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Original Paper

Public Acceptance Regarding Photovoltaic Solar in Myanmar Using the Theory of Planned Behavior

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Abstract

This study investigates public acceptance of photovoltaic (PV) solar energy in Myanmar using the Theory of Planned Behavior (TPB), focusing on various demographic groups in 2023. The 337 respondents across different regions provided a comprehensive overview of public attitudes. The survey examined subjective norms, attitudes, perceived behavioral control, willingness to pay, and intention to adopt (PV) solar technology. Results indicated a high level of awareness, with 98% familiar with (PV) solar and 95% knowledgeable about its panels. However, adoption rates were low at 20%. Subjective norms positively influenced attitudes, as 81% observed their social circles using (PV) solar and 80% found it convenient. Environmental concerns were minimal, with 75% not worried about (PV) Solar's impact and 85% recognizing its carbon reduction benefits. The initial cost was a significant barrier, with 80% finding it too expensive, despite 96% believing in future cost savings. Perceptions of self-efficacy showed strong support for (PV) solar as a solution for electricity demand (90%) and interest in rooftop solar panels (87%). From an aesthetic perspective, only 14% described solar panels as unattractive. The study recommends financial incentives, education campaigns, and improved (PV) solar access, with government and stakeholder support to boost acceptance and adoption in Myanmar.

Keywords

(pv) solar, public acceptance, theory of planned behavior, Myanmar, renewable energy

1. Introduction

Myanmar is currently facing evident challenges in its energy sector, including frequent blackouts and limited access to electricity. These issues have been exacerbated by black swan events such as political instability and natural disasters, highlighting the urgent need for reliable and sustainable energy solutions like photovoltaic (PV) solar technology. Despite the abundance of solar resources, the adoption of (PV) solar energy in Myanmar remains limited, largely due to challenges in public acceptance and infrastructural barriers.

The consumer purchasing decision process is intricate, and numerous studies have explored public acceptance of renewable energy from various theoretical perspectives, including self-efficacy theory, social cognitive theory, and the theory of reasoned action. Unlike contextual research, this study focuses on individual behavior and utilizes the variable "behavioral willingness" to evaluate public acceptance. The theory of reasoned action, introduced by Ajzen and Fishbein in 1967, posits that behavioral intention determines an individual's actions. Behavioral intention is shaped by subjective norms and attitudes toward behavior. Subjective norms encompass the collective opinions of influential individuals and organizations regarding a specific behavior, while attitudes toward the behavior reflect an individual's approval or disapproval, comprising their beliefs and perceived outcomes (Bang et al., 2000; Irfan et al., 2020).

Subsequently, Ajzen proposed the theory of planned behavior in 1985 to address the notion that behavior is not entirely voluntary but influenced by perceived behavioral control. Unlike the theory of reasoned action, which considers behavior as voluntary and influenced by subjective norms and attitudes, the theory of planned behavior incorporates perceived behavioral control, representing an individual's perception of the ease or difficulty of performing a behavior (Irfan et al., 2021). Perceived behavioral control is assessed through control beliefs, which evaluate the availability of resources necessary for behavior execution, and perceived facilitation, which assesses the significance of these resources in achieving desired outcomes (Ajzen, 2002; Ajzen & Madden, 1986).

The Theory of Planned Behavior (TPB), introduced by Ajzen (2002), provides a useful framework for understanding the factors that influence individual intentions to adopt new technologies. TPB posits that behavior is driven by behavioral intentions, which are shaped by attitudes, subjective norms, and perceived behavioral control. In the context of (PV) solar energy, TPB helps to elucidate how individuals' attitudes (including awareness, environmental concerns, and beliefs), the influence of social norms, and their perceived control over adopting the technology impact their intentions to adopt (PV) solar systems.

Globally, policymakers have prioritized the development of renewable energy technologies. The move from traditional methods of generating power to renewable sources results from regulatory bodies and civil society's desire for green production and usage (Irfan et al., 2022). Due to population growth and economic growth, the demand for energy has reached its peak, prompting governments to consider

alternative energy production methods and mitigate greenhouse emissions by relying very little on fossil fuels (Cherni et al., 2007). Although renewable energy is believed to be capable of satisfying the electricity requirements of a rapidly expanding population sustainably, and policymakers have a positive attitude toward its development, there are also issues, as some renewable energy projects have encountered solid public opposition worldwide.

The reasons for public opposition to these projects are numerous. For example, noise and visual effects often criticize wind power projects. Moreover, the potential threat to birds and wildlife is another prominent reason for the low public acceptance of wind farms (Yiridoe, 2014). Some hydropower projects have been opposed by the public, as the area's biodiversity was affected during a flood. Some small-scale projects also have been rejected by the local community due to their interference with rivers (Valencia, 2009; Schilling & Esmundo, 2009). Similarly, biomass energy is inappropriate due to the emissions produced during the regular operation of biomass power plants (Singh & Gu, 2010) and in some cases, PV solar energy has been overlooked due to unawareness of its affordability.

Public acceptance is crucial for the development of (PV) solar energy. Without broad public support, even the most well-intentioned renewable energy policies and initiatives may fail to achieve their goals. Previous studies, such as Ali et al. (2022), have demonstrated that high awareness and positive attitudes towards renewable energy are essential for its adoption. However, economic factors, such as the costs associated with renewable energy technologies and the availability of subsidies, play an evident role in shaping public acceptance.

