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PREDICTORS OF INTEREST IN CLIMATE INNOVATION ADOPTION FOR ELECTRICIY GENERATION: A CASE OF HOUSEHOLDS IN LAGOS STATE

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ABSTRACT
Climate innovation is a pillar to the transition from high carbon to zero carbon emitting electricity generation to attain the united nation net-zero greenhouse gas (GHG) emission. Globally, climate innovation is driving the energy sector towards climate neutrality, but little is known about the factors that influences the adoption in Nigeria. The main purpose of this study was to investigate the factors that influence interest of households to adopt climate innovation, particularly solar PV technology for electricity generation in Lagos state to speed up the process of the adoption in Nigeria. Quantitative survey research design with multi stage sampling technique was employed. A total of 585 valid responses comprising of 230 users and 355 potential users were analysed with partial least squares structural equation modeling (PLS-SEM) in SmartPLS 3.2.7. The tested variables of diffusion of innovation framework adopted for the study accounted for 43.5% of the variance in the interest in solar PV adoption. The findings highlight social influence, visibility of the installed solar PV in the neighbourhood and the interest in learning about solar PV technology as motivators of the household's interest in contacting solar PV sellers and installing Solar PV. The research concludes that innovativeness, characteristics of the innovation, communication channels and social curiosity play significant roles in influencing interest in climate innovation adoption. The policy makers, promoters and sellers of solar PV could target late adopters of technologies and use social networks to share reliable information from trusted sources to speed up adoption of solar PV technology. Further researches could be conducted from the perspective of environmental and consumer behaviour.
Keywords: Climate change, Climate innovation adoption, solar photovoltaic, Electricity generation, Diffusion of innovation

Introduction
The aspiration to limit the global temperature rise to 1.5^0C above the pre industrial level as set in the United Nations 2015 Paris climate agreement is driving the ongoing global revolutionary transformation of the energy system to achieve net-zero greenhouse gas (GHG) emissions by 2050

(IPCC, 2018). The shifting of the energy use to electricity and the transition to climate neutrality in the face of the present climate and energy crisis push for climate innovation. Recent studies [National Oceanic and Atmospheric Administration (NOAA), 2020; World Meteorological Organization (WMO) 2020; Glemarec, 2021] revealed that the concentration of GHG in the atmosphere keep rising in the postindustrial time. Carbon dioxide (CO_2), a major fraction of GHG in the atmosphere increased from 280 parts per million (ppm) in pre-industrial period (1850 – 1901) to over 420 ppm in year 2021 though there was negligible CO_2 emission reduction during the Covid-19 lockdown in 2020 (Forster et al., 2020). The average temperature exceeded 1.5°C above pre industrial levels in 2024 to be the warmest year in the last 175 year of record observation (WMO, 2025). IEA (2023) reported that the rate of CO_2 emissions growth over the last decade is slower than the past experience, with total energy-related emissions increased between 2019 and 2023 by around 900 Mt to reach a new global high record of 37.4 Gt. However, the global CO_2 emissions from fossil fuels continue to rise (Friedlingstein, et al., 2025). Against this backdrop of continual build-up of CO_2 in the atmosphere albeit at slow rate, urgent mitigating interventions and climate actions are deemed necessary to prevent the catastrophic effect of the existential climate change threats to humanity.

Nigeria has the largest population of about 86 million people without access to electricity (12.7% of the global energy access deficit) in 2021 and those that do have access, mostly in urban areas face the challenges of unreliable and insufficient supply from the national grid (IEA et al., 2023). This urban population comprising of businesses and households often filled this energy gap with expensive and heavy CO_2 emitting back up fossil fueled generating sets. Lagos has the highest number of fossils fueled individual power generating sets with the largest energy sector emission (14,563,211 tCO_2e in 2015) accounting for 55.1% of Lagos State's total GHG emissions (Lagos climate action plan, 2021). Nigeria, one of the countries worst hit by the impacts of climate change is facing significant climate-related challenges including rising temperatures, erratic rainfall, flooding, and desertification. Nigeria is ranked to be among the top ten most climate-vulnerable Countries and Lagos the tenth most climate change vulnerable city in the world (Roche et al., 2020).

Nigeria is faced with a multiple-pronged need to survive the current climate-related challenges and adapt to the changing climate. The national electricity mix is highly carbon based with 81% gas fueled generation and only 14% hydro generation. Hence the nationally determined contribution (NDC) of Nigeria to the Paris agreement allocates 60% of the total GHG emission to the energy sector. Nigeria is committed to reducing its GHG emissions by 20% unconditionally and 47% conditionally by 2030, and to reach net-zero emission by 2060 (IRENA, 2023a). Nigeria projected solar PV capacity investment to reach 32 GW in 2030 and 115 GW by 2050 corresponding to 70% by 2030 and 84% by

2050 of the renewable energy capacity respectively in its transforming energy scenario (TES). The total projected installed power generation capacity is 77% renewable in 2030 and 92% renewable in 2050 in the TES (IRENA, 2023a).

Solar energy, a form of renewable energy with large technological potential is recognised to be among the cleanest energy sources used to generate electricity by directly using solar photovoltaic (PV) technology (Amoako & Wilson, 2017; Jesuleye, et al., 2020a). Studies (Ahmad et al., 2017; Nwankwo et al, 2020; Jesuleye et al., 2020b) shows that solar PV technology-based electricity generation is a climate technology innovation ranked as the most sustainable and climate friendly for electricity generation among the various available renewable fueled electricity generation technologies. Solar PV technology and the business models to support the transforming of the high carbon energy sector to zero carbon emitting sector has reached the diffusion stage (Victor et al., 2019). In this regard there has been significant and rapid improvement in the cost and technological development of solar energy generation in the last decade (IRENA, 2021) which position solar PV technology at a competitive level with the fossil fueled power generation technologies (United nations, 2025).

