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Consumer Attitude, Socio-demographics and Adoption of Climate Change Measures

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Abstract

The objectives of this study were to determine the influence of consumer attitude towards adoption of climate change adaptation measures and to explore whether the socio-demographics of the consumers have any effects on the adoption of the measures. The study was conducted using a questionnaire to query respondent consumers. A 500 useful survey was analysed with Stata 12 statistical software. Descriptive statistics, factor analysis, reliability test and ordered probit regression model functions were used to generate the results. The results revealed that the consumer attitude towards climate change was positive and also indicated the standpoint from where actions are required. The outcomes of the socio-demographic variable were significant but mixed for the various characteristics of the variable. These outcomes have implications for the actions against climate change. It is important to deepen positively; consumer attitude towards climate change through continuous creation of awareness and enlightenment. The use of role models and opinion leaders is inevitable; their positive actions against climate change will help in the formation of positive attitude and behaviours towards the phenomenon. The limitation of the study included the nature of the questions. The survey questions were explicit in nature and may not actually reflect the actual behaviour of the consumers. Implicit approach which involves the observation of the demonstrated behaviours of the survey respondents is recommended.

Keywords: Climate Change; Climate Change Adaptation; Consumer; Consumer attitude; Socio-demographics.

Introduction

Climate change is one of the most discussed natural phenomena in the recent time that has attracted diverse opinions and for which scholarly studies with varied outcomes have been presented. Several areas of interest have been investigated ranging from whether climate change is real or not (Taylor 2015; Hegerl 1996; National Research Council 2006; Church & White 2006; IPCC 2007), who and what is responsible for climate change (Swim et al 2010; United States Environmental Protection Agency 2015; IPCC 2007; Consumers International 2007), its impacts on production and service delivery (Swim et al 2010; Boko et al 2007; Consumers International 2007) and adoption of adaptation and mitigation measures (IPCC 2007; Nzeadibe et al. 2011; Swim et al. 2010).

There is a natural variability in weather that impacts on climate in an inconsequential way with little or no effect on humanity and the environment. The trapping of carbon pollution from human activities causes the atmospheric temperature to rise to an extent that the world climate pattern is altered. The effect of the rise in atmospheric temperature as a result of the trapped carbon pollution from human activities is referred to as climate change. The quest for food security, economic development and industrialisation has been implicated in the pollution of the atmosphere. Driving these human agenda to create satisfying national consumption, power and good lifestyle image rely majorly on the use of unclean energy sources with the fossil fuels accounting for the largest source of atmospheric pollutants (IPCC 2007). The consequences of these unsustainable production and consumption behaviours impact on humans, human endeavours and the environment. Impacts such as heat-related illness and

disease (California Department of Public Health 2007; Karl et al. 2009), increased risk of drought, fire and flood (Karl et al. 2009; Boko et al. 2007), stronger storms and increased storm damage (Tasmania Government n.d.; IPCC 2007), risk to wildlife (Boko et al. 2007; IPCC 2007), rising sea level (Boko et al. 2007; Karl et al. 2009; IPCC 2007) and economic losses (Ochieng & Koske 2013; IPCC 2007; Karl et al. 2009) have been reported as consequences of unchecked carbon pollution due to human activity.

Actions against climate change have been taken from many fronts including identifying and assigning responsibilities to all concerned parties. The roles of consumers, producers/businesses and the government have been studied for causes, effects and how to control the continued rise in global temperature (Consumer International 2007; Tasmania Government n.d.; Pfister & Böhm 2001; Strazdins & Skeat 2011). The general belief is that it is the responsibility of the individuals to tackle climate change, not the government as our attitude, needs and lifestyle are mainly responsible for global warming and the changes being experienced in climate (Consumer International 2007). In the context of this study, attention is directed to the role of consumers in the fight against climate change.

Consumer action has a significant direct and indirect contribution to climate change. According to Patchen (2006), consumers must act in a way to reverse the effects of the change in climate. Behavioural re-orientation about consumption is an important step to achieving the goal. Changing consumption behaviour is a crucial task in responding to climate change. There must be a shift in consumer consciousness in regards to increased understanding and awareness of climate impact, however, actions towards adaptation and mitigating measures do not match the level of enlightenment across the globe (Consumers International, n.d.).

