International Journal of Business and Technology Management
e-ISSN: 2682-7646 | Vol. 7, No. 3, 111-125, 2025
https://asianscholarsnetwork.com/asnet-journals

Exploring the Factors Affecting the Intention to Adopt of Solar Renewable Energy in Malaysia: A Qualitative Analysis

Muhammad Haziq Mohammed[1*], Nur Hazlinda Azleen Abdul Halim[1], Sharizan Sharkawi[1], Mior Harris Mior Harun[1], Peck Leong Tan[1]

[1] Arsyad Ayub Graduate Business School (AAGBS), Universiti Teknologi MARA, Malaysia

*Corresponding Author: haziqmohammed@gmail.com

Received: 27 March 2025 | Accepted: 3 May 2025 | Published: 1 June 2025

DOI: https://doi.org/10.55057/ijbtm.2025.7.3.11

Abstract: *This research investigates the factors influencing the adoption of residential solar photovoltaic (PV) systems in Malaysia. Despite the country's advantageous geographical location for solar energy, the adoption rate remains slow, primarily due to government policies favouring non-renewable energy sources. The study employs an in-depth qualitative approach, utilizing open-ended semi-structured interviews and grounded theory strategy with six participants. Through thematic content analysis, the research identifies five main themes: Financial Viability, Performance and Efficiency, Practical Considerations, External Influences, and Company Credibility. These themes encompass various subcategories, revealing the complex interplay of factors influencing consumers' decisions to embrace solar energy. The findings provide valuable insights for policymakers, businesses, and researchers seeking to promote sustainable energy adoption in Malaysia.*

Keywords: Household consumer, Solar Energy System, Adoption factors, Thematic analysis

---

1. Introduction

Solar energy, derived from sunlight and serving as a source of electrical power, is a subject extensively studied by researchers such as Hassan et al. (2022), Hossain et al. (2022), Mostafaeipour et al. (2021) and Sreenath, S et al. (2020). Various applications of solar technologies, outlined by Burnett (2021), Heng (2019), Chachuli, (2021), and Chachuli (2021), encompass not only electricity generation but also the creation of a comfortable interior environment. It is noteworthy that solar energy, being environmentally friendly, does not produce harmful gases. The trajectory of global energy consumption, driven by population growth, is expected to continue on an upward trend (Hassan, 2022; Qahtan, 2019; Sovacool, 2021; Sreenath, 2020). As time progresses, the demand for energy continues to rise, while non-renewable energy (NRE) resources, such as fossil fuels, are dwindling (Abraim, 2022; Neupane, 2022; Obaideen, 2021; Ren, 2022). Consequently, there is an urgent need to explore alternative energy sources, including solar energy, to ensure the stability of the energy supply (Yu, 2022).

Malik and Ayop (2020) emphasize Malaysia's advantageous geographical location in the equatorial zone, providing a natural tropical climate with an average daily solar radiation of 4500 kWh m-2 and approximately 12 hours of abundant sunshine each day. This climate positions Malaysia favorably for harnessing solar power energy rather than relying on non-renewable energy (NRE). Notably, Malaysia has evolved into an international hub for manufacturing solar technologies, including solar photovoltaic (PV) cells, modules, and wafers (Malik, 2020). However, despite this, the adoption of solar energy in Southeast Asian countries, including Malaysia, remains relatively slow domestically. This reluctance is attributed to government policies that prioritize fossil fuels for electricity generation, hindering the widespread transition to solar energy. This observation suggests that readiness for solar energy adoption is currently at a standstill.

In addition to the existing citations, the work of other researchers, such as Feldman (2023), further contributes valuable insights into the field of solar energy adoption and its challenges.

2. Literature Review

The concept of people's lifestyles contributes to increased energy consumption. For instance, in countries with hot weather, the preference for air conditioning has led to a gradual rise in electricity demand. This assertion is corroborated by data from the Malaysia Energy Statistics Handbook 2019, which reported the peak demand for three major electricity providers in Malaysia which are Tenaga Nasional Berhad (TNB), Sabah Electricity Sdn Bhd (SESB), and Sarawak Energy (SEB). TNB's peak demand increased by 3.1% (17,790MW to 18,338MW), SESB's by 1.8% (938MW to 955MW), and SEB's by 6.1% (3302MW to 3504MW) respectively.

In alignment with the Shared Prosperity Vision 2030 and Key Economic Growth Activities (KEGA) 11, the Malaysian government aims for renewables to constitute 20% of electricity generation by 2025, with a focus on large-scale auctions. Studies by Muhammad-Sukki et al. (2014) and Lau et al. (2020) estimate that over 4.12 million buildings in Peninsular Malaysia are suitable for solar PV cell installation, potentially generating around 34,194 MW of electricity. This research aims to explore barriers hindering the adoption of solar energy in Malaysia, examining the readiness and challenges faced by Malaysians in embracing solar power.

2.1 Solar Energy

Lan et al. (2021) and Mohammad et al. (2020) define solar energy application as a technology that captures solar irradiance and converts it into voltage for electricity generation through photovoltaic (PV) cells. Yasmeen et al. (2022) emphasize solar energy's renewable nature, highlighting its non-polluting characteristics and minimal environmental impact compared to traditional fuel sources. The National Renewable Energy Laboratory notes that the sun provides more energy in one hour than humanity consumes. Solar power, harnessed through PV panels on rooftops, offers benefits such as renewable energy, cost savings, low maintenance, eco-friendly investment returns, and diverse applications. The predictability of solar energy for the next 6.5 billion years makes it a reliable and free resource.