To investigate public acceptance of (PV) solar energy in Myanmar, this study conducted a comprehensive survey in 2023, capturing responses from 337 individuals across various demographic groups. The survey examined key variables, including subjective norms, attitudes (awareness, environmental concerns, and beliefs), perceived behavioral control, willingness to pay, and intention to adopt (PV) solar technology. The rationale for this study is to identify the drivers and barriers to (PV) solar adoption, thereby informing policy recommendations and strategic interventions that can enhance public acceptance and support the country's transition to renewable energy.

By implementing strong policies and financial incentives, embracing technological innovations, and engaging communities, Myanmar can enhance its solar energy sector. Additionally, fostering a sense of psychological ownership among individuals can enhance their willingness to support and invest in (PV) solar initiatives, ensuring a sustainable energy future for the country.

2. Method

2.1 Case Studies

The theoretical framework involved assessing public acceptance of (PV) solar in Myanmar, referencing the paper by Ali et al. (2022). To achieve this, the study employed a survey questionnaire to collect data from a sample of the general population in Myanmar. The questionnaire was designed based on the constructs of the planned behavior theory, including attitudes, subjective norms, and perceived behavioral control. The relationship between different variables was examined to identify the factors affecting inhabitants' behavioral intentions.

According to the conference paper "Factors Influencing Households' Intention to Adopt Solar (PV): A Systematic Review" presented at the Applied Human Factors and Ergonomics (AHFE) 2020 International Conferences, several key factors significantly impact the decision-making process of households regarding the adoption of (PV) solar systems. Analyzed through the Theory of Planned Behavior (TPB), these factors include environmental awareness and positive attitudes towards sustainability, economic incentives such as subsidies and long-term savings, perceived ease of installation and maintenance, social influences from peers and community leaders, supportive government policies and regulatory frameworks, and advancements in solar technology. These determinants collectively shape the intention to adopt (PV) solar systems, underscoring the need for a multifaceted approach to encourage renewable energy adoption and informing policymakers to design effective strategies to enhance (PV) solar utilization.

According to the paper "Factors Influencing Consumers' Behavioral Intentions to Use Renewable Energy in the United States Residential Sector" by Masrahi, Wang, and Abudiyah (2021), this case study examines the factors influencing consumers' behavioral intentions to adopt renewable energy in the U.S. residential sector using the Theory of Planned Behavior (TPB) model, with additional constructs like willingness to pay (WTP) and household income. The study employed a survey method, distributed via SurveyMonkey, targeting residents within 22 states that significantly contribute to renewable energy production. The survey included questions designed to measure attitudes toward renewable energy, subjective norms, perceived behavioral control, and WTP, along with collecting household income data. Structural Equation Modeling (SEM) was used to analyze the data and test three models: the basic TPB model, an extended TPB model incorporating WTP, and a further extended model that included household income. Data analysis revealed that subjective norms and perceived behavioral control significantly affect intentions to use renewable energy, while attitudes toward renewable energy do not. The inclusion of WTP in the model shows a significant positive influence on intentions, highlighting the critical role of financial considerations in adoption decisions. The extended TPB model indicates that household income positively impacts subjective norms, perceived behavioral control, and WTP, although its direct effect on intentions is limited. The study finds that 86% of the variance in intentions can be explained by the TPB model, with perceived

behavioral control being the most significant factor, followed by subjective norms. These results suggest that enhancing social norms, providing financial incentives, and increasing awareness can effectively promote renewable energy adoption in the residential sector.

According to the paper "Assessing Public Perception and Willingness to Pay for Renewable Energy in Pakistan through the Theory of Planned Behavior", several factors influence public willingness to adopt Renewable Energy (RE) in Pakistan. The study collected data from 512 participants across four provinces of Pakistan using a questionnaire distributed online due to COVID-19 restrictions. Key findings reveal that awareness, perceived benefits (such as environmental protection and economic development), and moral obligations positively impact attitudes towards RE, which in turn increase willingness to pay. Perceived challenges (like high costs and reliability concerns) negatively affect attitudes. Interestingly, subjective norms (social influences) do not significantly affect willingness to pay among eco-literate individuals. Eco-literate individuals typically base their decisions on their own knowledge and values rather than on external social pressures. The data were analyzed using Partial Least Square–Structural Equation Modeling (PLS-SEM). The study suggests that enhancing public awareness, addressing challenges, and promoting RE benefits can effectively increase adoption rates.

The paper "Public Acceptance of Residential Solar Photovoltaic Technology in Malaysia" investigates the factors influencing Malaysian households' acceptance of (PV) solar technology. Using the Technology Acceptance Model (TAM) as a reference framework, the study gathered data from 663 respondents across peninsular Malaysia through a survey. Key findings indicate that perceived ease of use, perceived usefulness, and attitude towards (PV) solar energy significantly influence the behavioral intention to adopt this technology. The study highlights the importance of governmental support and awareness campaigns to enhance public acceptance. The results underscore the need for user-friendly and efficient (PV) solar systems to foster positive attitudes and intentions towards adoption. Despite the limitations of focusing only on urban peninsular Malaysia, the study provides valuable insights for policymakers to promote (PV) solar adoption through targeted strategies.

2.2 Research Framework

The study extended the theory of planned behavior by including three new variables: environmental concern, risk perception, and belief about (PV) solar costs. Combined with existing variables (awareness, beliefs about the positive consequences of solar energy, and subjective norms), the study measured these considerable variables related to attitudes toward behavior (Figure 1). Control variables, including gender, education, income, and age, were also incorporated to define the respondents' demographic characteristics and reveal perceived behavioral control through the questionnaires.