Adaptation measures refer to ways of dealing with the impacts of climate change while mitigation measures are directed to the causes of climate change. Adaptation is the principal way to deal with the impacts of a changing climate. Consumers and businesses often are best placed to make adaptation decisions that reduce climate risks to their assets and livelihoods (Department of Environment n.d.).

The willingness of consumers to adopt climate change adaptation measures is dependent on how they perceive climate change as real, its impact and the affordability of the adaptation measures (Patchen 2006). Therefore the objective of this study includes determining the importance of consumer attitude towards adoption of climate change adaptation measures. Also to be determined is whether the socio-demographics of the consumers play a role in the adoption of the measures.

This study is important as it explored the psychographic and socio-demographic characteristics of consumers in relation to the actions they will perform to fight climate change. When consumers form opinions, beliefs, there is translation of the sensory impressions into a coherent view of the world around them. These opinions, beliefs and perceptions are the building blocks of attitude formation. Hence it is suspected that attitude formed by consumers about climate change most likely will influence their adoption of climate change adaptation measures.

Literature Review

Patchen (2006) presented a framework indicating that a person's environmentally-relevant behaviour at a given time is affected mainly by his psychographics, the expected environmental benefits, costs of the specific actions, assessment of the various actions and perceived ability

to take specific types of actions. In the context of the study, the literature reviewed provided relevant body of knowledge important to this study on how consumer attitude and socio-demographics and climate change adaptation measures probably interact in the course of finding solutions for climate change.

Consumer attitude towards climate change

Several theoretical frameworks drawn from social-psychological work on the relationship of attitudes to behaviour have been applied to behaviour that affects the environment. People form attitudes in the context of their values as to whether they give priority to moral or utilitarian outcomes. Thus, messages providing information about the consequences of climate change need to be framed in the context of those values that are central to the targeted audiences (Patchen 2006).

Fishbein and Ajzen, (1980) noted that an individual's attitude towards a situation is linked with actions taken towards it, but can be affected by different factors that cause learning to take place prior to the attitude formation. Consumers use evaluative judgment to assess climate change adaptation measures but their belief strength expresses the degree to which the adopted measure actually help the environment. Therefore, consumers that will adopt climate change adaptation measures such as purchasing green electricity, build their attitudes based on their own beliefs and evaluation of any environmental benefits perceived (Tsakiridou, Mattas & Tzimitra-Kalogianni 2006). Consequently, consumers make their purchasing decisions taking note of other personal and social elements that impact their decision (Fishbein & Ajzen 1980).

Magnusson et al. (2003) used environment motives as predictors of attitude towards purchase of organic products and found health motive as a strong predictor. Similarly, Honkanen, Verplanken and Olsen (2006) reported that environmental motivation was also a strong predictor of consumer attitude towards environmental friendly products. People with a positive attitude towards climate change will act to preserve the environment and specifically combat climate change the more they get emotionally aroused or when they find that actions taken bring net benefits to themselves, society and the natural world (Patchen 2006).

Hollingsworth (2001) reported that consumers were slow to embrace environmentally friendly products many of which have little visible or quantifiable effect. However, attitude may be formed through lifetime experience, as a result of direct observation or indirectly by accepting information from outside sources (Ajzen and Fishbein 1980).

Socio-demographics

Socio-demographics were the characteristic variables that defined a population such as gender, age, level of education, employment status, household income, occupation, marital status, household size and living arrangements (Koukouli, Vlachonikolis & Philalithis 2002). This study reviewed gender, age, level of education, household income and marital status for the investigation.

Socio-demographics - Gender

Environmental concerns tended to preoccupy females more than males (Mann, Ferjani & Reissig 2012), and females were more inclined to purchase eco-friendly products. Men somewhat more than women supported policies (such as various energy-related taxes) intended to reduce climate change yet less worried about climate change than women. Patchen (2006) noted that men recognized the wisdom of societal policies to deal with problems such as climate

change. However, it had been studied that in the United States and Europe, women were more likely than men to engage in pro-environmental consumption behaviour, such as choosing a car with good gas mileage or participating in a "green electricity" program (Clark et al 2003; Zelezny, Chua, & Aldrich 2000).