2.2 Readiness of Adopting Solar Renewable Energy

The Malaysian government has implemented various energy-related policies to reduce climate change, with a focus on renewable energy (RE) development. Building Integrated Photovoltaic Technology Application (BIPV) is encouraged to reduce greenhouse gas emissions, and the government introduced the Renewable Energy Act 2011 and Sustainable Energy Development Authority Act 2011. The Feed-in Tariff (FiT) program, supported by the Renewable Energy Fund, incentivizes RE investors, with solar PV having the highest tariff. Net Energy Metering

(NEM) introduced in 2016 encourages solar adoption, allowing building owners to offset their electricity consumption at night by selling excess energy generated during sunlight hours.

2.3 Challenges in Adopting Solar Renewable Energy

The adoption of solar renewable energy in Malaysia encounters a range of challenges that span policy, financial, technical, and societal dimensions. On the policy front, despite the nation's advantageous solar potential, the lack of robust government incentives and subsidies poses a hindrance (Khoo, 2023). The absence of clear and compelling financial schemes may contribute to the perception of high initial costs and extended payback periods, discouraging both residential and commercial users from investing in solar installations (Malik, 2020). Moreover, grid connectivity poses technical challenges, requiring seamless integration and well-defined net metering policies to encourage users to contribute excess solar power to the grid (Lapillonne, 2023).

Public awareness and education represent significant challenges, with limited understanding of the benefits of solar energy and misconceptions about its complexity (Khoo, 2023). Initiatives to address this include comprehensive public education campaigns to highlight the advantages of solar power and debunk any myths surrounding its installation and use. Infrastructure and technology-related challenges involve ensuring the quality and standards of solar equipment, as well as addressing a shortage of skilled professionals for installation and maintenance (Khoo, 2023).

Addressing these challenges requires a collaborative effort from government bodies, industry stakeholders, and the public. Policymakers need to implement supportive and clear regulations, including incentives and financial mechanisms that make solar adoption economically viable (Khoo, 2023). Public awareness campaigns can help dispel misconceptions and promote the benefits of solar energy. Investment in infrastructure, technology, and workforce development is crucial to overcome technical barriers and ensure the long-term success of solar projects (Malik, 2020). By addressing these challenges comprehensively, Malaysia can create an environment conducive to the widespread adoption of solar renewable energy, contributing to a sustainable and greener energy future.

3. Theory

The Technology Acceptance Model (TAM) serves as a valuable theoretical framework for understanding and predicting individuals' acceptance and adoption of technology (Davis, 1989). In the context of the paper on residential solar photovoltaic (PV) adoption in Malaysia, TAM can be applied to elucidate how users perceive and decide to adopt solar PV systems based on identified factors. Let's delve into the relevance of TAM across various aspects of the study:

3.1 Perceived Usefulness (PU)

The financial viability of adopting solar PV technology is a crucial factor identified in the study. This aligns with TAM's concept of Perceived Usefulness (PU), where users are more likely to adopt technology if they perceive it as beneficial and advantageous. The study highlights financial incentives, cost savings, and long-term investment as key drivers, contributing to users' perceived usefulness of residential solar PV systems.

3.2 Perceived Ease of Use (PEOU)

Practical considerations, such as renovation and installation factors, maintenance knowledge, and system compatibility, are key themes in the study. These align with TAM's Perceived Ease of Use (PEOU), emphasizing that users are more likely to adopt technology if they find it easy to use and integrate into their daily lives. The study reflects how the perceived ease of adopting and managing residential solar PV systems influences users' decisions.

3.3 External Variables

The External Influences theme in the study, including awareness campaigns, community-driven decisions, and leveraging geographical advantages, resonates with TAM's acknowledgment of external variables. TAM recognizes that factors beyond individuals' immediate perceptions, such as social influence and external conditions, can significantly impact technology acceptance. The study highlights the importance of these external variables in shaping users' attitudes toward residential solar PV adoption.

3.4 Attitude Toward Using (ATU)

The Company Credibility theme in the study, which includes the reputation and after-sale service of solar companies, aligns with TAM's construct of Attitude Toward Using (ATU). TAM posits that users' attitudes toward a technology influence their behavioral intentions. In the study, positive attitudes toward the credibility of solar companies can enhance users' intention to adopt residential solar PV systems.

3.5 Behavioural Intention (BI)

The identified factors in the study collectively contribute to users' Behavioural Intention (BI) to adopt residential solar PV systems. TAM's central tenet is that users' attitudes and perceived usefulness and ease of use directly influence their behavioural intention to adopt technology. The study provides insights into how the factors influencing residential solar PV adoption align with TAM's overarching construct of behavioural intention.

In summary, the Technology Acceptance Model (TAM) provides a structured framework for understanding users' psychological processes and decision-making regarding the acceptance of solar technology in the context of residential PV adoption in Malaysia [9].

4. Problem Statement

The widespread acceptance of solar energy has undergone a substantial increase, fuelled by various influential factors. The continuous decrease in the cost of solar photovoltaic (PV) technology has significantly bolstered the economic competitiveness of solar energy when compared to traditional sources (IRENA, 2021). Forbes reported in 2023 that the cost per watt system ranged from USD 1.00 to USD 1.50, as depicted in the graph presented in PV Magazine, shown in Figure 1.

