppliers of sustainable renewable energy. By educating consumers about the advantages and stepping up promotional efforts, energy companies can enhance consumer awareness. The significance of environmental issues should be recognized and prioritized to achieve sustainable development and widespread adoption of home solar systems.

Effect of Consumer Intention and Moderating Effects of Factors (Moderator variables) to Willingness to Pay

The table below shows the effect of moderating variables on the relationship between consumers' intention and willingness to pay. Overall, the result of the regression indicated that all moderating variables explained 9.8% of the variance in willingness to pay ($R^2 = .980$, $F=767.664$, $p\text{-value}>0.05$).

Table 10. Effect of Consumer Intention and Moderating Effects of Factors (Moderator variables) to Willingness to Pay

R	R square	Factors	Unstandardized Beta	Std. Error	Standardized Beta	t-value	p-value
.990	.980	Consumer Intention	-.220	.083	-.186	-2.638	.009
		Interaction models					
		Consumer Intention x Attitude	.014	.010	.095	1.332	.185
		Consumer Intention x Subjective Norm	.117	.010	.669	12.303	.000
		Consumer Intention x Perceived Behavioral Control	-.112	.015	-.780	-7.225	.000
		Consumer Intention x Beliefs	-.107	.015	-.582	-7.229	.000
		Consumer Intention x Environmental Concern	.076	.010	.492	7.809	.000
F 767.664; P-value 0.000							

Results revealed that attitude does not significantly moderate the relationship between consumer intention and affect willingness to pay ($\beta = 0.14$, $p\text{-value} = .185$). This implies that the attitude of the consumers with intention to buy photovoltaic cells is not necessary for them to be willing to buy them. Consumers' attitude includes past purchasing experiences which are deemed not necessary when finally deciding to pay for photovoltaic cells. It also suggests that if the consumers have the desire or intention to buy a certain product, it automatically lead them to buy it regardless of his current attitude toward the product or the brand.

Results show that subjective norm has a moderating effect on the relationship between consumer intention and willingness to pay, and the moderating effect is found to be significant ($\text{Beta} = .117$, $p\text{-value} = .000$). The result of the test of moderation of subjective norm tells us that this moderating variable is a determinant of consumers' willingness to pay if they already have intention to buy. The higher the subjective norm that they hold, or if people around them approve of the concept or idea, the more they be more than willing to buy photovoltaic cells. For example, if the family member advises to buy photovoltaic cell, the more the individual willing to buy it.

In terms of customer intention, the unstandardized Beta of -220 with $p\text{-value} .009$ indicates that its relationship between willingness to pay is significant. Results also revealed that perceived behavioral control has a positive moderating effect on the relationship between consumers' intention and willingness to pay ($\text{Beta} = -.112$, $p\text{ value} = .000$). The moderating effect is found to be significant as well. It can be inferred from the result that perceive behavioral control is also a factor when individual decide to pay for the photovoltaic cell if they already have intention to buy it.

Results revealed that belief has a positive moderating effect on the relationship between consumers' intention and willingness to pay ($\text{Beta} = -.107$, $p\text{ value} = .000$). The moderating effect is found to be significant. Results revealed that environmental concern has a positive moderating effect on the relationship between consumers' intention and willingness to pay ($\text{Beta} = .076$, $p\text{ value} = .000$). The moderating effect is found to be significant.

The above findings align with the results of Irfan et al.'s (2020) study, where they discovered that the interaction term, indicating that subjective norms positively moderate the relationship between consumers' intention and willingness to pay for renewable energy, significantly and positively influences willingness to pay for renewable energy, perceived behavioral control acts as a favorable moderator between consumers' intention and willingness to pay for renewable energy. The normalized estimates of the interaction term reveal a negative correlation with willingness to pay for renewable energy. On the other hand, belief about the cost of renewable energy negatively moderates the link between consumers' intention and willingness to pay for renewable energy. However, the standardized estimates of the interaction term Environmental Control and Consumers' Intention did not contribute significantly to the variance of willingness to pay for renewable energy. Therefore, the expected influence of environmental concern as a regulatory factor on the relationship between consumers' intention and willingness to pay for renewable energy was not supported.