Risk assessment differed for men and women (Weber, Blais & Betz 2002; Johnson, Wilke & Weber 2004; Harris, Jenkins & Glaser 2006). Slovic (1999) reported that men rated environmental risks and consequences lower than women and were less concerned about the risks. Slovic's findings reflected the higher priority that women assigned to environmental issues, as compared with men. This study argued however that it was probable that men perceived climate change risk at the same level as women but were better risk tolerant. The risk perception and tolerance differential between men and women might account for why the former placed relatively higher value on utilitarianism and the latter on morality in the purchase/consumption of products. Relatedly, the notion that men showed less environmental concern in their behaviour does not necessarily mean that they were less likely than women to favour pro-environment social policies (Patchen 2006).

United Nation (2009) reported that women were more vulnerable to the effects of climate change than men; primarily as they constituted the majority of the world's poor and were more dependent for their livelihood on natural resources being threatened by climate change. Aside from vulnerability, women were also effective actors or agents of change in relation to climate change mitigation and adaptation. Women had a strong body of knowledge and expertise that could be used in climate change mitigation, disaster reduction and adaptation strategies. Furthermore, women's responsibilities in households and communities, as stewards of natural and household resources, positioned them well to act in ways that supported climate change adaptation measures to also protect their livelihood (United Nation 2009).

Socio-demographics - Age

The results of studies on age and use of environmentally friendly products had not been consistent. According to Gil et al. (2000) and Tsakiridou, Mattas and Tzimitra-Kalogianni (2006), younger consumers were unlikely to purchase eco-friendly products. Grunert and Juhl, (1995) argued that young consumers were more likely to buy eco-friendly products, while Lockie, (2006) found indifference about consumption of eco-friendly food across all ages.

Strazdins and Skeat (2011) stated that young adults concern about climate change was displaced by more immediate concerns such as body-image and that despite their awareness of phenomenon were more concerned with personal and social issues that were directly relevant to them. A survey of fifteen European countries by European Opinion Research Group (2002) on issues relating to the environment found that older people were not generally better informed on environmental matters but were more worried about environmental problems than younger people thus willing to take action against climate change. Gatersleben, Steg and Vlek (2002) in their Holland survey reported that older people demonstrated a variety of behaviours that included the application of climate change adaptation measures more than young people.

Socio-demographics – Marital status

According to Laroche et al. (2001) consumers' environmentally friendly behaviours depended on the family orientation and that married consumers with at least one child performed more environmentally friendly actions. Noor, Norsiah Mat, Mat, Jamaluddin, Salleh and Muhammad (2012) in their study of the emerging green product buyers in the Malaysian market reported that married people had higher green purchase behaviour than single and linked the report to

the belief that married people were more family and community oriented and, more likely to act in the community interest.

Some studies had reported otherwise. For example, Ogbeide, Ford and Stringer, (2014) reported that marital status of consumers was not statistically significant to determine the purchase of environmentally friendly product. However married couples all things being equal could be more financially equipped with combined income compared to singles and the financial resources at the disposal of a consumer had a strong implication on the performance of purchase behaviour.

Socio-demographics – Educational level

Education influenced the purchase of products that were environmentally friendly; educated consumers with tertiary educational qualifications were more likely to consume such products compared to those who were not highly educated (Denver, Christensen & Krarup 2007; Krystallis, Fotopoulos & Zotos 2006).

Robelia and Murphy (2012) analysed 15 knowledge surveys in the U.S. Amongst their findings was that there was a very high level of knowledge about some environmental issues such as management of garbage, eco-system and renewable resources but low levels of knowledge about climate change. Therefore making informed choice on climate change adaption measures was difficult when individuals had incorrect, inadequate or no knowledge about the measures. Fielding and Head (2012) reported that self-reported knowledge or that gained from personal experience could predict pro-environmental behaviour even as Levine and Strube (2012) noted that the right knowledge could predict behaviour despite it not being a sufficient condition for good decision-making.

Knowledge acquisition was based on education – formal or informal. Gifford and Nilsson (2014) found that individuals with more education in general were more concerned about the environment and likely to adopt climate change adaptation measures. European Opinion Research Group (2002), and Patchen (2006) argued that better educated people were more likely than their less educated folks to adopt various climate change measures such as purchasing eco-friendly product.

Socio-demographics – Income level

While education and income tended to influence each other, the effects of higher income sometimes was different from that of education. In the green electricity consumption program in Michigan, it was found that higher income consumers participated more than the lower income earners (Moore & Kotchen 2003).

