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The Influence of Price Value and Knowledge Transmission on Intention to Adopt Rooftop PV Systems in Residential

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ABSTRACT

PURPOSE - The energy transition is a key priority in achieving Indonesia's net zero emission target, with rooftop photovoltaic (PV) systems promoted as a solution. However, adoption in residential areas, especially in Bandung Raya, remains low. This study investigates the influence of price value and knowledge transmission on intention to adopt rooftop photovoltaic (PV) systems in residential of Bandung Raya.

METHODOLOGY - . A quantitative approach was employed, with data gathered through an online survey Google Form, resulting in 253 valid responses.

FINDING - The findings indicate that both price value and knowledge transmission have a significant combined influence on adoption intention, with a determination coefficient (R^2) of 0.648. These insights are expected to support the development of public policies and marketing strategies by energy sector stakeholders, particularly by emphasizing educational outreach and affordable pricing options to promote greater household adoption of rooftop PV systems.

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INTRODUCTION

Indonesian government plans to accelerate the early decommissioning of coal power plants (JETP Indonesia, 2023). This statement is supported by President Prabowo Subianto, who announced the deactivation of all coal and fossil fuel power plants within the next 15 years, expressing optimism to achieve net zero emissions by 2050 (Malko, 2024). This aligns with the Paris Agreement, where energy transition serves as a key strategy for Indonesia in fulfilling its greenhouse gas emission reduction commitments under the Nationally Determined Contribution (NDC).

In line with this commitment, Presidential Regulation No. 79 of 2014 on the National Energy Policy (RUEN) aims to increase the share of renewable energy in the national energy mix to 23% by 2025. To support this, particularly in solar energy, the Ministry of Energy and Mineral Resources (MEMR) issued Regulation No. 49 of 2019, allowing all PT PLN's customers to participate in the use and management of renewable energy as part of efforts to achieve energy security and independence, especially solar energy (United States Agency for International

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Development, 2020).

However, despite the existing regulations, the adoption of solar energy, particularly rooftop PV systems, remains low. In 2024, utilization only reached 245 MW, which is around 27.19% of the annual target of 901 MW (IESR, 2024). This is far below the government's target of achieving 3,6 GW of rooftop PV systems by 2025. The significant gap between target and realization indicates that barriers to the adoption of rooftop PV systems among households still persist.

Several prior studies have explored these barriers. Research by Hidayatno et al. (2020) and Setyawati (2020) revealed that although the regulatory framework for rooftop PV is in place, its implementation and information dissemination remain suboptimal, hindering adoption intentions. Malik & Ayop (2020) emphasized that the lack of government support, such as funding and incentives, could also be a limiting factor. Additionally, solar energy is still perceived as more expensive compared to other sources like coal and wind Schmalensee, (2015) Other studies, such as Abdullah et al. (2023), Sumarsono et al. (2022), and Xu et al. (2023) have examined technical and regulatory aspects.

While economic studies mostly focus on macroeconomic factors like market structures and investment policies, there is a lack of research adopting a microeconomic perspective to understand household behavior and intention in adopting rooftop PV systems. This is crucial because increased household participation can significantly boost adoption levels in Indonesia (Hidayatno et al., 2020).

Among relevant microeconomic factors are price value and knowledge transmission (Lau et al., 2020). Price value refers to individuals perception of financial benefits compared to the installation costs of rooftop PV systems. Meanwhile, knowledge transmission concerns public understanding of renewable energy, the benefits of rooftop PV, and the availability of information about the technology. Bandung Raya was chosen as the research site due to its socioeconomic diversity, ranging from high to lower middle income households. This is supported by Badan Pusat Statistik (BPS) data that highlight disparities in purchasing power and human development across regions in Bandung Raya (Badan Pusat Statistik Kota Bandung (BPS), 2024; Badan Pusat Statistik Kabupaten Bandung Barat, 2024). Such diversity allows this research to offer broader insights into adoption intentions based on various socioeconomic backgrounds. Furthermore, no prior research has specifically examined adoption intentions of rooftop PV systems in Bandung Raya. Thus, this study aims to fill that gap by focusing on price value and knowledge transmission, analyzing their influence on household level rooftop PV adoption in the region.

LITERATURE REVIEW

Price Value

Price value relates to the perception of benefit an individual receives relative to the cost of adopting technology. Venkatesh et al. (2012), price value is defined as the comparison between the sacrifices made and the benefits received, which shapes an individual's decision to adopt technology. In this context, price value is considered positive when individuals perceive benefits of utilizing the technology are greater than the related costs. In the context of rooftop PV systems, this factor is particularly relevant, as economic incentives like electricity bill savings or government subsidies can significantly enhance adoption intention. Prior studies (Bekti et al., 2022; Lau et al., 2020; Mathilda et al., 2024) confirm that financial considerations remain a

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dominant motivator in renewable energy adoption decisions, making price value a vital element to investigate in this research.