PANEL TYPE	COST PER WATT	6KW SYSTEM COST
Monocrystalline	$1.00 - $1.50	$6,000 - $9,000
Polycrystalline	$0.90 - $1.00	$5,400 - $6,000
Thin-film	$1.00 - $1.50	$6,000 - $9,000

Figure 1: Solar PV Panel Cost.
Source: Forbes.com, 2023

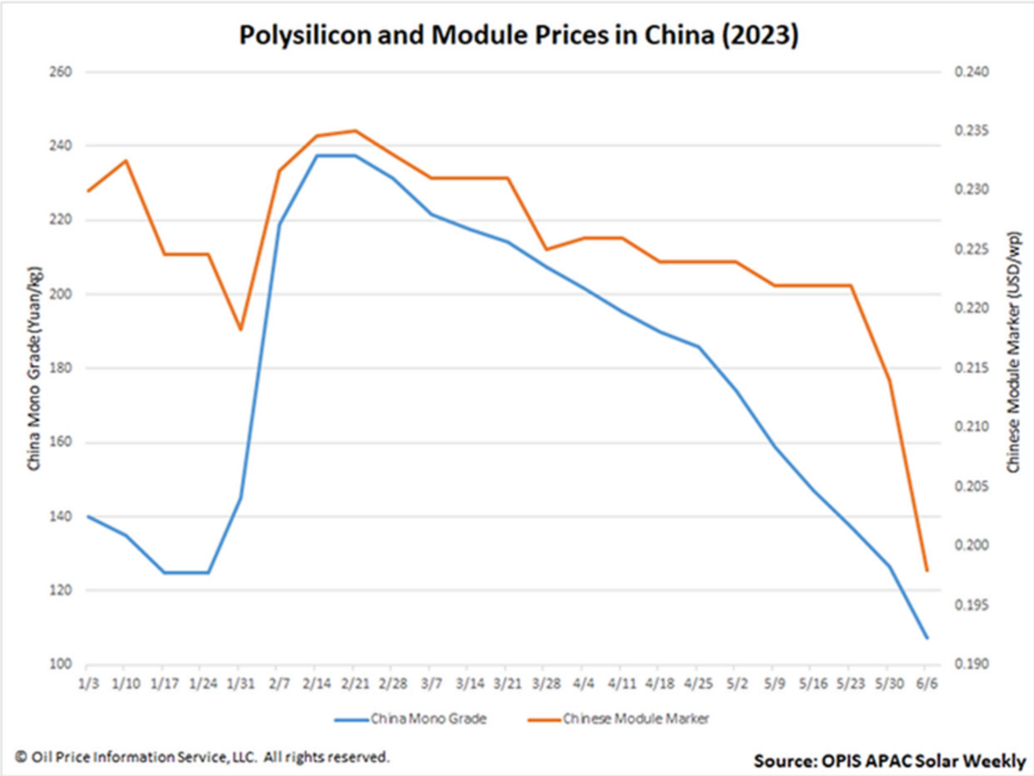

Figure 2: Polysilicon and Module Prices in China (2023).
Source: PV-Magazine

However, Cook et al. (2024) discovered that consumers in European countries were slightly less inclined to voluntarily install solar panels for climate change mitigation. As illustrated in the figure below, Italian (45%) and Swedish (44%) consumers expressed a higher willingness to install solar panels compared to those in France (24%).

Consumer behaviors with a moderate willingness to change, Europe/US 2022
Percentage of adult internet users

	UK	France	Germany	Italy	Sweden	Poland	US
Install solar panels							
Very willing	32	24	31	45	44	32	31
Somewhat willing	35	36	38	39	30	36	35
Not very willing	33	41	31	16	26	32	35
Take alternative local transportation (e.g., rideshare, carpool, mass transit)							
Very willing	31	30	30	28	37	32	23
Somewhat willing	39	38	39	42	36	41	32
Not very willing	31	32	31	30	27	27	45
Reduce air travel when alternative transport is available (e.g., train, electric vehicle)							
Very willing	30	34	38	33	37	29	32
Somewhat willing	42	39	36	46	34	40	39
Not very willing	28	27	26	21	29	31	29

Question: Please indicate how willing you would be to adopt the following behaviors.
Base: UK – 1,024, France – 1,004, Germany – 1,015, Italy – 1,011, Sweden – 1,000, Poland – 1,026, US – 2,528.
Sources: Kagan 2022 European Consumer Insights survey; Kagan Q3'22 US Consumer Insights survey.
Kagan, a media research group within the TMT offering of S&P Global Market Intelligence.
© 2023 S&P Global.

Figure 3: Consumer Behaviour with moderate willingness to change, Europe/US 2022 [6].

In 2022, the ASEAN region experienced a slowdown in the growth of solar generation compared to the previous year. The decline in clean energy deployment was significantly influenced by the discontinuation of the Feed-in Tariff scheme in Vietnam, which had previously seen a surge in solar capacity from 2018 to 2021.

In other ASEAN countries, solar generation witnessed growth in Indonesia (+0.3 TWh), the Philippines (+0.3 TWh), Thailand (+0.7 TWh), and Singapore (+0.3 TWh) in 2022. Malaysia and Vietnam both observed a year-on-year increase in solar generation of 8% (+0.2 TWh) and 2.3% (+0.6 TWh), respectively (Setyawati, 2023).