Income disparity affected the potential for environmental efforts. In the market, eco-friendly products cost higher than their comparative conventional ones. Low-income consumers could be priced out or withdrawn from purchase of such important products. Eco-friendly attributes made certain goods more energy efficient, more expensive and less impactful positively towards climate change as many low income consumers could not afford them (Vandenbergh & Ackerly 2008).

Adoption of climate change adaptation measures

Climate change adaptation measures included provision of sound public information at the regional and local level, taking climate change risks and opportunities into account in public policy, planning and regulation. Managing climate change risks and impacts on

infrastructure, assets and services and assisting vulnerable communities to build climate resilience and adaptive capacity reflect consumers' perception of the role of government on climate change (Tasmanian Government n.d.).

According to Coleman (2015), Australian consumers appeared increasingly cost-conscious, and Australian manufacturers faced unrelenting competition from cheaper imported goods, a small 1-2% price premium for carbon neutrality may be considered an extra cost consumers don't want to pay. However a strong perception that climate change was real and caused by human activities existed. The perception of the effect varied according to how far the consumers could rationalised the now and future effects (Ogbeide & Ele 2015). The more the consumers were able to perceive the effects of climate change physically, the more they were keen to take actions. Statements such as "Climate change will affect my future generations; Climate change can affect your electricity bill; Climate change can affect my choice of product" which implied future effects received a comparatively lower level of support to cause the consumers to act or take immediate actions (Ogbeide & Ele 2015). Patchen (2006), Nordlund and Garville (2003) and Baumberg (2003) earlier noted that as important as it was to advise consumers of the danger posed in the future if climate change issues were not addressed, relating the effects to "now" would be a more productive way to make consumers to act.

Kuhns (2015) reported that tree planting, particularly in the urban area would hardly reduce the amount of carbon dioxide in the atmosphere. He noted that planting 44 million trees per year for fifty years would result in absorbing 0.16 percent of the carbon dioxide the U.S. would emit over the next fifty years. Trees could play a role in helping to reduce greenhouse gas emissions but landscape tree planting or even rural tree planting in the U.S. could not make a significant dent in absorbing the carbon dioxide released from its activities (Kuhns 2015). Trees might not be the answer to climate change problems, but they could play an important part in reducing the amount of carbon dioxide emission blanketing the atmosphere.

The way individual consumers could affect climate change was by changing their behaviour to reduce greenhouse gas emissions, mainly by reducing the use of fossil fuels (Kuhns 2015; Consumers International, n.d.; Consumer International 2007; Patchen 2006). Apart from changing behaviour, consumer perception of control of the situation enabled the sustenance of eco-friendly behaviour. Taking action on climate change required personal acceptance for the causes and adopting climate change adaptation measures (Stern, Dietz & Kalof 1993).

Thinking that one's own behaviour could make a difference influence people's actions towards the environment. A study in three West Coast American cities about a variety of actions such as choosing energy efficient household products and engaging in carpooling to work which were better for the environment affected the consumers' perception of their environmental efficacy. The more individuals had a sense of efficacy, the more likely they were to engage in climate change adaption measures (Meinhold & Malkus 2005).

Operationalisation of the study

To conduct this study, the theoretical backbone was accessed through the review of relevant literature. It was on this premise that the variables for the study were designed into a questionnaire and a series of analytical approaches were considered from which the ones applied for the study were chosen.

The survey was conducted in Nigeria. The data was gathered from five of the six geo-political zones. The intent of the study was to collect data from all the zones but for the Boko Haram

insurgency situation in the North East zone, it was not possible for security reasons. The designed questionnaire for the study consisted of behavioural and socio-demographic statements. The behavioural statements were constructed into a 7 point Likert scale items. The 7 point Likert scale had '1' to denote strongly disagree and '7' represented strongly agree while '4' reflected a position of neutrality or indecision. Some of the statements used in the questionnaire were adapted/adopted from previous proven questionnaires and the rest were designed with conceptual structures from the literature reviewed.