Knowledge Transmission

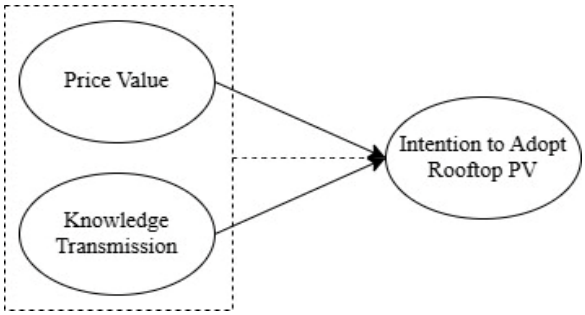
Definition of knowledge transmission is level of understanding and dissemination of information related to rooftop PV systems, which influences awareness and the intention to adopt the technology (Lau et al., 2020). It is a crucial factor that can either facilitate or hinder an individual's intention to adopt a product (Cheam et al., 2021). Consumers who possess greater knowledge about the performance attributes of renewable energy such as efficiency, advantages, and environmental impact tend to exhibit more positive attitudes and stronger adoption intentions (Hasheem et al., 2022). Wang et al., (2022) also found that consumers with higher levels of knowledge about green energy products are more likely to perceive them as beneficial and capable of contributing positively to environmental sustainability.

Intention to Adopt Rooftop PV Systems

Adoption intention is defined as how strongly an individual desires and plans to adopt a particular technology. According to Joubert & Van Belle (2013), adoption intention is the result of the cumulative influence of various factors that ultimately lead to the decision to act. In the context of renewable energy, Lau et al. (2020) and Cheam et al. (2021) emphasize that the adoption intention for rooftop PV systems is significantly influenced significantly positively by price value and the level of knowledge transmission.

Conceptual Framework

The following conceptual framework of the research conducted is based on the theoretical description and explanation of the relationship between the independent variables (price value and knowledge transmission) and the dependent variable (intention to adopt).



Sources: Processed data, 2025

METHODOLOGY

This study employed a quantitative approach using a survey method for data collection. The target population consisted of Indonesian residents living in the Bandung Raya area who met the following criteria: (a) aged between 20 and 59 years old, (b) employed with a steady income, and (c) had never installed a rooftop PV system in their household. These criteria were established to ensure that the respondents were potential users of solar energy technology who had the necessary purchasing power and were relevant to the context of its adoption. A total of 253 responses were collected through purposive sampling. Data were collected via an online questionnaire distributed via various social media platforms and community groups in Bandung

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Raya using Google Forms. Data were analysed using SPSS version 29, with all questionnaire items measured on a five point Likert scale. The measurement indicators for the variables were adapted from Lau et al. (2020) for both variables.

RESEARCH RESULTS

Profile Respondent

Based on Table 1, the respondents consisted of 144 males and 109 females, totaling 253 individuals. The 20–24 and 25–29 age groups had the highest number of respondents in terms of age distribution, with 58 and 57 individuals respectively. Meanwhile, the age group with the fewest respondents was 45–49 years old, with only 12 individuals.

Table 1. Gender by Age Group

Gender	Age						Total
	20-24	25-29	30-34	35-39	40-44	45-49	
Male	29	33	25	24	24	9	144
Female	29	24	17	14	22	3	109
Total	58	57	42	38	46	12	253

Sources: Processed Data, 2025

Based on respondents' residence, the majority lived in Kota Bandung, totaling 74 responses (29.2%), followed by Kabupaten Bandung Barat with 61 respondents (24.1%), Kabupaten Bandung with 55 respondents (21.7%), Kota Cimahi with 51 respondents (20.2%), and Kabupaten Sumedang with 12 respondents (4.7%). Based on level of monthly income, the largest group of respondents earned between IDR 2-4 million, accounting for 115 individuals (45.5%). The remaining respondents were distributed across income categories: 92 individuals (36.4%) earned IDR 5–7 million, 17 individuals (6.7%) earned IDR 8–9 million, 20 individuals (7.9%) earned IDR 10–15 million, and 9 individuals (3.6%) earned more than IDR 15 million. Regarding educational background, most of respondents had a bachelor's degree or equivalent (S1/D4), with 128 respondents (50.6%). A significant portion also held a high school education (SMA/SMK/MA or equivalent), totaling 78 individuals (30.8%). Respondents with a diploma (D1/D2/D3) made up 16.6% (42 individuals), and those with a master's degree (S2) accounted for only 2.0% (5 individuals).