Studies in climate innovation is increasingly attracting scholarly interest largely in energy technology, energy efficiency and policy initiative with most contributions from the United States of America, England and China (Chen et al., 2022). There are sparse studies in climate innovation in Africa particularly, Nigeria where the efforts to increase energy access and extenuate climate change are focused on exploitation of climate innovation particularly solar PV technology. This is to enhance the country's delivery on the NDC towards achieving SDGs 7 (sustainable energy), 13 (climate action), and net zero emission. Hence this study seeks to fill this gap by investigating the factors that influence the interest of households' adoption of solar PV technology as a climate innovation for electricity generation in Lagos State from the perspective of the diffusion of innovation theory. This is with a view to speed up the adoption of solar PV technology in Nigeria. The study will contribute to knowledge in the area of climate innovation adoption in Nigeria. Additionally, the study will also guide climate mitigation policy formulation and the interventions to promote climate innovation adoption in Nigeria.

Literature Review

Climate Innovation

Climate innovation refers to all innovations which result in the direct or indirect prevention of GHG emissions especially carbon dioxide emissions (Ehrenfeld, 2012). In other words, they are cutting-edge solutions to tackle the global climate crisis by eliminating the carbon footprint and adapt to the changes through new, game-changing ideas and technology. The transformative climate innovations span policy, culture, institutions, science, technology, management and finance

(Glemarec, 202; (OPELE, J.K., Alade, T.T & Ajifowoke, 2024)1). This includes development and deployment of technologies, policies, and business models that help to mitigate greenhouse gas emissions, adapt to climate change impacts, and transition toward a low-carbon and climate-resilient economy (Cheng et al., 2022). A case point is the uptake of renewable energy technology particularly solar photovoltaic (PV) technology for electricity generation to limit the rise in global temperature close to 1.5^0C from the pre-industrial times. Solar PV as a climate technology innovation uses solar modules to directly convert sunlight to electricity with PV cells comprising of semiconductor layers, such as silicon without GHG emission (Adepoju et al., 2020). Climate energy technology innovation is vital to address climate change, meet growing energy needs, and advance sustainable economic development.

Diffusion of Innovation (DOI) Theory

Recent studies (Chen, 2014; Alrashoud and Tokimatsu, 2019; Flores and Jansson (2021) have explored the driving of climate progress in adopting and scaling the climate solutions necessary to support the global energy transition to meet SDG 7 and SDG 13 goals by 2030, as well as net-zero GHG emission by 2050 based on the concept of diffusion of innovation (DOI) theory. The concept of diffusion of innovation (DOI) theory developed by Rogers (1983) describes the process of adopting an innovation in the form of a new solution, an idea, service or new object to a particular user. The theory seeks to explain why and how new solutions, concepts and practices are adopted as well as why the adoption of new solutions can spread out over long period of time. Rogers (1983, p. 5) define Diffusion as "The process by which innovation is communicated through certain channels over time among members of a social system". The scholar define communication as "a process in which participants create and share information with one another in order to reach a mutual understanding" (Rogers, 1983). Communication channel is "the means by which messages move from one individual to another" (Rogers, 1983, p. 17). The theory asserted that appropriate selection and the message passed through the communication channels are vital factors in the diffusion of innovation process.

DOI theory also postulates that the interest to adopt an innovation depends on its characteristics consisting of relative advantage (perceived superiority), compatibility (alignment with needs), complexity (user friendliness), trialability (testing possibility) and observability (visibility) of the innovation. According to Bakkabulindi (2014) if a user sees a new solution or product to be of a higher relative advantage over an existing solution or product base on its performance, higher compatibility with the users interest or desire, lower complexity in the use of the new solution or product, higher observability such that the benefits delivered by the new solution or product can be more observed, and higher trialability which is the degree that the new solution or product can be successfully experimented

before acquiring it, then the interest of the user to adopt the new solution or product will be higher. Furthermore, based on the consumer's innovativeness the theory categorised innovation adopters as innovators, early adopters, early majority, late majority and laggards. The stages of decision-making process are distinguished as knowledge, persuasion, decision, implementation and confirmation (Rogers, 1983). According to Staniszewska (2015) renewable energy solutions are innovations that are new solution for a specific user or social group. The scholar posited that the stages of decision-making particularly the knowledge and persuasion stages should be analysed carefully to successfully disseminate renewable energy solution in the society to build social acceptance for the solutions. The early adopters' categories are distinguished to have social trust, influence and guide the community opinion on a given solution therefore they play very important role in promoting energy related solutions (Opele et al., 2021). Staniszewska (2015) concluded that DOI theory can contribute significantly to reducing the social resistance of potential customers and increase the efficiency of the diffusion process itself and hence can be practically applied to the dissemination of renewable energy solutions.

Hypothesis Development

This research investigated how the various components of Rogers's diffusion of innovation theory through innovativeness, communication channels and characteristics of the innovation influence households' interest in adoption of solar PV technology in Lagos state, Nigeria. The study developed and tested the following hypotheses.