Collecting the sample across the whole country was predicated on capturing its diversity particularly as related to human and physical capital development rather than using one zone which could bias the generalisation of the result. A multi stage sampling method was used to select respondents across the geo-political zones. The questionnaires were administered to elucidate the relevant information about the respondents. The data collected was cleaned and analysed using Stata 12 statistical software. The following analyses were carried out:

Descriptive statistics: The descriptive statistics of consumer attitude towards climate change was determined. The number of scale items (observed variables) used to represent the latent variable – attitude were fourteen. The mean scores were used to rate the sample response to each of the scale items. The items were positively and negatively worded. A high and low mean score for positively and negatively worded items respectively indicated consumer positive attitude towards climate change.

Factor analysis: Furthermore, the scale items that represented attitude were subjected to factor analysis and reliability test. For studies where Likert scale items were used, it was important that the observed variables used to represent a latent variable were actually representative of the latter in a uni-dimensional way (Hair et al. 2010). One way it was ensured was to carry out factor analysis to determine the variables' correlation and factor loading. The principal components analysis was conducted with the 14 scale items. The factor loading for each of the observed variables reported was above 0.5. Also, multicollinearity was considered in the choice of the items retained following Hair et al. (2010) and Tabachnick and Fidell (2007) recommendation. All observed variables that had multicollinearity were deleted from analysis. The values of Kaiser-Meyer-Olkin measure of sampling adequacy (KMO-MSA) though not reported were within the accepted threshold (equal to and above 0.5). Eight of the 14 items were uni-dimensional with factor loading (variance) above 0.5.

Reliability test: The internal consistency of the latent variable - attitude towards climate change was very important to the subsequent analysis. Hence reliability test was carried out to evaluate the internal consistency of the latent variable after factor analysis. This was determined using Cronbach's Alpha. The item-to-total correlation though not reported in Table 2 was more than 0.50 for the variables. The item-to-total correlation was high enough not to impact the alpha value negatively. The Cronbach's Alpha outcome for the variable was consistent with Nunnally (1979) and Peters (1979) recommendation that Cronbach's Alpha of 0.70 or above was acceptable as a good measure of reliability. The same factor analysis and reliability test were conducted for the adaptation measure for climate change for the same reasons as provided for consumer attitude towards climate change. Nine uni-dimension variables were obtained.

Summated scores and ordered probit regression: To determine whether adoption of climate change adaptation measures were influenced by consumer attitude and socio-demographics, firstly the eight variables that represented consumer attitude towards climate change and the nine for adaptation measure for climate change (outcome of factor analysis) were summated into two aggregate variables with summated scores. This action was taken to avoid redundant

output and inaccurate results as was the case when many Likert scale items were used in ordered probit regression model.

Secondly, the parameters were estimated using the ordered probit model. The model was popular in variables measurement where scale items were mainly used. Apart from the popularity, the choice of ordered probit model was to captured the non-linearity inherent in scale item data thus avoiding misleading consequence as with linear regression model for discrete and ordinal variables. In the estimation of parameters, ordered probit model assessed the underlying distribution, relative to the actual response provided by the survey respondents, and that was why the distances among responses (e.g 'strongly agree, 'Agree' and 'somewhat agree') though assigned numbers were logically not the same. It reflected the ordinal nature of categorical variable.

Result and discussion

The result presented here reflects the descriptive statistics of the variables used for the study. It also showed the relationships between the dependent and the independent variables.

Descriptive Statistics

Table 1 shows the descriptive statistics of consumer attitude towards climate change.

Table 1. Consumer attitude towards climate change

Consumer attitude towards climate change	Obs	Mean	Std Dev	Min	Max
I am concerned about the effects of climate change.	500	5.466	1.572	1	7
The potential effects of climate change is exaggerated.	500	3.268	1.506	1	7
Climate change is mainly caused by human consumption activities.	500	4.542	2.031	1	7
Climate change has occurred many times in human history and its part of the natural shifting of the climate.	500	4.376	2.177	1	7
Consumers can help reduce the impact of climate change if they can change their consumption patterns.	500	4.810	1.746	1	7
There is no point trying to reduce emissions at an individual level.	500	3.032	1.749	1	7
I want financial incentives to take action on climate change.	500	3.480	1.912	1	7
I don't see why I should take action on climate change if other people are not.	500	1.994	1.259	1	7
Businesses should take the issue of climate change more seriously.	500	5.574	1.622	1	7
The economic growth of developing countries represents the greatest threat to world climate.	500	4.140	2.089	1	7
It is too late to do anything about climate change.	500	1.534	0.997	1	7
Attempts to tackle climate change should be coordinated at an international level to be successful.	500	4.616	2.146	1	7
The Government should enforce more strict environmental policies in order to prevent climate change.	500	6.126	1.292	1	7
Off-setting carbon emissions is a good way of reducing the effects of climate change.	500	5.270	1.679	1	7