Table 2. Income and Educational Background by Resindential Area

Characteristics	Domisili					Total
	Kota Bandung	Kab. Bandung Barat	Kab. Bandung	Kota Cimahi	Kab. Sumedang	
Income						
2-4 Juta/Bulan	31	26	28	22	8	115
5-7 Juta/Bulan	25	24	17	23	3	92
8-9 Juta/Bulan	9	3	5	0	0	17
10-15 Juta/Bulan	6	7	3	3	1	20
Rp15 Juta/Bulan	3	1	2	3	0	9
Education						

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SMA/SMK/MA	18	14	25	16	5	78
D1/D2/D3/Diploma	13	11	3	13	2	42
S1/D4/Sarjana	41	34	26	22	5	128
S2/Magister	2	2	1	0	0	5

Sources: Processed Data, 2025

Descriptive Statistic

The descriptive statistics in Table 3 indicate that the price value variable had a mean score of 4.119, with values ranging from a minimum of 3.668 to a maximum of 4.199, and a standard deviation of 0.857. This suggests that respondents generally perceived the economic value of rooftop PV systems as high and relatively consistent. The knowledge transmission variable had a mean value of 4.024, ranging from a minimum of 3.755 to a maximum of 4.194, with a standard deviation of 0.814. This indicates that respondents had a relatively strong and consistent understanding of rooftop PV technology. Meanwhile, the intention to adopt rooftop PV systems had a mean score of 0.714, with scores ranging from 3.779 to 4.348, and a standard deviation of 0.714, reflecting a relatively high and homogeneous level of intention among respondents to adopt the technology.

Table 3. Descriptive Statistic

	N	Minimum	Maximum	Mean	Std. Deviation
Price Value	253	3.668	4.119	4.119	0.857
Knowledge Transmission	253	3.755	4.194	4.024	0.814
Intention to Adopt Rooftop PV	253	3.779	4.348	0.714	0.035

Sources: Processed Data, 2025

Classical Assumption Test

A normality test was conducted using the non-parametric Kolmogorov Smirnov method. As shown in Table 4, the Asymp. Sig. value was 0.099. Due to this value being greater than the threshold of 0.05, it can be concluded that the data are normally distributed and thus meet the normality assumption.

Table 4. Normality Test

		Unstandardized Residual
N		253
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	1.83959959
Most Extreme Differences	Absolute	.052
	Positive	.033
	Negative	-.052
Test Statistic		.052
Asymp. Sig. (2-tailed)[c]		.099

Sources: Processed Data, 2025

The results of the multicollinearity test can be found in Table 5 reveal that both the price value and knowledge transmission variables have tolerance values of 0.994 and VIF values of 1.006. According to Hair et al. (2010), a dataset is considered free from multicollinearity if each

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variable has a tolerance value greater than 0.10 and a VIF less than 10.00.

Table 5. Multicollinearity Test

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	16.198	.765		21.184	.000		
	Price Value	.516	.026	.744	19.771	.000	.994	1.006
	Knowledge Transmission	.051	.008	.253	6.727	.000	.994	1.006

Sources: Processed Data, 2025

The heteroscedasticity test was performed using a regression of the absolute residuals on the independent variables, price value and knowledge transmission. Ghozali (2021) states that a dataset is considered free from heteroscedasticity if the significance value for each variable is more than 0.05. As shown in Table 6, the significance values were 0.076 for price value and 0.874 for knowledge transmission, indicating that the data do not suffer from heteroscedasticity.

Table 6. Heteroskedasticity Test

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.201	.448		4.914	.000
	Price Value	-.027	.015	-.112	-1.780	.076
	Knowledge Transmission	.001	.004	.010	.159	.874

Sources: Processed Data, 2025

Based on the multiple linear regression analysis Table 7, the constant value is 16.198, indicating that if price value and knowledge transmission are both zero, the baseline intention to adopt rooftop solar panels is 16.198. The price value variable has a regression coefficient of 0.516 with a significance value of 0.000 (Sig. < 0.05), indicating that a one unit increase in price value leads to a 0.516 increase in adoption intention.

Table 7. T Test

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	16.198	.765		21.184	.000
	Price Value	.516	.026	.744	19.771	.000
	Knowledge Transmission	.051	.008	.253	6.727	.000

Sources: Processed Data, 2025

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Meanwhile, knowledge transmission has a regression coefficient of 0.051 and a significance value of 0.000, meaning that a one-unit increase in this variable also contributes positively to the intention to adopt rooftop solar panels. The resulting regression model can be expressed as:

$$Y = 16.198 + 0{,}516X1 + 0{,}051X2 \quad (1)$$

Hypothesis Test

The results of the hypothesis testing presented in Table 8 T test indicate price value has a regression coefficient (β) of 0.516 with a significance level of 0.000 ($p < 0.05$). Meanwhile, the knowledge transmission variable has a regression coefficient (β) of 0.051, also with a significance level of 0.000 ($p < 0.05$). These findings suggest that both variables contribute positively to the adoption intention, with price value exerting a stronger influence compared to knowledge transmission. Moreover, the t value for price value (19.771) > t table value (1.969) and the t value for knowledge transmission (6.727) also exceeds the t table value (1.969), proving that these variables have a individual influence.