IV. CONCLUSION

Overall, results show that homeowners are switching more frequently to solar energy due to its numerous advantages for the economy and environment. Solar energy has a smaller ecological impact than fossil fuels, which makes it desirable in part. Because they release greenhouse gases into the air and water, fossil fuels are not environmentally beneficial. The good news is that solar energy is very different from the negative effects of fossil fuels. Furthermore, consumers' intention, subjective norms, perceived behavioral control, beliefs about solar photovoltaic energy, and environmental concern employ significantly moderate relationships between

consumers' intention and willingness to pay. Thus, the study rejects Ho1, Ho3, Ho4, Ho5, and Ho6. However, it was found out that attitude does not significantly moderate the relationship between the consumer's intention and willingness to pay, which therefore accepts the Ho2 of the study. If the government continues to support solar energy efforts, the vast majority of respondents are determined to use solar energy in the near future. In a similar vein, they claim that using solar energy is one of their top objectives since they think it has many benefits that regular electricity does not, including considerable cost savings. Because solar energy is a clean, efficient way to reduce pollution and power homes and businesses, it is vital to note that respondents had a positive attitude toward the technology. The majority of respondents said they would feel comfortable utilizing it and paying for its installation in their homes due to the good connotations connected with solar energy's dependability, energy efficiency, and environmental friendliness. The results also imply that respondents' desire to save money is the main driver for using solar energy.

V. RECOMMENDATION

The study was also found to be helpful for manufacturers of photovoltaic cells. They may use the study as a guide to improve their marketing strategy by addressing the gaps stated in the research. They may also consider exploring other variables such as financial considerations, technical knowledge and skills, access to information and resources, government policies and incentives, and social influence. Future researchers may examine differences in beliefs, motivations, and barriers to gain insights into the impact of solar panel ownership on individuals' belief systems. They may also explore dimensions such as attitudes towards renewable energy, climate change beliefs, willingness to engage in pro-environmental behaviors, and the perceived environmental impact of different energy sources to broaden the scope of the research in terms of data collection. Based on the findings that attitude does not significantly moderate the relationship between consumer intention and affect willingness to pay, it is recommended to explore alternative moderating factors, such as subjective norms or individual characteristics, that may influence this relationship. Additionally, considering other consumer behavior dimensions beyond willingness to pay, such as purchase intention or customer satisfaction, could provide further insights. Investigating contextual factors and conducting replication studies to validate the findings are essential to enhance the understanding of this relationship. These recommendations will contribute to a more comprehensive understanding of the complex dynamics between consumer intention, attitude, and affect willingness to pay.

A. Limitations

Future researchers are suggested to conduct a study on another locale to cover a larger sample and additional areas in expansion to the possibility that each locale might have its own unique culture and point of view. Analyzing respondents from other regions can encourage offer assistance companies to get consumers within the Philippines.

B. CAPSTONE

For the capstone it comes up with the proposal to Province of Batangas and Electric Companies which is Community Solar Programs. The objective is to raise awareness through organizing workshops and training through partnerships with the Institute of Integrated Electrical Engineers of the Philippines, Inc., and contractors of solar panel installation: Promoting the patronage of solar photovoltaic energy. Raising awareness through workshops and training in partnership with the Institute of Integrated Electrical Engineers of the Philippines, Inc. (IIEE) and contractors of solar panel installation can be an effective strategy to educate and engage

individuals and businesses about solar energy. Here's some information on how to organize such workshops. First is to establish partnerships where reach out to the IEEE and local and foreign contractors specializing in solar panel installation. Explain your objective of raising awareness about propose a partnership to organize workshops and training sessions. Next is to secure a venue wherein to identify a suitable venue that can accommodate the expected number of participants. Consider partnering with educational institutions, community centers, or conference facilities that may have the necessary infrastructure, such as audiovisual equipment and seating arrangements. Followed by to promote the workshops. Create promotional materials, including brochures, posters, and digital advertisements, highlighting the benefits and details of the workshops.