Country	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Brunei	1	1	1	1	1	1	1	1	1	1
Cambodia	4	5	6	9	12	18	29	29	99	208
Indonesia	17	26	38	42	79	88	98	69	155	172
Lao PDR	0	0	0	3	3	4	22	22	22	22
Malaysia	1	25	97	166	229	279	370	536	882	1493
Myanmar	1	3	4	6	21	32	44	48	88	84
Philippines	2	2	3	28	173	784	908	914	973	1048
Singapore	5	8	12	25	46	97	116	160	272	329
Thailand	79	382	829	1304	1425	2451	2702	2967	2988	2988
Vietnam	5	5	5	5	5	5	8	105	4898	16504

Figure 4: Variation installed capacity (MW) of Solar PV in ASEAN Countries.
Source: Sreenath, 2022

The expansion of renewable energy supply in Indonesia, Malaysia, the Philippines, Singapore, and Vietnam was primarily driven by additions to solar PV capacity. Although no new solar capacity was added, Thailand initiated the integration of a battery storage system into a solar PV-plus-storage project, facilitating the growth of solar generation.

Multiple studies have highlighted Malaysia's significant solar photovoltaic (PV) potential, estimated at up to 9,150 MW. Despite governmental acknowledgment of substantial capacity for renewable energy sources, including biomass, biogas, municipal waste, and solar energy, these sources have not received adequate support or promotion, as emphasized by Solangi et al. (2011). This discrepancy between potential and active promotion calls for a more concerted effort to tap into available renewable energy resources and further advance the country's sustainable energy endeavors.

The Malaysian Reserve (2023) reported that Malaysia's ambitious renewable energy targets, mandated by the Malaysian Ministry of Energy and Natural Resources (KeTSA), play a crucial role in shaping the nation's sustainable energy future. These targets include achieving a national renewable energy mix goal of 20% by 2025.

However, the realization of these objectives faces formidable challenges, particularly concerning solar renewable energy (RE) adoption. Despite various governmental incentives and policy measures, the integration of clean energy sources, especially solar photovoltaic (PV), remains disproportionately low, accounting for only 2% of the country's total electricity-generation capacity. Notably, solar PV installations are predominantly concentrated in the commercial and industrial sectors, leaving the residential sector significantly underrepresented in the country's renewable energy landscape.

The ambitious renewable energy targets outlined in the National Energy Policy (2022-2040), aiming for a renewable capacity of 18.4 GW by 2040, face significant challenges in practical implementation. The latest available data indicates that only 9.1% of Malaysia's total energy capacity comes from renewable sources, highlighting a substantial gap between targets and actual capacity capacity (Lapillonne, 2023).

		Frequency	Per cent	Valid Percent	Cumulative Percent
Awareness of the changes in the environment	Yes	110	79.1	79.1	79.1
	No	29	20.9	20.9	100.0
	Total	139	100.0	100.0	
Support the development of sustainable energy	Yes	130	93.5	93.5	93.5
	No	9	6.5	6.5	100.0
	Total	139	100.0	100.0	
Previous experience in applying solar energy	Yes	43	30.9	30.9	30.9
	No	96	69.1	69.1	100.0
	Total	139	100.0	100.0	

Figure 4: Frequency Distribution of The Research Constructs [15]

Khoo et al. (2023) explored the willingness of adoption and reported that a substantial majority of respondents (79.1%) were aware of the environmental changes caused by fossil fuels, demonstrating a high level of consciousness regarding the environmental impact of traditional energy sources. Moreover, an overwhelming majority of respondents (93.5%) expressed support for the development of sustainable energy, particularly solar energy. This high level of support suggests a favorable attitude towards renewable energy initiatives among the surveyed population.

However, the table also indicates that only 30.9% of respondents had previous experience in applying solar energy, indicating a potential gap between support for sustainable energy and actual adoption. This suggests an opportunity for further exploration into the factors influencing the growth of solar energy adoption in Malaysia.

5. Research Methodology

The researchers opted to use open-ended semi-structured interviews and grounded theory strategy with six participants to explore the essential factors that affected their intention to adopt solar energy solutions, which in this research refers to solar PV installation at residential homes. The inductive approach in this case study was used to discover and classify the factors identified in the interview transcripts. Conceptualised interpretations regarding customers' adoption intention related to solar PV installation were developed in a hierarchical structure, with the top-level concepts forming the main factors related to the research objective. Finally, the framework explaining these factors is described in a theoretical narrative.

The main objective of qualitative research is to gather in-depth insights into an issue. Therefore, qualitative research typically embraces non-random sampling (Creswell, 2018). Here, purposive and convenience sampling strategies were applied to ensure that suitable individuals with in-depth knowledge concerning the subject matter were selected. The sample constituted as follows: three (3) are currently working in the energy industry, two (2) in property industry and one (1) in the education industry. An informed consent to participate in the study was given by all participants shortly after the objective of the study was explained. It is interesting to note that all of the participants are residing in landed homes, which correspond to the topic under study.