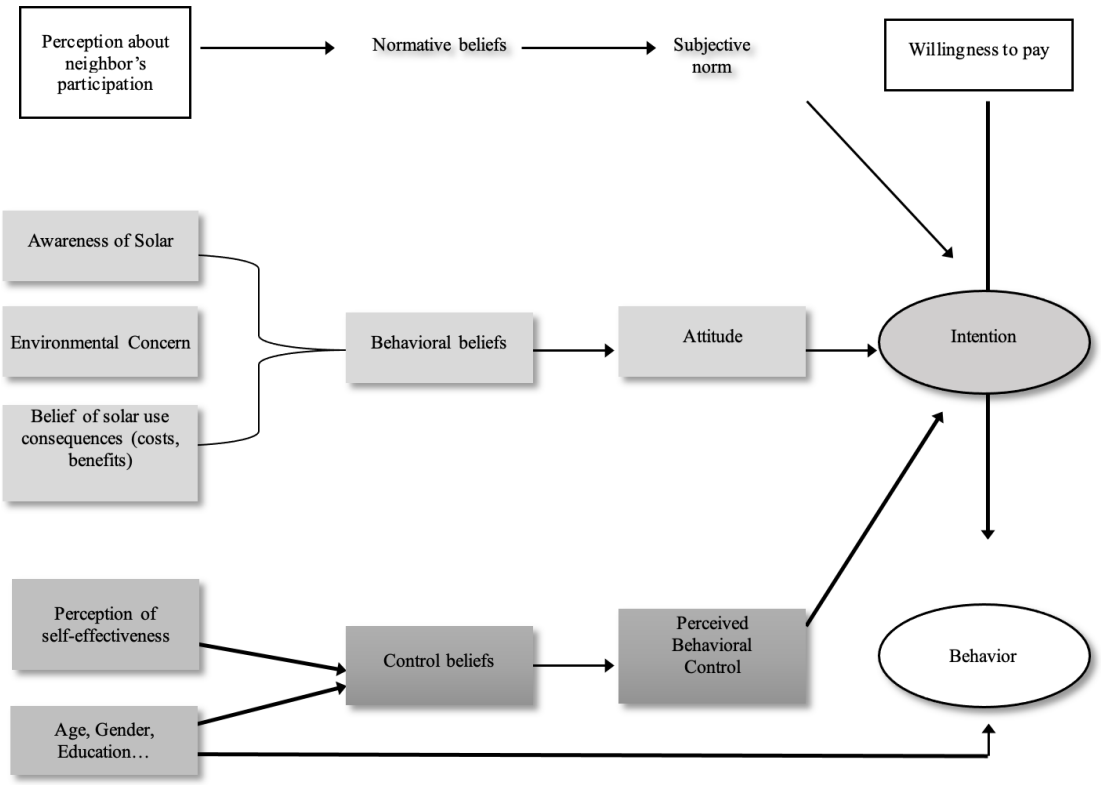

Figure 1. Research Framework for Public Acceptance (Ali et al., 2022)

A questionnaire survey for public acceptance was meticulously crafted and conducted in Google Form, then efficiently disseminated to the community through various social media platforms such as Facebook, Messenger, Telegram, and Viber during March 2023. The survey received a notable response, totaling 337 valuable submissions.

2.3 Analysis

The data was analyzed using descriptive statistics to explore the relationship between individual factors and public acceptance of (PV) solar. The analysis began with an examination of the respondents' socioeconomic characteristics, providing a foundational understanding of the demographic context within which opinions and attitudes were formed. This demographic analysis included variables such as gender, age, education level, personal income, occupation, mode of living, and region of residence.

3. Result

The results were presented in a structured manner, starting with demographic data analysis, followed by the statistical evaluation of public acceptance variables using TPB. Descriptive Statistical Analysis using Mean and Standard Deviation provides a summary of the central tendency and variability of the survey data, helping to understand public acceptance of (PV) solar in Myanmar.

3.1 Demographic Data

Table 1 presents the demographic data of respondents, categorizing them based on gender identity, age identity, educational status, occupational status, mode of living, monthly income, region (states/divisions), and monthly average electricity bill. The data reveals insights into the distribution of respondents' demographics, which is essential for understanding their attitudes, beliefs, and behaviors related to renewable energy, particularly photovoltaic (PV) solar energy in Myanmar (Table 1).

Gender Identity: Out of 337 respondents, 44% (148) identified as male, 53% (180) as female, and 3% (9) preferred not to say. Gender identity is important for understanding public acceptance of (PV) solar, as it can impact attitudes, beliefs, and behaviors related to renewable energy.

Age Identity: Respondents' ages varied, with 14% (48) aged 18-24, 32% (106) aged 25-34, 31% (105) aged 35-44, 20% (67) aged 45-54, 3% (10) aged 55-64, and 1 respondent above 65 years old. These age groups can be categorized as young (18-24, 14%), middle-aged (25-44, 63%), and older adults (45 and above, 23%).

Educational Status: Educational levels varied, with 6% (21) indicating high school or vocational school, 14% (45) university students, 47% (158) university graduates, 30% (102) postgraduates, and 3% (11) indicating "other".

Occupational Status: Occupational status included 43% (144) government staff, 31% (106) company staff, 14% (46) business owners, and 12% (41) indicating "other".

Mode of Living: A notable majority, 85% (286), lived in urban areas, while 15% (51) lived in rural areas.

Monthly Income: Monthly incomes varied, with 43% (144) earning 300,000 MMK or less, 28% (95) between 300,001-500,000 MMK, 8% (27) between 500,001-700,000 MMK, and 21% (71) above 700,000 MMK. A considerable proportion (43%) reported low monthly incomes of 300,000 MMK or less.