Innovativeness indicates "the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system" (Rogers, 2003, p. 22). Flores and Jansson (2021) investigated the relationship of consumer innovativeness and green perceptions on green innovation use, focusing shared e-bikes and e-scooters as case study in Sweden. The study found that Consumer innovativeness and green perceptions had positive significant relationship with the use of shared e-bikes and shared e-scooters. Similarly, Sun et alThis aligns with the findings of Sun et al. (2020) that consumer innovativeness significantly influences the attitude toward rooftop PV installation. Chen (2014) also concluded that consumers' innovativeness influences the intention to install a residential solar power system, and that interest in technical innovation and enjoyment of the technical aspects of energy systems stimulated early adopters of residential solar electricity system. Wolske et al. (2017) also study found that innovativeness through consumer novelty seeking and consumer independent judgment making significantly and positively influenced interest in talking to solar PV installer in the United States of America. Thus, the following hypotheses are proposed:

Hypothesis 1a. Consumer novelty seeking significantly influence households' interest in solar PV technology adoption in Lagos State

Hypothesis 1b. Consumer independent judgment making significantly influence urban households' interest in solar PV technology adoption in Lagos State.

Characteristics of the innovation represent the perceived persuasion features of innovation that predicts the rate of adoption of innovation (Rogers, 2003). For instance, Alrashoud and Tokimatsu (2019) investigated the rate of accepting to install solar PV and identified the critical factors that may act as motivators or disincentives throughout the perspective of sociotechnical systems regarding solar PV systems diffusion. The acceptors' (97.46% of the respondents) interest in installation of solar PV was influenced by relative advantage attributes which include reduction of the effects of global warming and provision of a source of unlimited electricity supply. Furthermore, Putria et al. (2019); investigated the social and psychological determinants of interest in solar PV among 174 highly educated, non-adopter respondents who were aware of solar PV in Jakarta Metropolitan area of Indonesia. The study revealed that compatibility, complexity and observability have significant direct and indirect effect on interest in solar PV adoption. Similarly, Wolske et al. (2017) found that the perceived characteristics of the innovation through trialability, relative advantage, perceived riskiness (complexity and compatibility) and observability significantly and positively predicted interest in talking to a solar PV installer in the United State of America. The findings also agree with related study on innovation in Nigeria (Adeyeye et al., 2018) Hence the study included the characteristics of the innovation in the model to examine them in the context of solar PV adoption in Lagos, Nigeria and proposed the following hypotheses:

Hypothesis 2a. Relative advantage significantly influence households' interest in solar PV technology adoption in Lagos State.

Hypothesis 2b. Trialability significantly influence households' interest in solar PV technology adoption in Lagos State.
Hypothesis 2c. Compatibility significantly influence households' interest in solar PV technology adoption in Lagos State.

Hypothesis 2d. Complexity significantly influence households' interest in solar PV technology adoption in Lagos State.
Hypothesis 2e. Observability significantly influence households' interest in solar PV technology adoption in Lagos State.

Communication Channels is described as "a process in which participants create and share information with one another in order to reach a mutual understanding" (Rogers, 2003, p. 5). The scholar postulated that technologies and innovations adoption is partly related to individual's information sharing process with their neighbours. This is consistent with similar studies in the United States (Bollinger & Gillingham, 2012; Graziano & Gillingham, 2015) and Germany (Rode & Weber, 2016) that peer influence drives the adoption of residential solar PV. The result also agrees with the

findings of Caplan (2023), that social interaction (peer) speed up the adoption of rooftop-solar PV. Wolske et al. (2017) in a studyin the United State of America also found that communication channels through PV marketing, trust in PV industry and trust in social network significantly stimulated interest in talking to a solar PV installer. From this, the study proposes hypotheses as follows:

Hypothesis 3a. PV marketing significantly influence households' interest in solar PV technology adoption in Lagos State.
Hypothesis 3b. Trust in Industry significantly influence households' interest in solar PV technology adoption in Lagos State.
Hypothesis 3c. Trust in Social Network significantly influence households' interest in solar PV technology adoption in Lagos State.
Social Curiosity shows that people's actions and decisions are regularly influenced by their social environment and according to Renner (2006) social curiosity facilitates the acquisition of social information and knowledge. Litman and Pezzo (2005; 2007) posit that an individual with social curiosity look for social situations to actively search and obtain new social information and consequently may acquire more knowledge about the social environment. Wolske et al. (2017) tested DOI framework to investigate the factors that drives interest in solar PV adoption in the United States of America by introducing social curiosity as mediating variable penultimate interest in solar PV adoption. The study found that relative advantage and trialability positively influenced interest in solar PV adoption through social curiosity. Similarly, the study of Putria et al. (2019) in Indonesia shows that complexity of the innovation indirectly influenced interest in solar PV adoption through social curiosity. Hence the study proposes the following hypothesis:

Hypothesis 4. Social Curiosity significantly influence households' interest in solar PV technology adoption in Lagos State.
Based on the above hypotheses the model adopted to test the relationships among the constructs for this study is shown in figure1.

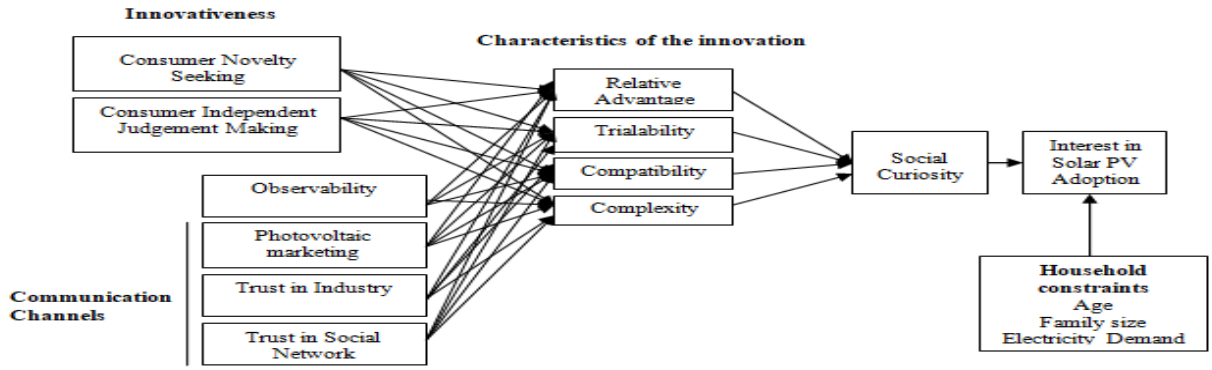


Figure 1. Conceptual framework (Adapted from Wolske et al., 2017 and Putria et al., 2019