The researchers planned an interview guide or protocol in accordance with the research objectives and predetermined identified elements: the individual, technological, governmental and financial determinants. The interview protocol contained three main sections, as outlined in Appendix 1. The first section was an introduction: the interviewer introduced himself/herself and the purpose of the interview, assured confidentiality, asked permission to record the interview and provided warm-up questions. The second section consisted of the main questions related to the purpose of the interview. This part was developed in a logical order and derived from the research questions and a consideration of the previous literature. A set of probing questions was prepared to obtain more specific and in-depth information during the main questions. The last section included the concluding instructions to end the interview and thank the informants. The interviews were conducted online, via Microsoft Teams as the application has in-built transcriber to ease transcription process. The average time taken to conduct an interview was 25 minutes, and they were conducted in English.

Regarding the qualitative sampling size, most recent qualitative scholars have mentioned that the subjective assessment of the researcher determines the sample size and that he/she realises when the point of saturation has been reached (Yin, 2017; Creswell, 2018). The point of saturation means that the information has become redundant and no more new themes are being identified, at which point the researcher can end the process (Creswell, 2018; Sekaran, 2019). Correspondingly, six participants from various positions and organizations participated in the semi-structured interviews, which was sufficient to reach saturation in this study.

The thematic analysis process was done manually in order to analyse the transcriptions data and identify the codes associated with the theoretical underpinning, which formed the research basis. The qualitative data analysis involved the steps presented by Braun and Clarke (2006). These include interviewing and recording, listening to the MS Teams recordings, transcribing the recordings, coding the confirmed transcripts, naming and organising codes, mapping quotations and memos into the appropriate codes, analysing and producing outputs and, finally, writing the reports. For data analysis, three stages of open, axial and selective coding were used.

6. Results and Discussion

6.1 Coding/categorization stage

In this research, the approach of open coding, axial coding and selective coding was used to identify the attitude. In open coding, the opinions of informed people are used and their views are recorded as explanations, then primary codes are extracted based on the number of repetitions. In axial coding, all the primary codes obtained in the previous coding were examined and related codes were placed in subsets. Then all the subcategories were analyzed and classified into main categories. In the selective coding according to the identified categories, all the subcategories were prioritized based on the number of repetitions using the frequency of occurrence through Pivot Table. Based on qualitative analysis, 53 initial codes with 21 sub-categories in 5 main categories/themes of factors influencing end consumers' intention to adopt solar energy solutions were identified.

Open coding. In open coding, the opinions of informed participants were used and their views were recorded as explanations, then primary codes are extracted based on the number of repetitions. In this section, all the described descriptions were reviewed and the descriptions that had the most repetitions were identified in a brainstorming session and recorded as initial codes. Based on qualitative analysis, 53 initial codes were identified, and the results are presented in Table 1.

Table 1: Initial codes extracted from the interviews and brainstorming

Initial Code		
Additional incentives	Cost reduction	Awareness creation
Assistance and options	Energy difference	Government assistance

Initial Code		
Cooperation economy	Long-term savings	Lead by example
Discount income group	Self-sustaining	Community driven decision
Financial aid	System resilience	Neighborhood solar check
Financial incentives	Energy match needs	Malaysian climate
Flexible repayment	Sunlight assessment	Length of service
Low interest financing	Integrate existing system	Complex of project
Lower financing cost	Energy reuse	Understood well on the equipment and system
Lower income subsidies	Fit existing structure	Have teams to entertain
Specialized financing	Future home changes	Saving
Subsidies loans	Minor renovation	Worth
Subsidy assistance	No major renovation	No wiring expense
Tax relief	Roof direction and space	Solar substitute
Cost return	Panel maintenance and warranty	Necessity spend
Cost-saving power	Self-maintenance	
Financial sense	Contractor reputation	
Installation	Set and forget	
Long term investment	Home value	

Axial coding. Based on the results of initial coding, open coding was done. Then the results were classified based on axial coding. In the axial classification, all descriptions and initial codes that are around one axis were placed in one class. Based on the results of axial coding, 21 subcategories and 5 themes were identified: financial viability, performance and efficiency, practical considerations, external influences and company credibility. The results are presented in Table 2.

Table 2: Axial coding and subcategories extracted from the interviews

Axial code	Subcategories
Financial support and incentives	Additional incentives
	Assistance and options
	Cooperation economy
	Discount income group
	Financial aid
	Financial incentives
	Flexible repayment
	Low interest financing
	Lower financing cost
	Lower income subsidies
	Specialized financing
	Subsidies loans
	Subsidy assistance
	Tax relief
Financial consideration	Cost return
	Cost-saving power
	Financial sense
	Installation
	Long term investment

Axial code	Subcategories
	Saving
	Worth
Cost-effective installation	No wiring expense
Economic consideration	Solar substitute
Expenditure for necessity	Necessity spends
Performance and cost	Cost reduction
	Energy difference
	Long-term savings
System resilience and cost	Self-sustaining
	System resilience
Sunlight and energy efficiency	Energy match needs
	Sunlight assessment
Integration and system compatibility	Integrate existing system
Energy efficiency	Energy reuse
Renovation and installation considerations	Fit existing structure
	Future home changes
	Minor renovation
	No major renovation
	Roof direction and space
Maintenance knowledge and control	Panel maintenance and warranty
	Self-maintenance
Contractor evaluation	Contractor reputation
Convenience and maintenance	Set and forget
Property value and aesthetics	Home value
Awareness and leadership	Awareness creation
	Government assistance
	Lead by example
Community engagement	Community driven decision
	Neighbourhood solar check
Geographical advantage	Malaysian climate
Company experiences	Length of service
	Complex of project
System knowledge	Understood well on the equipment and system
After-sale service	Have teams to entertain

Selective coding. In this step of the research, the relationship obtained in open coding and the sub-categories resulting from axial coding with the main category based on the index of repetition was determined in the Table 3 below.