Region (States/Divisions): Respondents were distributed across various States and Divisions, with the majority located in Nay Pyi Taw (39%, 130). Other notable areas included Mandalay (17%, 59), Yangon (20%, 68), Bago (6%, 20), and Magwe (5%, 18). Areas with few or no respondents included Kayah, Kayin, Chin, and Kachin, which have ongoing conflicts affecting generalizability.

Monthly Average Electricity Bill: Most respondents (42%) reported a monthly electricity bill of 20,000 MMK or less, 32% between 20,001-40,000 MMK, 9.5% between 40,001-60,000 MMK, and 6% over 100,000 MMK. High electricity costs could impact willingness to adopt (PV) solar.

Table 1. Demographic Data of Respondents

Demographic Data	Categories	% of Respondents
Gender Identity	Male	44%
	Female	53%
	Prefer not to say	3%
Age Identity	Young (18-24)	14%
	Middle-aged (25-44)	63%
	Older adults (45 and above)	23%
Educational Status	High school or vocational school	6%
	university students	14%
	university graduates	47%
	postgraduates	30%
	other	3%
Occupational Status	government staff	43%
	company staff	31%
	business owners	14%
	Other	12%
Mode of Living	Rural	15%
	Urban	85%
Monthly Income	300,000 MMK or less	43%
	300,001-500,000 MMK	28%
	500,001-700,000 MMK	8%
	above 700,000 MMK	21%
Region (States/Divisions)	Nay Pyi Taw	39%
	Yangon	20%
	Mandalay	17%
	Bago	6%
	Magwe	5%
	Ayeyarwady	1%
	Tanintharyi	1%
	Sagaing	3%
	Mon	4%
	Rakhine	1%
	Shan	3%
Monthly Average Electricity Bill	20,000 MMK or less	42%
	20,001-40,000 MMK	32%
	40,001-60,000 MMK	9.5%
	over 100,000 MMK	6%

Note. MMK=Myanmar Kyat.

These demographic insights highlight the diverse backgrounds of the respondents and the potential factors influencing their attitudes towards (PV) solar energy. Understanding these variations is crucial for designing targeted interventions to increase the adoption of renewable energy in Myanmar.

3.2 Awareness of (PV) Solar

The study assessed awareness of (PV) solar through four questions using a 4-point Likert scale (strongly disagree, disagree, agree, strongly agree) and Yes/No responses (Table 2).

Awareness of Solar Energy: Out of 337 participants, 71% agreed and 27% strongly agreed that they had heard about (PV) solar, showing a high level of awareness. Only 1% disagreed, and 0.3% strongly disagreed.

Knowledge of (PV) Solar Panels: 75% agreed and 20% strongly agreed that they knew about (PV) solar panels and their usage, indicating a considerable level of understanding. Only 5% disagreed, and none strongly disagreed.

Knowledge of Inverters: 85% agreed and 23% strongly agreed that they knew about inverters and their usage, showing a high level of understanding. Only 2% disagreed, and 1% strongly disagreed.

Use of Home Solar Systems: Only 20% reported using home solar systems, while 80% had not adopted home solar.

The results indicate a high level of awareness of (PV) solar technology among the surveyed population, with a majority familiar with solar energy, (PV) panels, and inverters. Despite the high awareness, the adoption rate of home solar technology remains relatively low, with only 20% of respondents reporting usage (Table 2).

While awareness and knowledge about (PV) solar technology are high, the low adoption rate suggests that other factors may be hindering the widespread use of home solar systems in Myanmar. These could include financial constraints, lack of access to technology, or insufficient support and incentives. Addressing these barriers could enhance the adoption of (PV) solar technology, leveraging the existing awareness to promote broader implementation.

Table 2. Results for Awareness of (PV) Solar

Questions	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Standard Deviation
Awareness of Solar Energy	27%	71%	1%	0.3%	3.261	0.148
Knowledge of (PV) Solar Panels	20%	75%	5%	0%	3.148	0.141
Knowledge of Inverters	23%	85%	2%	1%	3.166	0.142
Use of Home Solar Systems	20% (Yes)		80%(No)			

3.3 Subjective Norms toward (PV) Solar

The study explored subjective norms toward ((PV) solar energy by posing three key questions (Table 3).

Observation of (PV) Solar Usage: A majority of participants 68% agreed and 13% strongly agreed that they had observed their neighbors and friends using (PV) solar. Only 18% disagreed or strongly disagreed, suggesting that most participants had seen (PV) solar being used in their community. The majority of participants reported seeing their neighbors and friends using (PV) solar, suggesting that observing (PV) solar use within their social networks increases the likelihood of individual adoption.

Perceived Convenience: 70% of respondents agreed, and 10% strongly agreed that their neighbors and friends found (PV) solar convenient. Conversely, 17% disagreed, and 2% strongly disagreed, indicating a general perception of convenience associated with (PV) solar use among social circles. Most participants believed that their neighbors and friends found (PV) solar convenient, indicating that positive feedback within social networks can influence perceptions of convenience and promote adoption.

Ease of Purchase: 67% of participants agreed, and 10% strongly agreed that their neighbors and friends could easily purchase (PV) solar. However, 21% disagreed, and 1% strongly disagreed, indicating some perceived barriers to purchase despite a generally positive view of accessibility. While most participants believed their neighbors and friends could easily purchase (PV) solar, a notable minority perceived barriers such as financing difficulties or lack of awareness. Addressing these barriers could further improve access and adoption rates.