Methodology

The study employed quantitative survey research design to investigate the influence of the independent variables comprising of consumer innovativeness, characteristics of the innovation and the communication channels on the dependent variables comprising of social curiosity and the interest in Solar PV adoption. Social curiosity was introduced as mediator and the penultimate variable to know how interested the respondents are in learning about the benefits and cost of Solar PV when a friend, family or neighbor installed Solar PV based on the recency of the study of Wolske et al. (2017) and (Putria et al. (2019). Innovativeness at the early and late stages of adoption were measured through consumer novelty seeking and consumer independent judgement making scales respectively. Communication channels were assessed through PV marketing, trust in PV industry and trust in social network. The characteristics of the innovation were tested through relative advantage, trialability, compatibility, complexity and observability of the innovation. A total of 11 constructs within the proposed DOI model and 38 indicators were investigated. The indicators were measured on a 5-point Likert scale ranging from 1- strongly disagree, 2- Disagree, 3- Don't know, 4- Agree to 5- strongly agree. The target population for the study consisted of the Solar PV users and potential user households in the metropolitan area of Lagos state. The population consisted of different categories of households encompassing the affluent, middleclass and poor with good portfolio of housing types suitable for roof-top photovoltaic installations (Enongene et al., 2019).

Multi-stage sampling technique was adopted for the study. At the first stage, purposive sampling technique was used to select the metropolitan area of Lagos state being the state with the highest number of back up individual fossil fueled generating sets and 55.1% of the state's total GHG emission in the energy sector (Lagos climate action plan, 2021). Proportionate sampling technique was employed at the second stage to select the appropriate samples of user and potential user households from the population of each local government areas in the metropolitan area. Thereafter simple random sampling technique was engaged to select the household sample in the potential adopter sub group, while snowball technique was used to select the sample from the widely dispersed adopter households in the study area by referral.

The study employed Yamane formula (1967) for sample size calculation. A total of 800 questionnaires consisting of 400 each for users and potential users were distributed. 585 completed questionnaires comprising of 230 user and 355 potential user households were retrieved resulting in 73% response rate. 228 and 326 retrieved questionnaires from users and potential users respectively giving a total of 554 were found suitable for analysis. This aligns with the suggestion of Churchill and Dawn (2006) that in behavioral studies the sample size should range from 200 to 500 respondents.

Descriptive statistics was conducted to analyse the sociodemographic characteristics of the respondents and Partial least squares-structural equation modeling (PLS-SEM) was adopted and. SmartPLS 3.2.7 was used to analyse the construct relationships developed in the model. The software possesses a friendly user interface with advanced reporting features. The sample sizes 228 for users and 326 for potential users were higher than PLS-SEM sampling threshold of 100 samples (Reinartz et al., 2009) indicating that the sample size for the research was adequate for the analysis method. The model was tested controlling for household constraints comprising age, family size and electricity demand.

Results and Discussion

Socio-demographic Analysis

Table 1 shows that about two third of the respondents (65%) were male. The highest percentage of the respondents (38.2%) was in the age bracket of 31-40 years. Majority of the respondents 76.5% were married while similarly almost all the respondents were educated to undergraduate level upwards (about two third 63% were educated to undergraduate level). As regards the number of people living in a house, the house with four people accounted for 28%, about half (50.9%) of the respondents own the homes that they live in and similarly dwell in flats (Apartments) type of dwellings. Table 1 further shows that almost all (94.8%) of the respondents' dwellings are connected to the national grid for electricity supply while many (36.8%) of the respondents earn between N1m - N3m as income per year and similarly, many (38.1%) of the respondents pay between N5,000-N10,000 as electricity bill in a month. From table 1, one could deduce that the respondents were matured, educated, and knowledgeable to understand and interpret the questionnaire, and could take decision on vital affairs regarding their households. Similar demographic characteristics has been documented in related study (Adewole & Opele, 2019) Besides, the respondents consisted of home owners and tenants with varying numbers of household members, and different categories of dwelling types and sizes of which almost all were connected to the national grid. These were suitable for the scope of the study.

Table 1.Socio-demographic Characteristics of the Respondents

Parameters	Classification	Total	Percentage (%)
Gender	Male	360	65
	Female	194	35
Total		**554**	**100**
Age	21-30yrs	99	17.9
	31-40yrs	212	38.2
	41-50yrs	146	26.4
	Above 50yrs	97	17.5
Total		**554**	**100**
Marital Status	single	92	16.6
	married	424	76.5
	Divorced	25	4.5
	Widowed	13	2.4
Total		**554**	**100**
Education	Primary	8	1.4
	Secondary	33	6.0
	Undergraduate	349	63.0
	Post graduate	164	29.6
Total		**554**	**100**
Number of people living in house	2	53	9.5
	3	89	16.1
	4	155	28.0
	5	136	24.5
	6 and above	118	21.3
	6.00	3	0.5
Total		**554**	**100**
Ownership of home	yes	282	50.9
	No	272	49.1
Total		**554**	**100**
Number of bedroom in the house	1	42	7.6
	2	111	20.0
	3	216	39.0
	4	122	22.0
	5	47	8.5
	6 and above	16	2.9
Total		**554**	**100**
Type of dwelling	Duplex	77	13.9
	Bungalow	129	23.3
	Detached house	23	4.1
	Semi-detached	12	2.2
	Terraced house	7	1.3
	Flat (Apartments)	282	50.9
	Tenement(face to face)	24	4.3
Total		**554**	**100**
Dwelling connection to national grid	Yes	525	94.8
	No	29	5.2
Total		**554**	**100**
Bands of approximate total household income per year (N)?	Less than 1m	192	34.7
	1m - 3m	204	36.8
	3m - 5m	93	16.8
	5m - 10m	46	8.3
	10m - 20m	12	2.2
	Over 20m	7	1.2
Total		**554**	**100**
Average monthly electricity bill (N)?	Below 5000	181	32.7
	5000 - 10000	211	38.1
	10000 - 15000	52	9.4
	15000 - 20000	49	8.8
	Above 20000	61	11.0
Total		**554**	**100**