Table 3: Proposed themes and corresponding axial codes

Themes	Categories
Financial viability	Financial support and incentives
	Financial consideration
	Cost-effective installation
	Economic consideration
	Expenditure for necessity
Performance and efficiency	Performance and cost
	System resilience and cost

International Journal of Business and Technology Management
e-ISSN: 2682-7646 | Vol. 7, No. 3, 111-125, 2025
https://asianscholarsnetwork.com/asnet-journals

	Sunlight and energy efficiency
	Integration and system compatibility
	Energy efficiency
Practical considerations	Renovation and installation considerations
	Maintenance knowledge and control
	Contractor evaluation
	Convenience and maintenance
	Property value and aesthetics
External influences	Awareness and leadership
	Community engagement
	Geographical advantage
Company credibility	Company experiences
	System knowledge
	After-sale service

Theme 1: Financial viability factor. In this study, financial viability was independently coined by the researchers, and this is one of the unique contributions to the body of knowledge in solar PV in Malaysia. As such, financial viability is defined in the context of this study as the overall economic feasibility and attractiveness of installing solar photovoltaic systems. It refers to how practical and appealing it is for people to have solar panels on their homes. It is not just about money; it is about the overall economic feasibility and attractiveness of embracing solar power. This involves looking at things like getting financial support and incentives, thinking about the costs involved, considering if the installation is cost-effective, understanding the economic benefits, and pondering if it is a worthwhile expense for the household. This concept dives into what influences people to bring solar energy into their lives, exploring factors like external financial support, overall financial considerations, the practicality of installation costs, the economic rationale, and the idea of solar power as a necessary and justified expense.

Theme 2: Performance and efficiency factor. Performance and efficiency in the context of residential solar PV systems refer to the intricate evaluation of the system's operational functionality, economic efficacy, and environmental responsiveness, encompassing considerations of performance relative to costs, system resilience, sunlight utilization for energy efficiency, and integration compatibility. This coined theme encompasses a multifaceted evaluation of system functionality and effectiveness. Throughout the interview and the course of research, the researchers attempted to explore how people see the value in solar systems, not just in terms of their performance compared to the cost, but also considering how sturdy and long-lasting these systems are for the investment made. Specifically, the intricate relationship between the system's performance and associated costs is scrutinized, elucidating consumers' perceptions of the value derived concerning system output vis-à-vis the financial investment. Furthermore, the evaluation extends to the resilience and longevity of solar PV systems in relation to their associated costs, unravelling factors shaping perceptions of system durability. The environmental component, particularly sunlight availability, is scrutinized concerning energy efficiency, revealing the impact of external factors on overall system performance. The study further delves into the integration capabilities and compatibility of solar PV systems with existing household infrastructure, offering nuanced insights into overall performance considerations. Finally, the specific dimension of energy efficiency is investigated, seeking to discern consumers' evaluations of the efficacy of solar PV technology in converting sunlight into usable energy for domestic consumption. This research strives to furnish a comprehensive scholarly perspective on the determinants influencing end consumers' decisions regarding the adoption of solar PV technology, emphasizing performance, efficiency, and associated costs within the academic discourse on residential solar PV adoption.

Theme 3: Practical considerations. Practical considerations within the scope of residential solar PV adoption are defined as comprehensive assessment of renovation and installation factors, knowledge and control pertaining to maintenance, meticulous evaluation of contractors, and the convenience of system upkeep, all while accounting for the potential impact on property value and aesthetic considerations. This encompasses assessing renovation and installation considerations, which delve into the feasibility and logistical aspects of integrating solar systems into existing structures. The knowledge and control axis explore the importance of consumer awareness and control over maintenance processes, ensuring a sustainable and user-friendly experience. Contractor evaluation becomes pivotal, emphasizing the significance of scrutinizing service providers for reliable installations and ongoing support. Additionally, the theme encompasses convenience and maintenance, addressing the ease with which homeowners can manage and sustain their solar PV systems. Lastly, property value and aesthetics are crucial aspects, acknowledging the potential influence of solar installations on property value and the aesthetic appeal of the overall system. In essence, practical considerations encapsulate a holistic evaluation of factors affecting the integration and long-term management of residential solar PV systems.

Theme 4: External influences factor. The theme is defined as elements that collectively shape a person’s intention or behaviour, exerting a significant impact on individuals' decisions to adopt solar technology solutions. The derived theme encapsulates key takeaways that underscore the multifaceted dynamics influencing residential solar PV adoption. Firstly, there is a strategic emphasis on promoting solar adoption through effective communication and leadership, aiming to encourage both individuals and communities to embrace solar energy. This strategic approach recognizes the need for comprehensive awareness campaigns and influential leaders to drive widespread adoption. Secondly, the theme highlights the significance of community-driven decision-making, portraying the decision to adopt solar energy not merely as an individual choice but as a collective effort where shared decisions and heightened awareness within communities play a pivotal role. This reinforces the idea that community dynamics are integral to the success of solar initiatives. Lastly, the theme emphasizes the importance of leveraging geographical advantages, suggesting a tailored and region-specific approach to promoting solar adoption. By recognizing and capitalizing on geographical factors, such as climate and sunlight availability, a more targeted and effective strategy can be developed to facilitate the widespread adoption of solar technology. Together, these insights shed light on the interconnected aspects of strategic promotion, community-driven decisions, and leveraging geographical advantages in fostering the adoption of solar PV systems.