Based on responses to the three questions about subjective norms, there is strong evidence that the perceived attitudes and behaviors of neighbors and friends positively influence individual attitudes towards (PV) solar in Myanmar (Table 3). Overall, these results suggest that subjective norms, such as the perceived attitudes and behaviors of social networks, play an evident role in shaping individual attitudes toward (PV) solar in Myanmar. Promoting (PV) solar adoption could benefit from targeting social networks to increase awareness and positive attitudes within these networks.

Table 3. Results for Subjective Norms toward (PV) Solar

Questions	Strongly Agree	Agree	Disagree	Strongly Agree	Mean	Standard Deviation
Observation of (PV) Solar Usage	13%	68%	17%	2%	2.926	0.131
Perceived Convenience	10%	70%	17%	2%	2.884	0.129
Ease of Purchase	10%	67%	2%	1%	2.886	0.129

3.4 Environmental Concern toward (PV) Solar

The study investigated environmental concerns toward (PV) solar energy by asking three key questions (Table 4).

Worries About Environmental Problems: Most participants (75%) were either not worried or only slightly worried about environmental problems caused by (PV) solar. Only a small portion (3%) strongly agreed that they were worried. The majority of respondents did not express considerable worries about environmental problems caused by (PV) solar, indicating a relatively low level of concern among the surveyed population. However, addressing the concerns of the 25% who did express worries through additional information and reassurance about the environmental sustainability of (PV) solar could encourage wider adoption.

Space Constraints: A majority (74%) disagreed or strongly disagreed that (PV) solar panels took up too much space in their homes and environment. However, 26% expressed some level of agreement or uncertainty, indicating that space concerns might affect their willingness to adopt the technology. Space concerns may not be a major barrier to adoption, as most respondents did not see (PV) solar panels as taking up excessive space. Nonetheless, educating individuals about the actual space requirements and dispelling misconceptions could further alleviate these concerns.

Reduction of Carbon Emissions: A notable majority (84%) agreed that the utilization of (PV) solar reduces carbon emissions, highlighting a positive perception of (PV) Solar's environmental benefits. The strong belief in (PV) Solar's ability to reduce carbon emissions suggests that the population is supportive of renewable energy initiatives aimed at mitigating climate change. This offers an opportunity to promote policies that encourage the adoption of (PV) solar for environmental benefits.

In conclusion, while there is generally low concern about environmental problems caused by (PV) solar among the surveyed population, addressing the concerns of the minority and dispelling misconceptions about space constraints could enhance the acceptance and adoption of (PV) solar technology in Myanmar. The positive perception of carbon emission reduction offers an opportunity to further promote renewable energy adoption and environmental sustainability initiatives in the country.

Table 4. Results for Environmental Concern toward (PV) Solar

Questions	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Standard Deviation
Worries About Environmental Problems	3%	22%	59%	16%	2.15	0.129
Space Constraints	4%	22%	66%	8%	2.23	0.126
Reduction of Carbon Emissions	21%	64%	14.5%	0.5%	3.06	0.136

3.5 Belief to (PV) Solar

Eight questions were asked to gather respondents' beliefs about the initial cost, maintenance cost, efficiency, reliability, durability, and convenience associated with (PV) solar energy (Table 5).

Initial Cost Perception: The majority (80%) agreed or strongly agreed that the initial cost of (PV) solar installation is too expensive, indicating a considerable barrier to adoption.

Cost Burden: Mixed views were observed on whether the initial cost creates a burden, with 64% agreeing and 36% disagreeing.

Preferred Backup Energy Source: A small minority (5%) preferred backup generators using petrol or diesel during power outages, suggesting a preference for traditional energy sources due to various reasons such as convenience or lack of access to (PV) solar systems.

Inverter with Batteries: Nearly 80% of respondents preferred using an inverter with batteries during power outages, indicating potential for (PV) solar systems with battery storage as a reliable source of electricity.

(PV) Solar with Inverter: A majority (65%) preferred (PV) solar and an inverter with batteries during power outages, showing openness to using (PV) solar as an alternative energy source.

Future Cost Savings: Most respondents (72%) believed that using (PV) solar could save energy costs in the future, indicating a strong perception of its financial benefits.

Existing (PV) Solar Technologies Cost: There were diverse opinions on the cost of existing (PV) solar technologies, with 65% agreeing they are cost-competitive, while 32% disagreed.

Lifestyle Improvement: A substantial majority (82%) agreed that using (PV) solar would improve their lifestyle, likely due to the environmental and financial benefits associated with this renewable energy source.

Most respondents believe in the economic benefits of (PV) solar, with a preference for using inverters with batteries or (PV) solar systems during power outages. The initial cost remains a considerable barrier, with 80% finding it too expensive. Although many do not perceive it as a burden, making (PV) solar more affordable is crucial for widespread adoption. While there is strong interest in renewable energy and the perceived benefits of (PV) solar, the high initial cost is a considerable barrier. Efforts to reduce these costs and promote affordability are essential to increase adoption rates and promote sustainability in Myanmar.

Table 5. Results for Belief to (PV) Solar

Questions	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Standard Deviation
Initial Cost Perception	20%	60%	19%	1%	2.988	0.133
Cost Burden	14%	50%	34%	2%	2.75	0.125
Preferred Backup Energy Source (Diesel Generator)	5%	40%	45%	9%	2.412	0.122
Preferred Backup Energy Source (Inverter with Batteries)	10%	66%	22%	2%	2.843	0.128
Preferred Backup Energy Source ((PV) Solar with Inverter)	16%	69%	14%	1%	3.0	0.134
Future Cost Savings	24%	72%	4%	0.5%	3.187	0.143
Existing (PV) Solar Technologies Cost	11%	54%	32%	3%	2.724	0.124
Lifestyle Improvement	15%	67%	16%	2%	2.941	0.131

3.6 Perception of Self-effectiveness

This study investigated perceptions of self-efficacy regarding (PV) solar utilization by posing four distinct questions to participants (Figure 2, Table 6).