Table 8. T Test

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	16.198	.765		21.184	.000
	Price Value	.516	.026	.744	19.771	.000
	Knowledge Transmission	.051	.008	.253	6.727	.000

Sources: Processed Data, 2025

F test results presented Table 9 show the sig. value 0.000, which is below 0.05. According to Ghozali (2021), an F test value below 0.05 implies that regression model is statistically significant. This means independent variables have a collective influence on dependent variable. In the context of this study, the sig. value of 0.000 < 0.05 suggests price value and knowledge transmission simultaneously have a significant effect on intention to adopt rooftop PV systems. In addition, the calculated f value (230.176) > F table (3.878), confirming that the two variables studied have a simultaneous influence.

Table 9. F Test

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1570.354	2	785.177	230.176	.000[b]
	Residual	852.800	250	3.411		
	Total	2423.154	252			

Sources: Processed Data, 2025

Coefficient Determination

Shown in Table 10, the R^2 value is 0.648. This indicates that 64.8% of intention to adopt rooftop PV systems explained by the independent variables of price value and knowledge transmission.

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Table 10. Coefficient Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.805[a]	.648	.645	1.84694

Sources: Processed Data, 2025

DISCUSSION

The results indicate that price value has a significant positive influence on the intention to adopt rooftop photovoltaic (PV) systems. For non users, particularly households in middle income countries like Indonesia, price value serves as a primary consideration in adoption decisions (Lau et al., 2020). Mathilda et al. (2024) confirms that Indonesia, as a middle income country, is highly sensitive to price factors. Individuals before deciding to adopt new technology tend to compare the initial investment with sustained benefits, such as financial savings on electricity, contributions to environmental preservation, available incentives, and maintenance costs (Bekti et al., 2022; Lam et al., 2025). When technology is perceived as offering value for money, the intention of adoption increases (Lau et al., 2021). Setyawati (2020) also highlight the strategic importance of incentives in promoting rooftop PV adoption in Indonesia. Consistent with previous research, the descriptive analysis in this study finds that most respondents agree that the installation cost of rooftop PV systems is proportional to the benefits received, viewing it as a worthwhile long term investment.

Knowledge transmission also significantly and positively impacts individuals' intention to adopt rooftop PV systems. Knowledge serves as a key factor in determining behavioral intention, as individuals tend to seek relevant information before adopting a new technology (Lau et al., 2020). Understanding aspects such as energy efficiency, technological advantages, and environmental impact fosters more favorable attitudes toward adoption (Hasheem et al., 2022). Wang et al. (2022) further emphasize that consumers with higher levels of energy literacy are more likely to trust the benefits of green energy products, thereby increasing adoption intentions. In this study, the descriptive findings also support this claim, revealing that most respondents possess adequate knowledge of rooftop PV systems and find related information easily accessible, especially via the internet.

Simultaneously, price value and knowledge transmission collectively have a significant effect on adoption intention, with a coefficient of determination (R^2) of 0.648. This indicates that both variables explain 64.8% of the variance in the intention to adopt rooftop PV systems. Although both factors exert a positive influence, price value emerges as the dominant predictor, as reflected in its higher regression coefficient. This suggests that adoption intention is more strongly influenced by price value considerations than by knowledge alone. The studies conducted by Lau et al. (2020), Bekti et al. (2022), Lam et al. (2025)share a similar view, highlighting price value as the most influential factor in the intention to adopt rooftop PV systems. Nevertheless, the role of information dissemination and education remains essential in enhancing individuals confidence toward rooftop PV systems. Cheam et al. (2021) found that a good understanding of rooftop PV systems positively impact on intention to adopt, especially among those who have never used the technology before.

CONCLUSIONS AND SUGGESTION

This study concludes that both price value and knowledge transmission have a positive and significant influence, partially and simultaneously on intention to adopt rooftop PV systems in Bandung Raya. Among these, price value emerges as the dominant factor, reflecting that perceived economic benefits are the main driver of adoption decisions. Middle income households, particularly those with higher education and financial awareness, tend to be more responsive to the balance between cost and long term savings. Meanwhile, knowledge

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transmission supports this process by strengthening public understanding, reducing uncertainty, and increasing confidence in solar technology. Therefore, it is recommended that the government and energy industry stakeholders prioritize strategies that emphasize economic value through financial incentive schemes and education on cost efficiency and return on investment. Additionally, efforts to disseminate information about rooftop PV system should be strengthened through digital media and community based collaborations. Future research is recommended to explore other regions with different demographic characteristic and consider additional variables beyond price value and knowledge transmission.

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