Theme 5: Company credibility factor. Company credibility in the context of residential solar PV adoption is defined as the collective perception of the reliability and trustworthiness of a solar company, encompassing factors such as the company's prior experiences in the industry, the depth of its system knowledge, and the effectiveness of its after-sale service. This theme delves into the holistic assessment of a company's credibility, highlighting the importance of its track record, technical expertise, and commitment to customer satisfaction in influencing consumers' decisions to adopt solar technology. While trust is a common theme in the study of solar technology adoption, it is mostly relating to government or governmental bodies overseeing power grids, for instance, trust in State Grid in China (Ding, 2021). Thus, this is another novel contribution of this research that looks into the trust derived from solar PV supplier or manufacturer.

6. Conclusion

In conclusion, this research contributes a nuanced understanding of the multifaceted factors influencing the adoption of residential solar photovoltaic (PV) systems in Malaysia. The identified themes, encompassing Financial Viability, Performance and Efficiency, Practical Considerations, External Influences, and Company Credibility, highlight the intricate dynamics shaping consumers' decisions. The study underscores the significance of a holistic approach, considering economic feasibility, system performance, practicality, external influences, and the credibility of solar companies. As argued by Khoo et al. (2023), understanding these factors is crucial for fostering a sustainable and widespread adoption of solar energy.

The findings emphasize the need for targeted awareness campaigns, community-driven decisions, and the strategic leveraging of geographical advantages to expedite solar adoption. This aligns with the assertion by Malik and Ayop (2020) regarding Malaysia's advantageous position for solar energy utilization. Policymakers are urged to address existing barriers and implement effective financial incentives, as suggested by Yu et al. (2022), to encourage residential solar PV adoption. Furthermore, solar companies must prioritize reliability and customer satisfaction, aligning with the findings of the research by Cook et al. (2024) on consumer behaviour in European countries.

As Malaysia strives to achieve its renewable energy targets, set by the Malaysian Ministry of Energy and Natural Resources, the insights derived from this research offer actionable recommendations for policymakers, businesses, and researchers. By overcoming the identified challenges, Malaysia can accelerate the integration of residential solar PV systems and progress towards a more sustainable energy future.

References

Abraim, M., Salihi, M., El Alani, O., Hanrieder, N., Ghennioui, H., Ghennioui, A., ... & Azouzoute, A. (2022). Techno-economic assessment of soiling losses in CSP and PV solar power plants: A case study for the semi-arid climate of Morocco. Energy Conversion and Management, 270, 116285.

Braun, V. & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3(2),* 77-101. Doi:10.1191/1478088706qp063oa

Burnett, J. W., & Hefner, F. (2021). Solar energy adoption: A case study of South Carolina. The Electricity Journal, 34(5), 106958.

Chachuli, F. S. M., Mat, S., Ludin, N. A., & Sopian, K. (2021). Performance evaluation of renewable energy R&D activities in Malaysia. Renewable Energy, 163, 544-560.

Chachuli, F. S. M., Ludin, N. A., Jedi, M. A. M., & Hamid, N. H. (2021). Transition of renewable energy policies in Malaysia: Benchmarking with data envelopment analysis. Renewable and Sustainable Energy Reviews, 150, 111456.

Cook, J., Williams, J., Harmon, J., Xu, K., & Nissen, K. (2024). Solar Pathways in Federal Energy Assistance Programs: Expanding the Low-Income Home Energy Assistance Program (LIHEAP) and the Weatherization Assistance Program (WAP) (No. NREL/TP-6A20-88519). National Renewable Energy Laboratory (NREL), Golden, CO (United States).

International Journal of Business and Technology Management
e-ISSN: 2682-7646 | Vol. 7, No. 3, 111-125, 2025
https://asianscholarsnetwork.com/asnet-journals

Creswell, J. & Creswell, J. D. (2018). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, 5th ed., Sage publications, Los Angeles, CA

Creswell, J. W. & Poth, C. N. (2018). Qualitative Inquiry and Research Design Choosing among Five Approaches, 4th ed., SAGE Publications, Thousand Oaks, CA

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS quarterly, 319-340.

Ding, L., Shi, Y., He, C., Dai, Q., Zhang, Z., Li, J., & Zhou, L. (2021). How does satisfaction of solar PV users enhance their trust in the power grid? - Evidence from PPAPs in rural China. Energy, Sustainability and Society, 11-31. Doi:10.1186/s13705-021-00306-4

Feldman, D., Dummit, K., Zuboy, J., Smith, B., Stright, D., Heine, M., & Margolis, R. (2023). Fall 2023 Solar Industry Update (No. NREL/PR-7A40-88026). National Renewable Energy Laboratory (NREL), Golden, CO (United States).

Hassan, M. K., Alqurashi, I. M., Salama, A. E., & Mohamed, A. F. (2022). Investigation the performance of PV solar cells in extremely hot environments. Journal of Umm Al-Qura University for Engineering and Architecture, 13(1), 18-26.

Heng, S. Y., Asako, Y., Suwa, T., Tan, L. K., Sharifmuddin, N. B., & Kamadinata, J. O. (2019). Performance of a small-scale solar cogeneration system in the equatorial zone of Malaysia. Energy Conversion and Management, 184, 127-138.