Preferred Renewable Energy Source: The survey results showed that (PV) solar was the preferred renewable energy source for 219 respondents (65%). The preference for solar energy was consistent across gender, age, and educational groups. For example, 65% of female respondents and 65% of male respondents preferred solar energy. Similarly, 67% of respondents aged 25-44, 65% of those aged 18-24, and 60% of those aged above 45 favored solar energy. Educationally, preference ranged from 62% among high school students to 82% among other educational categories, with postgraduates and graduates showing a strong preference for solar energy.

(PV) Solar as a Solution for Electricity Demand: The majority of respondents (302 out of 337, or 90%) agreed or strongly agreed that (PV) solar is a viable solution for Myanmar's electricity demands. This agreement was consistent across gender, with a higher proportion of females agreeing compared to males. Age-wise, 69% of respondents aged 25-44, 65% of those aged 18-24, and 73% of those aged

above 45 supported (PV) solar as a solution. Educationally, the agreement ranged from 76% to 100% across all groups.

Interest in Rooftop Solar Panels: The survey revealed that 294 out of 337 respondents (87%) agreed or strongly agreed with the statement, "I would like to have solar panels on my roof". Interest was high across all demographics, with slight variations. For example, 71% of respondents aged 25-44, 73% of those aged 18-24, and 74% of those aged above 45 showed interest in rooftop solar panels. Educationally, higher education levels correlated with a stronger preference for solar panels.

Aesthetic Appeal of Solar Panels: Most respondents (291 out of 337, or 86%) disagreed or strongly disagreed with the statement, "Solar panels are ugly in my eyes". This low level of concern about the visual impact of solar panels was consistent across gender, age, and educational groups. For example, 70% of males and 77% of females disagreed with the statement. Age-wise, 74% of respondents aged 25-44, 78% of those above 45, and 67% of those aged 18-24 found solar panels aesthetically acceptable. Educationally, 77% of graduates and 75% of postgraduates disagreed with the negative aesthetic statement.

The findings indicate a high level of interest and acceptance of (PV) solar energy across various demographics in Myanmar, with specific insights into preferences and perceptions regarding solar energy's feasibility and aesthetics. Addressing economic barriers and enhancing public awareness could further boost the adoption of (PV) solar technology in Myanmar.

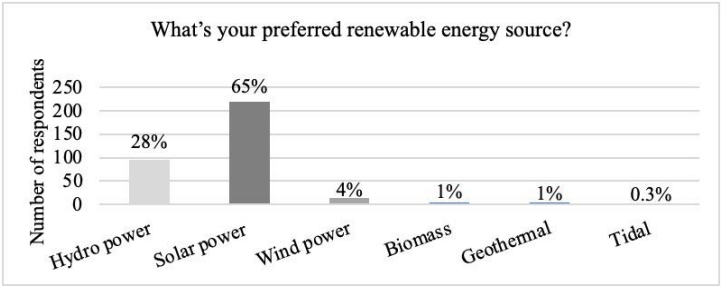

Figure 2. Frequency of Respondents to Preferred Renewable Energy Source

Table 6. Results for Perceptions of Self-efficacy toward (PV) Solar

Questions	Strongly Agree	Agree	Disagree	Strongly Disagree	Mean	Standard Deviation
(PV) Solar as a Solution for Electricity Demand	21%	69%	8%	2%	3.08	0.137
Interest in Rooftop Solar Panels	15%	72%	12%	1%	3.01	0.134
Aesthetic Appeal of Solar Panels	3%	11%	74%	12%	2.04	0.132

4. Discussion

The comprehensive analysis of the survey data provided valuable insights into the public acceptance of (PV) solar energy in Myanmar, examining variables such as subjective norms, attitudes (including awareness, environmental concerns, and beliefs), perceived behavioral control, willingness to pay, and intention to adopt (PV) solar technology. The findings highlight both the positive perceptions and the barriers that influence the adoption of (PV) solar, offering a nuanced understanding of the factors that can drive or hinder the widespread use of this renewable energy source in the country.

Subjective Norms: The study investigated perceptions of subjective norms toward (PV) solar through three questions. The results indicated that the perceived attitudes and behaviors of neighbors and friends positively influenced individual attitudes towards (PV) solar in Myanmar. A majority of respondents (81%) reported seeing their neighbors and friends using (PV) solar, which increased the likelihood of adoption among individuals within the same social network. Additionally, 80% of participants believed that their neighbors and friends found (PV) solar convenient, further reinforcing positive perceptions through social influence. However, while 77% believed their neighbors and friends could easily purchase (PV) solar, 23% expressed concerns about ease of access, highlighting perceived barriers such as financing difficulties or lack of awareness.

Attitudes Encompassing Awareness, Environmental Concerns, and Beliefs: The study assessed awareness, environmental concerns, and beliefs about (PV) solar to understand the overall attitudes toward this technology.

Awareness: The survey revealed a relatively high level of awareness of (PV) solar technology, with 71% of respondents familiar with (PV) solar and 75% knowledgeable about its usage. However, the adoption rate was relatively low, with only 20% having already used home solar systems. This suggested that while there was a good level of awareness and knowledge of (PV) solar technology, there were factors hindering the widespread use of home solar in Myanmar.