The result indicates that the respondents surveyed showed a varied level of agreement to all the observed variables used to measure consumer attitude towards climate change. The result suggested consumer attitude towards climate change was positive. The variable "Climate change has occurred many times in human history and it's part of the natural shifting of the climate" revealed pessimism among the respondents (mean = 4.38). This could be a reflection

of the level and quality of knowledge available to the consumers. Aside from this variable all the other 13 variables returned mean values that supported consumers' positive attitude towards climate change. Variables such as "I am concerned about the effects of climate change; Climate change is mainly caused by human consumption activities; Consumers can help reduce the impact of climate change if they can change their consumption patterns and; Businesses should take the issue of climate change more seriously" that were positively worded had mean scores above 4. This indicated a level of agreement of the consumers with these attitude variables. Other positively worded variables - "The economic growth of developing countries represents the greatest threat to world climate; Attempts to tackle climate change should be coordinated at an international level to be successful; The Government should enforce more strict environmental policies in order to prevent climate change and Off-setting carbon emissions is a good way of reducing the effects of climate change" returned similar result (see Table 1).

For those variables that were negatively worded - "I don't see why I should take action on climate change if other people are not; It is too late to do anything about climate change; I want financial incentives to take action on climate change and; The potential effects of climate change is exaggerated", the low mean score (below 4) also indicated consumers' positive attitude towards climate change. Positive attitude breeds conviction to act on climate change therefore consumers with positive attitude towards climate change were likely to take adaptation measure against the phenomenon.

The result, aside from revealing positive consumer attitude towards climate change also indicated that the consumer attitude reflected three perspectives from where actions are required. The attitude perspectives were that actions are required from personal (individual), business and government for climate change solution to be achieved in a meaningful way. Therefore it was imperative that while individuals must change their attitude and behaviour towards product and service consumption, businesses must find a new and sustainable ways of producing products and delivering services without compromising the environment by undue increase of greenhouse gases in the atmosphere.

While change of attitude was required from consumers and businesses, the result made it incumbent on the government to provide policy framework and regulation that guarantee the health of the environment without undue compromise of consumption and economic prosperity of the country. Government policy should set out roles to be played by consumers and businesses and itself. The attitude of consumers was that government should be in the forefront of climate change, use policy instruments to control actions of individuals and businesses. Government must ensure the provision of sound public information to people particularly at the regional and local level and must take climate change risks and opportunities into account in public policy, planning and regulation. Furthermore, it was inferred that the consumers' attitude is such that a government manages climate change risks and impacts to socioeconomic infrastructures and; assists vulnerable people and communities to build resilience and adaptive capacity against climate change.

Result of factor analysis and reliability test

The consumer attitude towards climate change variables were used for further analysis. To enable that, the 14 variables were factor analysed using principal component analysis method. The result is presented in Table 2.

Table 2: Consumer attitude towards climate change: Factor Analysis and Reliability Test

Variables for consumer attitude towards climate change	**Variance**
I am concerned about the effects of climate change.	0.889
Climate change is mainly caused by human consumption activities.	0.652
Climate change has occurred many times in human history and its part of the natural shifting of the climate.	0.794
Consumers can help reduce the impact of climate change if they can change their consumption patterns.	0.776
Businesses should take the issue of climate change more seriously.	0.696
The economic growth of developing countries represents the greatest threat to the world's climate.	0.671
The Government should enforce more strict environmental policies in order to prevent climate change.	0.699
Off-setting carbon emissions is a good way of reducing the effects of climate change.	0.692
Reliability Test: Cronbach's alpha 0.869	

Note. Extracted variance of 0.50 and above indicates good item correlation to the construct it represents.

The result shows that of the 14 variables used to represent consumer attitude towards climate change, eight of them revealed single dimensionality. These variables were accepted based on their extracted variance of 0.50 and above. Though extracted variance of 0.30-0.40 represents minimum acceptance level, for practical significance, a variance of 0.50 and above was used to accept the variables (Hair et al., 2010). Aside from the extracted variance, crossed loaded variables with 0.50 extracted variance were eliminated.