Evaluation of Measurement Model

4.2.1 Reflective Measurement Model

Table 2 revealed that Cronbach's alpha (CA) ranged from 0.776 to 0.895 and composite reliability (CR) ranged from 0.855 to 0.934. All the CA and CR values exceeded the minimum acceptable threshold level of 0.70 and lower than the maximum acceptable threshold level of 0.95. This implied that all the reflective constructs have sufficient levels of internal consistency reliability. The average variance extracted (AVE) values ranged from 0.598 to 0.825 which were above the minimum acceptable AVE value of 0.50 indicating that all latent variables were able to explain more than half of the variance of its indicators suggesting adequate convergent validity.

There was no cross loading of higher values found with opposing latent constructs indicating satisfactory discriminant validity as shown in Table 2.

Table 2. Internal consistency reliability, Convergent validity and Discriminant validity.

Construct	Indicator	Outer Loading	Cronbach's Alpha	Composite Reliability	AVE
dCIJM	dDOICICIJM1	0.898	0.849	0.909	0.768
	dDOICICIJM2	0.866			
	dDOICICIJM3	0.865			
dCNS	dDOICCTSN1	0.805	0.795	0.875	0.701
	dDOICCTSN2	0.849			
	dDOICCTSN3	0.822			
dCX	dDOICmx1	0.827	0.877	0.914	0.728
	dDOICmx2	0.875			
	dDOICmx3	0.831			
	dDOICmx4	0.879			
dEPM	dDOICCEPM1	0.850	0.832	0.887	0.664
	dDOICCEPM2	0.832			
	dDOICCEPM3	0.781			
	dDOICCEPM4	0.794			
dOBS	dDOIOB1	0.778	0.775	0.855	0.598
	dDOIOB2	0.777			
	dDOIOB3	0.864			
	dDOIOB4	0.662			
dRA	dDOIRA1	0.781	0.802	0.863	0.559
	dDOIRA2	0.809			
	dDOIRA3	0.801			
	dDOIRA4	0.649			
	dDOIRA5	0.683			
dTPV	dDOICCTPVI1	0.901	0.895	0.934	0.825
	dDOICCTPVI2	0.897			
	dDOICCTPVI3	0.926			
dTR	dDOITR1	0.746	0.806	0.870	0.628
	dDOITR2	0.847			
	dDOITR3	0.833			
	OITR4	0.737			
dTSN	dDOICCTSN1	0.805	0.766	0.865	0.681
	dDOICCTSN2	0.849			
	dDOICCTSN3	0.822			
fSOCU	fSOCU1	0.824	0.891	0.924	0.754
	fSOCU2	0.881			
	fSOCU3	0.887			

	fSOCU4	0.878			
gINTRST	gINTRST1	0.856	0.867	0.909	0.714
	gINTRST2	0.885			
	gINTRST3	0.859			
	gINTRST4	0.777			

Notes: dCIJM = consumer independent judgment making, dCNS = consumer novelty seeking, dCX = complexity, dEPM = Exposure to PV marketing dOBS= observability, dRA = relative advantage. dTPV = Trust in PV industry, dTR = Trialability, dTSN = Trust in social network fSOCU = social curiosity, gINSTRST = interest

The Heterotrait-Monotrait (HTMT) criterion result shown in Table 3 indicated that all the HTMT values were below the critical value of 0.85 suggesting acceptable discriminant validity

Table 3. Discriminant validity- Heterotrait-Monotrait (HTMT) RatioTest

	dCIJM	dCNS	dCX	dEPM	dOBS	dRA	dTPV	dTR	dTSN	fSOCU	gINSTRST
dCIJM											
dCNS	0.562										
dCX	0.173	0.118									
dEPM	0.281	0.431	0.092								
dOBS	0.446	0.478	0.164	0.486							
dRA	0.516	0.337	0.191	0.248	0.358						
dTPV	0.247	0.353	0.069	0.462	0.421	0.256					
dTR	0.426	0.251	0.300	0.173	0.121	0.240	0.148				
dTSN	0.449	0.301	0.078	0.306	0.306	0.296	0.454	0.384			
fSOCU	0.138	0.072	0.079	0.065	0.126	0.070	0.133	0.153	0.269		
gINSTRST	0.124	0.095	0.100	0.089	0.134	0.102	0.063	0.079	0.163	0.731	

Notes: dCB=compatibility, dCIJM= consumer independent judgment making, dCNS= consumer novelty seeking, dCX = complexity, dEPM= exposure to PV marketing dOBS=observability, dRA= relative advantage. dTPV= trust in PV industry, dTR= Trialability. dTSN= trust in social network fSOCU= social curiosity, gINSTRST= interest

Formative Measurement Model

To achieve convergent validity and reliability of the formative measurement model, indicators dDOICmb2 and dDOICmb3 of compatibility construct were deleted because their variance inflation factors (VIFs) values were above 5 threshold value. Table 4 shows that the VIF values of the retained indicators were below the threshold value of 5 indicating that there was no collinearity problem. Therefore, the study proceeded to analyse the significance

of the outer weights. For the statistical significance and relevance of the formative indicators, Table 4 reveal that the *p* values of the indicators were lower than the threshold value of 0.05 at 5% significant level to establish significant outer weights. The t values of the formative indicators were higher than 1.96 at 5% level of significance which suggest that the indicators were significant and relatively important. The outer loadings for the formative indicators were above 0.5 threshold level showing that the indicators were relatively important hence suggesting satisfactory convergent validity of the formative measurement model.