Environmental Concerns: The majority of respondents (74%) did not express considerable worries about environmental problems caused by (PV) solar, indicating low concern among the surveyed population. However, 25% did express some concern, suggesting a need for additional information and reassurance about environmental sustainability. Furthermore, 85% agreed that (PV) solar reduces carbon emissions, indicating strong recognition of its environmental benefits.

Beliefs: The study also explored beliefs regarding the cost, maintenance, efficiency, reliability, durability, and convenience of (PV) solar. The initial cost was a notable concern, with 80% agreeing it was too expensive and 64% feeling it created a burden. Despite these cost concerns, there was strong belief in the economic benefits of (PV) solar, with 72% agreeing that it could save energy costs in the future. Additionally, preferences for energy sources during power outages highlighted a strong inclination towards (PV) solar and inverters with batteries, suggesting belief in the reliability and effectiveness of these technologies.

Perceived Behavioral Control Stemming from Self-Efficacy Perceptions: The study assessed perceptions of self-efficacy through questions about preferred renewable energy sources and the willingness to install solar panels. The findings indicated a high level of interest in (PV) solar, with 65% choosing it as their preferred renewable energy source and 87% expressing willingness to have solar panels on their roofs. This demonstrates a strong sense of self-efficacy and perceived behavioral control regarding the adoption of (PV) solar technology. However, concerns about aesthetics were noted, with 14% expressing that solar panels were unattractive, indicating a potential barrier to adoption. The mode of living did not obviously influence the aesthetic perception of solar panels. Gender and age were not a strong predictor of attitudes towards the aesthetics of solar panels. Higher education levels correlated with a stronger negative perception of the aesthetics of (PV) solar panels.

Willingness to Pay: The survey revealed that while there is strong interest in (PV) solar, the perceived high initial cost remains a considerable barrier. Despite recognizing the long-term economic benefits, many respondents indicated that the upfront costs are a substantial hurdle. Addressing this issue through financial incentives, subsidies, or more accessible financing options could increase willingness to pay and enhance adoption rates.

Intention to Behavior: The study indicated a strong intention to adopt (PV) solar technology among the respondents. The high level of interest in installing solar panels and the preference for (PV) solar as a renewable energy source reflect a readiness to shift towards this technology. However, translating this intention into actual behavior will require addressing the identified barriers, particularly cost and aesthetic concerns.

Public Acceptance of (PV) Solar: The overall public acceptance of (PV) solar in Myanmar is relatively high, driven by strong awareness, positive attitudes towards its environmental benefits, and belief in its economic advantages. Subjective norms play a crucial role in shaping these attitudes, indicating that social influences can obviously impact adoption rates. Addressing cost barriers and providing targeted education and incentives will be key to converting positive perceptions and intentions into widespread adoption.

Overall, the findings suggest a positive perception of (PV) solar among the general public in Myanmar, with high levels of awareness, recognition of environmental benefits, and belief in the economic advantages of this technology (Table 7). Subjective norms, such as the influence of neighbors and friends, play a substantial role in shaping attitudes towards (PV) solar. While cost remains a considerable barrier, addressing these concerns through targeted education, awareness-raising efforts, and incentives could enhance adoption rates. Promoting the long-term economic benefits and addressing aesthetic concerns could further support the acceptance and adoption of (PV) solar technology, contributing to a more sustainable energy system in Myanmar.

Table 7. Findings for Public Acceptance of (PV) Solar Energy

Categories	Findings
Subjective Norms	81% see neighbors/friends using (PV) solar, increasing likelihood of adoption.
	80% believe neighbors/friends find (PV) solar convenient.
	77% think neighbors/friends can easily purchase (PV) solar, 23% see access barriers.
Awareness	71% are familiar with (PV) solar technology.
	75% are knowledgeable about its usage.
	Only 20% have used home solar systems, indicating barriers to adoption despite high awareness.
Environmental	74% do not worry about environmental issues caused by (PV) solar.
Concerns	25% have some concerns, indicating a need for reassurance.
	85% agree (PV) solar reduces carbon emissions, recognizing its environmental benefits.
Beliefs	80% agree (PV) solar is too expensive.
	64% feel the initial cost is a burden.
	72% believe (PV) solar can save energy costs in the future.
	Preference for (PV) solar during power outages indicates belief in its reliability.
Perceived	65% prefer (PV) solar as a renewable energy source.
Behavioral Control	87% are willing to install solar panels on their roofs.
	14% find solar panels unattractive, a potential barrier.
	Higher education correlates with negative aesthetics perception.
Willingness to Pay	Strong interest in (PV) solar, but high initial costs are a barrier.
	Financial incentives, subsidies, or accessible financing options could increase willingness to pay and enhance adoption rates.
Intention to	High intention to adopt (PV) solar technology.
Behavior	Strong interest in installing solar panels and preference for (PV) solar.
	Cost and aesthetic concerns need addressing to translate intention into actual behavior.
Public Acceptance	Relatively high public acceptance driven by awareness, positive attitudes towards environmental benefits, and belief in economic advantages.
	Subjective norms obviously influence adoption rates.

4.1 Policy Recommendations and Political Implications

Based on the results and findings, to effectively promote the adoption of photovoltaic (PV) solar energy in Myanmar, it is essential to consider both policy recommendations and the broader political implications of the study's findings. Table 8 provides a comprehensive overview of these recommendations, outlining specific actions and their corresponding political implications to foster a supportive environment for solar energy adoption.