Acknowledgments

The researcher would like to extend their deepest gratitude and thanksgiving to the following individuals for without them this research paper will not be possible:

To my beloved adviser Dr. Edgar Allan G. Castro, having inspired the researcher right from the start of the conception of the topic for this research, for all the insights, instructions, encouragements, and motivations that truly took the interest of the researchers until the completion of this paper.

To Dr. Allan Nicko Rodelas, the researcher statistician, who extended help more than what was due of him.

To Mr. Honorato A. Sebulino and Dr. Sheila Maloles, the researchers' Teacher-in-Charge, who patiently entertained all the queries that the proponents had, his assistance and guidance in meeting the researchers' needs for the completion of this paper.

To Engr. Allan Nortez Dr. Jasmin De Silva and Mr. Emilio Manuel Macaso, the researchers' set of panelists, for their ideas, suggestions, and expertise that helped improve the content of this paper.

To the researcher's classmates who encouraged the researchers to perform at their best and shared the agony of beating deadlines. With them, the researchers never felt alone in this 'battle'.

To the researcher's family and friends, having extended all the support and understanding on the endeavors of the researchers.

And above all, to the Lord God Almighty, for the enumerable blessings, guidance and wisdom given to the proponents. For His grace and unending unconditional love to the researcher. Without His blessings and mercy, this research will not be possible and successful, and the researchers offer this research for his greater glory.

References

- ABS-CBN News (2021) Why is electricity in PH expensive and unreliable?
- Alhammami, H.; An, H. (2020). Techno-economic analysis and policy implications for promoting residential rooftop solar photovoltaics in Abu Dhabi, UAE. *Renew. Energy* 2020, 167, 359–368.
- Alimi, O., Meyer, E., and Olayiwola, O. (2022). Solar Photovoltaic Modules' Performance Reliability and Degradation Analysis—A Review. DOI: 10.3390/en15165964
- Buzkowitz Energy (2018) Why Solar Energy in the Philippines Makes Sense?
- Bragolusi, P.; D'Alpaos, C. (2021). The Willingness to Pay for Residential PV Plants in Italy: A Discrete Choice Experiment. *Sustainability* 2021, 13, 10544
- Fatima, N., Li, Y., Ahmad, M., Jabeen, G., and Li, X. (2021). Factors influencing renewable energy generation development: A way to environmental sustainability.
- Ghosh, A. and Ghosh, D. (2018) Investments in clean energy in South Asia: visiting barriers and gaps from the perspective of policies and poli-tics in sustainable energy and transportation. Springer, Singapore, pp115–135
- Hansla A, Gamble A, Juliusson A, Gärling T. (2018) Psychological determinants of attitude towards and willingness to pay for green electricity. *Energy Policy* 36(2):768–774
- Irfan, M., Zhao, Z., Li, H., & Rehman, A. (2020). The influence of consumers' intention factors on