Table 4. Collinearity, Significance and Relevance of Formative Test

Correlation	Weight	t Statistics (|O/STDEV|)	*p* Values*	Loadings	t Statistics (|O/STDEV|)	*p* Values*	VIF
dDOICmb1 -> dCB	0.426	3.057	0.002	0.593	4.952	0.000	1.043
dDOICmb4 -> dCB	0.822	8.887	0.000	0.909	13.431	0.000	1.043

Note: dCB=compatibility. * = $p < 0.05$

Evaluation of Structural Model

Table 5 shows that all the VIF values were clearly below the critical value of 5 suggesting that there was no collinearity problem in the structural model. The boots strapping with 5000 samples shows that the path relationships with t-values are higher than the threshold value of 1.96, and p-values lower than the threshold value of 0.05 at 5% level of significance indicating that they are significant and have relevant importance.

Table 5. Collinearity Path Coefficients, t-Values, p-Values

Path	Beta	t Statistics (|O/STDEV|)	*p*-Values*	VIF
dCIJM -> dCB	0.231	3.873	0.000	1.497
dCIJM -> dCX	-0.157	2.983	0.003	1.497
dCIJM -> dRA	0.333	5.815	0.000	1.497
dCIJM -> dTR	0.310	5.457	0.000	1.497
dCX -> fSOCU	-0.104	2.389	0.017	1.185
dEPM -> dCB	-0.189	2.816	0.005	1.356
dOBS -> dCB	0.206	4.045	0.000	1.387
dOBS -> dCX	-0.122	2.850	0.004	1.387
dOBS -> dRA	0.102	2.208	0.027	1.387
dTPV -> Dcb	0.117	2.335	0.020	1.382
dTPV -> gINSTRST	-0.124	2.793	0.005	1.408
dTSN -> dCX	0.156	3.088	0.002	1.302
dTSN -> Dtr	0.207	3.889	0.000	1.302
dTSN -> Fsocu	0.186	2.986	0.003	1.302
fSOCU -> gINSTRST	0.660	16.118	0.000	1.075

Notes: dCB=compatibility, dCIJM=Consumer independent judgment making, dCX = complexity, dEPM= Exposure to PV marketing dOBS=observability, dRA= relative advantage. dTPV= Trust in PV industry, dTR=Trialability. dTSN=Trust in social network fSOCU=social curiosity, gINSTRST= interest, * = $p < 0.05$.

The model's explanatory power was assessed using coefficient of determination (R^2 Value). Cohen (1988) classified R^2 values of 0.26, 0.13 and 0.02 for endogenous latent variables to be substantial, moderate and weak respectively. Table 6 revealed that consumer independent judgment making, observability and trust in social network explained a moderate amount of variance (R^2Adj. = 0.045) in complexity. Complexity and trust in social network also explained a moderate amount of variance (R^2Adj. = 0.053) in social curiosity while Social curiosity and Trust in PV industry explained a substantial amount of variance (R^2Adj. = 0.435) in interest in solar PV adoption. These indicate that the model explained a substantial variance of 43.5% in interest in adoption of solar PV.

Cohen (1988) categorise the f^2effect values of the importance impact of exogenous latent variable on endogenous variable as 0.02, 0.15, and 0.35 for small, medium, and large effects respectively. The measurement of f^2 effect size of the exogenous latent variable on endogenous variable in Table 6 show that the model has large effect size f^2 = 0.732 on the dependent variable indicating that the model has 73.2% importance impact on interest in solar PV adoption. Richard et al. (2003) asserts that the average effect size in social science is 0.021 from a meta-analysis of hundreds of social psychological researches.

Hypotheses testing

The summary of the hypothesized relationships in Table 6 and figure 2 showed that after controlling for household constraints, consumer independent judgment making (β = -0.157, t = 2.983, *p* =0.003) had negative significant direct effect on Complexity, Complexity (β = -0.104, t = 2.389, *p* = 0.017) had negative significant direct effect on Social curiosity. Social curiosity (β = 0.660, t = 16.118, *p* =0.000) had positive significant direct effect on interest in solar PV adoption at 5% level of significant, indicating that Consumer independent judgment making, positively significantly and indirectly influence interest in solar PV adoption through Complexity and Social curiosity (Figure 2). Therefore, Hypothesis 1b is supported.

Complexity (β = -0.104, t = 2.389, *p* = 0.017) had negative significant direct effect on Social curiosity while social curiosity (β = 0.660, t = 16.118, *p* =0.000) had positive significant direct effect on interest at 5% significant level (Table 6). The results showed that complexity positively significantly and indirectly influence interest in solar PV adoption through mediation of Social curiosity (Figure 2) indicating that Hypotheses 2d is supported.