Table 8. Policy Recommendations and Political Implications

Policy Recommendations		Actions	Political Implications
Strengthening Community and Social Norms	Encouraging Social Proof	Promote success stories and testimonials; involve local leaders and influencers.	Leverage social proof to normalize solar energy adoption.
	Community-Based Programs	Implement community solar programs to reduce costs and increase visibility.	Strengthen community bonds and promote collective solar investments.
Increasing Awareness and Education	Educational Campaigns	Launch government-sponsored campaigns to provide accurate information.	Address environmental concerns and cost perceptions, increasing adoption.
	Incorporating Renewable Energy into Curricula	Integrate renewable energy concepts into school and university curricula.	Educate future generations to value and adopt renewable energy.
Financial Incentives and Subsidies	Subsidies and Incentives	Provide government subsidies, tax incentives, and low-interest loans for solar installations.	Alleviate financial burdens and encourage adoption among lower-income groups.
	Flexible Financing Options	Develop pay-as-you-go models or leasing programs.	Reduce immediate financial burdens, making solar energy more accessible.
Aesthetic and Design Considerations	Improving Aesthetics	Promote aesthetically pleasing solar designs like solar shingles or BI (PV).	Address concerns about the unattractiveness of solar panels.
	Incentives for	Offer incentives for	Encourage manufacturers

	Innovative Designs	innovative solar panel designs.	to develop more visually appealing options.
Targeted Support for High-Interest Groups	Engagement with Higher Education Institutions	Conduct awareness programs and research on improving solar panel aesthetics.	Address negative perceptions of (PV) solar aesthetics among highly educated groups.
Policy and Infrastructure Development	Regulatory Support and Grid Integration	Enhance regulatory frameworks and streamline grid connection processes.	Encourage solar energy adoption through supportive net metering policies.
	Infrastructure Investment	Invest in infrastructure, storage solutions, and smart grid technologies.	Ensure reliable and efficient energy distribution, supporting the integration of solar energy.

The study's findings on public acceptance of (PV) solar in Myanmar offer critical insights for policymakers. By addressing the barriers identified, such as initial costs, aesthetic concerns, and enhancing social proof and education, Myanmar can obviously increase the adoption of (PV) solar technology. Political strategies that leverage community norms, provide financial incentives, improve aesthetics, and support infrastructure development can transform positive perceptions and intentions into tangible actions, driving the country towards a sustainable energy future.

4.2 Potential Biases and Limitations

Sampling Bias: The use of online distribution methods may have resulted in sampling bias, as individuals without internet access or those not active on social media were less likely to participate. Consequently, the sample may not fully represent the views of rural populations or those with limited access to technology. Efforts were made to disseminate the survey across various online platforms to reach a broader audience.

Response Bias: Participants may have provided socially desirable answers, particularly in questions related to environmental concerns and willingness to adopt (PV) solar technology. To address this, the questionnaire was designed using a 4-point Likert scale, which eliminates the neutral option and encourages participants to express a clear opinion. However, some degree of response bias may still exist.

Limited Scope: The survey captures a snapshot of public acceptance at a specific point in time. Longitudinal studies could provide more comprehensive insights into changing attitudes and behaviors over time. Future research could address this limitation by conducting follow-up surveys to track

changes in public opinion.

Resource Constraints: Limited resources and time constraints may have affected the scope and depth of data collection and analysis. Future studies with larger sample sizes and more extensive fieldwork could provide richer and more nuanced insights. Addressing these constraints in future research could help build on the findings of this study and offer more comprehensive conclusions.

By addressing these potential biases and limitations, this study aims to provide a balanced and comprehensive assessment of public acceptance for (PV) solar energy development in Myanmar. Recognizing and mitigating these biases is crucial for ensuring the validity and reliability of the research findings.

4.3 Conclusion

This study highlights the notable factors influencing public acceptance of (PV) solar in Myanmar, providing insights for targeted interventions. The findings indicate that subjective norms, attitudes encompassing awareness, environmental concerns, and beliefs, perceived behavioral control, willingness to pay, and intention to adopt (PV) solar technology all play crucial roles in shaping public acceptance. The study revealed that while awareness and knowledge about (PV) solar technology are high among the surveyed population in Myanmar, the adoption rate remains relatively low at 20% due to perceived barriers such as initial costs. Subjective norms play a crucial role in shaping positive attitudes towards (PV) solar, with 81% of participants observing (PV) solar usage within their social circles and 80% perceiving it as convenient. Environmental concerns are minimal, with 75% of respondents not significantly worried about environmental problems caused by (PV) solar and 85% acknowledging its benefits in reducing carbon emissions. The initial cost was a significant barrier, with 80% finding it too expensive, despite 96% believing in future cost savings. Perceptions of self-efficacy showed strong support for (PV) solar as a solution for electricity demand (90%) and interest in rooftop solar panels (87%). From an aesthetic perspective, only 14% described solar panels as unattractive.

Addressing these financial constraints and enhancing support and incentives could leverage the existing awareness and positive attitudes to promote broader implementation of (PV) solar technology in Myanmar, contributing to environmental sustainability and energy security.

To enhance public acceptance and promote the widespread adoption of (PV) solar technology, policymakers should focus on addressing these barriers through financial incentives, subsidies, accessible financing options, and educational campaigns. Promoting the long-term economic benefits and addressing aesthetic concerns through innovative designs can further support the acceptance and adoption of (PV) solar technology. By leveraging social influences and community norms, and by fostering trust through transparency and public engagement, Myanmar can move towards a sustainable energy future.

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