- willingness to pay for renewable energy: a structural equation modeling approach. *Environmental Science and Pollution Research*, 27(17), 21747–21761. <https://doi.org/10.1007/s11356-020-08592-9>
- J. Wang, S. Wang, Y. Wang, J. Li, D. Zhao Extending the theory of planned behavior to understand consumers' intentions to visit green hotels in the Chinese context *Int. J. Contemp. Hospit. Manag.*, 30 (8) (2018), pp. 2810-2825
- Jabeen G., Yan Q., Ahmad M., Fatima N., and Qamar S (2019) Consumers' intention-based influence factors of renewable power generation technology utilization: a structural equation modeling approach. *JClean Prod* 237:11773
- Jachimowicz JM, Hauser OP, O'Brien JD, Sherman E, Galinsky AD. (2018) The critical role of second order normative beliefs in predicting energy conservation. *Nat Hum Behav* Oct;2(10):757-764. doi: 10.1038/s41562-018-0434-0. Epub 2018 Sep 17. PMID: 31406290.
- Jaxa-Rozen, M. and Trutnevyte, E. (2021). Sources of uncertainty in long-term global scenarios of solar photovoltaic technology. DOI:10.1038/s41558-021-00998-8
- Kargar Dehbidi, N., Ghorbanian, E., and Tarazkar, M. H. (2020). The impact of renewable and non-renewable energies consumption on economic growth in D-8 group countries. *Q. J. New Econ. Trade* 15 (2), 69–90. doi:10.30465/JNET.2020.5836
- Kesari, B., Atulkar, S., & Pandey, S. (2021). Consumer Purchasing Behavior towards Eco-Environment Residential Photovoltaic Solar Lighting Systems. *Global BusinessReview*, 22(1), 236–254. <https://doi.org/10.1177/0972150918795550>
- Kumar, N. and Chopra, S. (2023). When and How Solar Photovoltaic Waste Would Become a Burden for Hong Kong? and the Actionable Insights for Effective Management. DOI: 10.13140/RG.2.2.32323.37922
- Lopes JR, de Araújo Kalid R, Rodríguez JL, Ávila Filho S (2019) A new model for assessing industrial worker behavior regarding energy saving considering the theory of planned behavior, norm activation model and human reliability. *Resource Conserve Recycle* 145:268–278
- Martinez-Cruz, A.L.; Nunez, H.M. (2021). Tension in Mexico's energy transition: Are urban residential consumers' in Aguascalientes willing to pay for renewable energy and green jobs? *Energy Policy* 2021, 150, 112145.
- Muyingo, H. (2018). Organizational challenges in adopting building applied photovoltaics in the Swedish tenant-owner housing sector. *Sustainability*, 7(4), 3637–3664
- Nikolić-Ristić, D., Đokić, N., & Miličević, N. M. (2021). Impact of Subjective Norms on the Use of Solar Panels. https://doi.org/10.46541/978-86-7233-397-8_131
- Oates, B. (2019). Getting solar power to the rural communities that need it most. Center for Rural Strategies. Available at: <https://dailyyonder.com/getting-solar-powerto-the-rural-communities-that-need-it-most/2019/12/26/>.
- Rehman A., Rauf A., Ahmad M., Chandio AA., and Deyuan, Z. (2019) The effect of carbon dioxide emission and the consumption of electrical energy fossil fuel energy and renewable energy on economic performance: evidence from Pakistan. *Environ Sci Pollut Res* 26(21):21760–21773
- Res 27, 21747–21761 (2020). <https://doi.org/10.1007/s11356-020-08592-9>
- Ristic, D.N. (2022). The influence of subjective norms on the use of heat pumps in achieving sustainable development. DOI: 10.5937/AnEkSub2200009N
- Ryan, A.J.; Donou-Adonsou, F.; Calkins, L.N. (2019). Subsidizing the sun: The impact of state policies on electricity generated from solar photovoltaic. *Econ. Anal. Policy* 2019, 63, 1–10.
- Solar AI Technologies (2022) Solar Panel Philippines – Price of Installation and Maintenance
- Solaric (2018) How much do you really save with solar in the Philippines
- Solar Magazine (2022) Philippines falling far short in terms of realizing its solar, renewable energy potential
- Sun, P., Wang, H., Huang, H., & Ho, C. (2020). Consumer attitude and purchase intention toward rooftop photovoltaic installation: The roles of personal trait, psychological benefit, and government incentives. *Energy & Environment*, 31(1), 21–39. <https://doi.org/10.1177/0958305x17754278>
- Y. Sun, S. Wang Understanding consumers' intentions to purchase green products in the social media marketing context *Asia Pac. J. Market. Logist.*, 32 (4) (2019), pp. 860-878