Hossain, M. Z., & Illias, H. A. (2022). Binary power generation system by utilizing solar energy in Malaysia. Ain Shams Engineering Journal, 13(4), 101650.

Khoo, T. J., Chai, T. Q., & Ha, C. Y. (2023). Readiness of Malaysian on Sustainable Development in Solar Energy Application. International Journal of Sustainable Construction Engineering and Technology, 14(1), 189-201.

Lan, J., Wang, T., Dong, J., Kang, S., Cheng, P., Liu, X., ... & Ma, L. (2021). The influence of ice sheet and solar insolation on Holocene moisture evolution in northern Central Asia. Earth-Science Reviews, 217, 103645.

Lapillonne, B., & Payan-Enerdata, E. (2023). Energy Efficiency Trends in Transport in the EU. Energy, 2.

Lau, L. S., Choong, Y. O., Wei, C. Y., Seow, A. N., Choong, C. K., Senadjki, A., & Ching, S. L. (2020). Investigating nonusers' behavioural intention towards solar photovoltaic technology in Malaysia: The role of knowledge transmission and price value. Energy Policy, 144, 111651.

Malik, S. A., & Ayop, A. R. (2020). Solar energy technology: Knowledge, awareness, and acceptance of B40 households in one district of Malaysia towards government initiatives. Technology in Society, 63, 101416.

Mohammad, S. T., Al-Kayiem, H. H., Aurybi, M. A., & Khlief, A. K. (2020). Measurement of global and direct normal solar energy radiation in Seri Iskandar and comparison with other cities of Malaysia. Case Studies in Thermal Engineering, 18, 100591.

Mostafaeipour, A., Alvandimanesh, M., Najafi, F., & Issakhov, A. (2021). Identifying challenges and barriers for development of solar energy by using fuzzy best-worst method: A case study. Energy, 226, 120355.

Muhammad-Sukki, F., Abu-Bakar, S. H., Munir, A. B., Yasin, S. H. M., Ramirez-Iniguez, R., McMeekin, S. G., ... & Tahar, R. M. (2014). Feed-in tariff for solar photovoltaic: The rise of Japan. Renewable energy, 68, 636-643.

Neupane, D., Kafle, S., Karki, K. R., Kim, D. H., & Pradhan, P. (2022). Solar and wind energy potential assessment at provincial level in Nepal: Geospatial and economic analysis. Renewable Energy, 181, 278-291.

Obaideen, K., AlMallahi, M. N., Alami, A. H., Ramadan, M., Abdelkareem, M. A., Shehata, N., & Olabi, A. G. (2021). On the contribution of solar energy to sustainable developments goals: Case study on Mohammed bin Rashid Al Maktoum Solar Park. International Journal of Thermofluids, 12, 100123.

Qahtan, A. M. (2019). Thermal performance of a double-skin façade exposed to direct solar radiation in the tropical climate of Malaysia: A case study. Case Studies in Thermal Engineering, 14, 100419.

Renewable capacity statistics 2021. IRENA. (2021, April 1). https://www.irena.org/publications/2021/March/Renewable-Capacity-Statistics-2021

Ren, X., Zhang, X., Yan, C., & Gozgor, G. (2022). Climate policy uncertainty and firm-level total factor productivity: Evidence from China. Energy Economics, 113, 106209.

Sekaran, U. & Bougie, R. J. (2019). Research Methods for Business: A Skill Building Approach, 8th ed., Wiley and Sons, Chichester, West Sussex

Setyawati, D. (2023). Social Acceptance in the Context of Energy Justice. In State-of-the-Art Indonesia Energy Transition: Empirical Analysis of Energy Programs Acceptance (pp. 13-27). Singapore: Springer Nature Singapore.

Solangi, K. H., Islam, M. R., Saidur, R., Rahim, N. A., & Fayaz, H. (2011). A review on global solar energy policy. Renewable and sustainable energy reviews, 15(4), 2149-2163.

Sovacool, B. K. (2021). Who are the victims of low-carbon transitions? Towards a political ecology of climate change mitigation. Energy Research & Social Science, 73, 101916.

Sreenath, S., Azmi, A. M., Dahlan, N. Y., & Sudhakar, K. (2022). A decade of solar PV deployment in ASEAN: Policy landscape and recommendations. Energy Reports, 8, 460-469.

Sreenath, S., Sudhakar, K., Yusop, A. F., Cuce, E., & Solomin, E. (2020). Analysis of solar PV glare in airport environment: Potential solutions. Results in Engineering, 5, 100079.

Sreenath, S., Sudhakar, K., & Yusop, A. F. (2020). Technical assessment of captive solar power plant: A case study of Senai airport, Malaysia. Renewable Energy, 152, 849-866.

Yasmeen, R., Yao, X., Padda, I. U. H., Shah, W. U. H., & Jie, W. (2022). Exploring the role of solar energy and foreign direct investment for clean environment: evidence from top 10 solar energy consuming countries. Renewable Energy, 185, 147-158.

Yin, R. K. (2017). Case Study Research and Applications: Design and Methods, 6th ed., SAGE Publications, Thousand Oaks, CA.

Yu, J., Tang, Y. M., Chau, K. Y., Nazar, R., Ali, S., & Iqbal, W. (2022). Role of solar-based renewable energy in mitigating CO2 emissions: evidence from quantile-on-quantile estimation. Renewable Energy, 182, 216-226.