As revealed in Table 6 observability (β = -0.122, t = 2.850, *p* = 0.004) had negative significant direct effect on complexity, complexity (β = -0.104, t = 2.389, *p* = 0.017) had negative significant direct effect on social curiosity and social curiosity (β = 0.660, t = 16.118, *p* =0.000) had positive significant direct effect on interest at 5%

level of significant. This showed that observability had positive significant indirect influence on interest in solar PV adoption with complexity and social curiosity mediating (Figure 2). Hence Hypotheses 2e is supported.

Table 6. further revealed that Trust in PV industry (β = -0.124, t = 2.793, *p* = 0.005) negatively significantly and directly influence interest in solar PV adoption at 5% significant level indicating that Hypotheses 3b is supported.

The result also showed that trust in social network in one path (β = 0.156, t = 3.088, *p* = 0.002) positively significantly and directly influenced complexity, complexity (β = -0.104, t = 2.389, *p* = 0.017) negatively significantly and directly influenced social curiosity while social curiosity (β = 0.660, t = 16.118, *p* =0.000) positively significantly and directly influenced interest in solar PV adoption at 5% significant level. In another path, trust in social network (β = 0.186, t = 2.986, *p* =0.003) had positive significant direct effect on social curiosity while social curiosity (β = 0.660, t = 16.118, *p* =0.000) had positive significant direct effect on interest in solar PV at 5% level of significant. This indicate that trust in social network influence interest in solar PV adoption with complexity and social curiosity mediating on one path and with only social curiosity mediating in another path as shown in Figure 2. Therefore, Hypotheses 3c is supported.

Table 6 and Figure 2 presented that social curiosity (β = 0.660, t = 16.118, *p* =0.000) positively significantly and directly influence interest in solar PV at 5% level of significant indicating that hypotheses 4 is supported.

Table 6. Hypotheses Testing

Group	Factor	Path	Path Coefficient	t-Value	*p*-Value*	R^2 Adj.	f^2	Decision
Innovativeness		dCIJM -> dCX	-0.157	2.983	0.003	0.045	0.017	
	Consumer independent judgement making	dCX -> fSOCU	-0.104	2.389	0.017	0.053	0.010	
		fSOCU -> gINSTRST	0.660	16.118	0.000	0.435	0.732	H1b Supported
Characteristic of the innovation	Complexity	dCX -> fSOCU	-0.104	2.389	0.017	0.053	0.010	
		fSOCU -> gINSTRST	0.660	16.118	0.000	0.435	0.732	H2d Supported
	Observability	dOBS -> dCX	-0.122	2.850	0.004	0.045	0.011	
		dCX -> fSOCU	-0.104	2.389	0.017	0.053	0.010	
		fSOCU -> gINSTRST	0.660	16.118	0.000	0.435	0.732	H2e Supported
Communication channels	Trust in PV industry	dTPV -> gINSTRST	-0.124	2.793	0.005	0.435	0.020	H3b Supported
	Trust in social network	dTSN -> dCX	0.156	3.088	0.002	0.045	0.020	
		dCX -> fSOCU	-0.104	2.389	0.017	0.053	0.010	
		fSOCU -> gINSTRST	0.660	16.118	0.000	0.435	0.732	
		dTSN -> fSOCU	0.186	2.986	0.003	0.053	0.027	H3c Supported
		fSOCU -> gINSTRST	0.660	16.118	0.000	0.435	0.732	
Social curiosity		fSOCU -> gINSTRST	0.660	16.118	0.000	0.435	0.732	H4 Supported

Notes: H= Hypotheses, dCIJM= Consumer independent judgment making, dCX = complexity, dOBS= observability, dTPV= Trust in PV industry, dTSN= Trust in social network, fSOCU= Social curiosity, gINSTRST= interest, * = $p < 0.05$

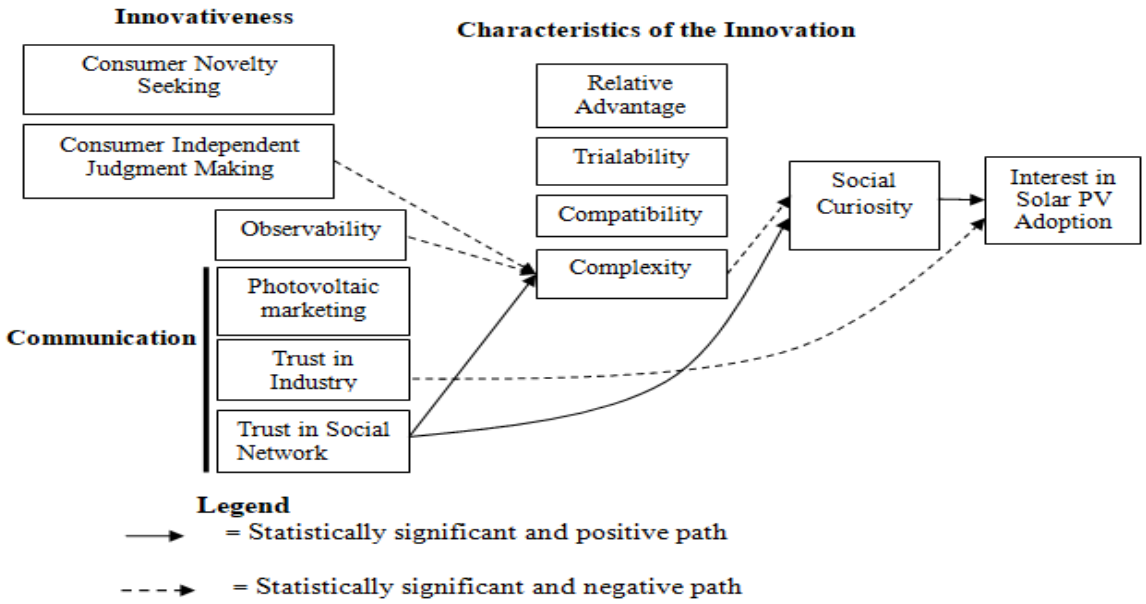


Figure 2. Statistically significant paths

Discussion

The result revealed that social curiosity mediating between the independent variables of innovativeness, characteristics of the innovation, communication channels and the final dependent variable, interest in solar PV adoption, is the strongest and most important factor to influence interest of the people in contacting a solar PV seller or installer and to install solar PV. This result aligns with the study of Wolske et al. (2017) that social curiosity is a strong predictor of solar PV adoption. The result shows that learning about the cost and benefits of solar PV when neighbours, friends or family installed solar PV motivate the households' behaviour towards contacting solar PV sellers or installers to install solar PV. This demonstrates the significance of social influence among the respondents suggesting that social curiosity to learn about the cost and benefits can be promoted to stimulate the interest of the households in adoption of solar PV.

The significance of innovativeness in the result through consumer independent judgment making indicate that the respondents are late technology adopters who wait to learn from the experience of others before taking decision on adoption of a technology. The hypothesised association between consumer independent judgment making and interest in solar PV adoption revealed that the information from acquaintances and the opinions formed on the experiences of friends who have used solar PV reduce the doubts that the technology is difficult to understand and use (complexity). Furthermore, the relationship lessens the interest in learning about the cost and benefits of solar PV and triggers the households' interest in contacting a seller or

installer and to install solar PV. This is consistence with the finding of Wolske et al. (2017) that consumer independent judgment making positively influence solar PV adoption and also corroborates the assertion of Thøgersen et al. (2010) and Muraguriet al. (2020) that consumer innovativeness drives innovative behavior and plays a major role in predicting adoption and diffusion of green products and services. It can be said that the respondents are late adopters who will always wait to learn from others experience and opinions on a product before taking purchase decision.

The study found that seeing solar PV technology installed on friends and neighbours' homes reduced the degree at which solar PV technology is perceived as a hassle to operate and difficult to use. This reduced their curiosity to inquire more about the cost and benefits of solar PV from friend, family or neighbor who installed solar PV but inspire their interest in contacting the sellers or installers and to install Solar PV. This corroborates the past researches of Qureshia et al. (2017) and Putria et al. (2019) that lesser complexity and high level of observability drive households to pursue adoption of solar PV. The location of solar panels on the roof top of homes increases the visibility, proximity and knowledge of the neighbours about the operation of Solar PV system and eliminates the fear of the presumed difficulty in its usage. These imply that increasing the observability level of solar PV reduces the complexity characteristics and stimulate the interest in adoption of solar PV.

The results further showed that trust in the information received from the respondents' social network increase their perception level of solar PV as difficult to understand and use. This prompt the households' curiosity to learn about the cost and benefits of solar PV when their friends, family or neighbors installed Solar PV which stimulate their interest in contacting and talk to solar PV sellers and installers. The result is in congruence with the findings of Rode and weber (2016), and Caplan (2023) that social interaction (peer) speeds up the adoption of rooftop-solar PV electricity of households. Additionally, the advertisement in the mass media and through distribution of handbills and posters about the innovation characteristics such as relative advantage, trialability, compatibility and complexity of solar PV did not persuade the households' interest to inquire about the cost and benefits or talk to the sellers to install solar PV. In other words, it can be said that the exposure of the households to PV marketing did not influence them but rather the word-of-mouth information through social network motivate their interest to adopt solar PV.

Conclusion

The study investigated the various factors that influence interest of households in solar PV adoption for electricity generation in Lagos State, through the components of diffusion of innovation (DOI) model comprising of innovativeness, communication channels and characteristics of the innovation. The findings revealed the importance of social influence, seeing people installed solar PV in their neighbourhood and inquiring about solar PV

technology cost and benefits in motivating interest in contacting solar PV sellers and installing Solar PV. The study concludes that innovativeness through consumer independent judgment making, characteristics of the innovation through complexity and observability of the innovation, and communication channels through trust in social network with social curiosity as the mediator, are important and play significant roles in influencing households' interest in solar PV technology adoption. This implies that DOI can be used to explain the motivators of interest in adoption of solar PV.

The findings of this study show that the households who are less novelty seeking but largely depend on others to inform their purchasing decision have greater interest in adopting Solar PV. This imply that to accelerate solar PV technology adoption, the policy makers, promoters and sellers of solar PV can target the people who are late adopters of technologies. The study also highlights the importance of both the reliable information from trusted sources in the social networks and social influence in motivating the people's interest in Solar PV adoption. This suggest that Social networks and platforms with both local and national coverage can be developed to focus on communicating reliable information about cost and benefits of solar PV, and sharing of the good experience and opinions of well-known solar PV users such as opinion leaders in the local communities. This can guide the people's conviction to make rational and positive decision to adopt solar PV.

Furthermore, for the policy makers, the findings that social influence drive interest in solar PV suggest the formation of policies to encourage creation of development groups such as community development associations where trust worthy information on solar PV can be communicated and shared. Additionally, the policies can encourage community outreach and engagement in solar PV adoption, and the introduction of community/group-buy programmes which could attract discount purchases.

The studied population consisted of both the users and the potential users of solar PV indicating that the findings might not represent the interest of the potential users only therefore further research may be conducted on the potential users only with the aim to increase the adoption rate.
This study investigated the factors that influence interest in solar PV adoption from the perspective of diffusion of innovation theory which might not have considered psychological factors that seems to influence interest in solar PV adoption. Hence it may be interesting to explore the broad scope of social psychological factors in the context of environmental and consumer behaviour.

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