Cronbach's Alpha value was used to measure the internal consistency of the scale items that represented consumer attitude towards climate change. The eight scale items from the factor analysis pooled an average Cronbach's Alpha of 0.869. This value indicated a high level of internal consistency of the variable with the sample. The Cronbach Alpha outcome was consistent with Nunnally (1979) and Hair et al. (2010) - a Cronbach's Alpha of 0.700 is accepted as a good measure of reliability. This same procedure was adopted for variables used to represent consumer adaptation measures against climate change, see Table 3.

Table 3. Adaptation measures against climate change: Factor Analysis and Reliability Test

Variables for adaptation measures against climate change	**Variance**
Involve in tree planting program	0.527
Buy a locally made product rather than one imported from far away.	0.593
Use more of public transport to reduce my contribution to global warming.	0.590
Plant trees and flowers around my house.	0.635
Turn off all electrical appliances when not in use.	0.708
Buy energy efficient light bulbs.	0.746
Talk to friends or family about global warming.	0.794
Turn off the standby mode when my appliances are not in use	0.661
Buy energy efficient appliances	0.803
Reliability Test: Cronbach's alpha 0.913	

Ten variables were used to represent consumer adaptation measures against climate change. Nine of them revealed uni-dimensionality. These same criteria as used to explain the result in Table 2 was also applied to Table 3. The nine variables were accepted based on their extracted variance of 0.50 and above. Reliability test result revealed a Cronbach's Alpha score of 0.913, an indication of high level of internal consistency of the variable with the sample.

Ordered probit analysis of consumers' adaptation measures against climate change

To operationalise this analysis without having the problem of redundant variables as is the case when too many scale items are used in ordered probit regression model, the eight variables that represented consumer attitude from the factor analysis and the nine variables that represented consumer adaptation measures against climate change were summated into composite variables before running the ordered probit regression analysis. The result in Table 4 shows the relationships between the independent and dependent variables

Table 4 Result: Ordered probit analysis of consumers' adaptation measures against climate change

Variable	Variable name	Coefficient	Standard Error	P>z
Gender1				
	Female	0.653***	0.112	0.001
Age1				
	30 - 39 years	-0.101	0.131	0.442
	40 - 49 years	-1.525**	0.255	0.028
	50 - 59 years	0.754***	0.221	0.001
	60 + years	0.978**	0.397	0.014
Education1				
	Secondary School certificate	1.516***	0.226	0.001
	OND/NCE	0.515**	0.208	0.013
	Bachelor's degree/HND	0.781***	0.179	0.001
	Higher degrees	0.974***	0.225	0.001
Marital Status1				
	Married or cohabiting	1.023***	0.167	0.001
Annual household income 1				
	₦ 90,000.00 and below	-0.561***	0.132	0.001
	₦90,001 to ₦180,000	-0.516**	0.210	0.035
	₦180,001 to ₦207,000	1.525**	0.255	0.010
	₦270,001 to ₦360,000.00	1.517***	0.223	0.001
	₦ 360,000.00 plus	0.750***	0.220	0.001
Attitude	Attitude toward climate change	0.634***	0.478	0.001

X2 Log-L -614.95; Chi-square = 260.88, p-v. 0.001 (n = 500)
***, **, * Indicates estimated coefficient is significant at the .01 level, 0.05 level, 0.10 level.
Gender1, Age1, Education1 excludes male gender, 18-29 age group category, First school leaving certificate category while Household annual income 1 excludes ₦ 90,000.00 and below. Marital status1 excludes single marital status. OND = Ordinary National Diploma and NCE = National Certificate of Education. ₦1.00 = $0.005 USD

Table 4 shows results of the ordered probit analysis of consumers' adoption of climate change adaptation measures. The model significance was verified by calculating the Chi-squared statistics. A likelihood ratio criterion was used to test the null hypothesis.

For consumers' adoption of climate change adaptation measures, the Chi-square was 260.88 with a p-value of 0.01. The result indicates the model was statistically significant at 1% or above. The Chi-square test of the null hypothesis revealed that the model did not have greater

explanatory power than an "intercept only" model. Therefore the null hypothesis was rejected in the model estimated. The implication of the overall model significant at 1% level of confidence was that the relationships between the explanatory variables and the outcome variable was not by chance.

To establish the effect of one independent variable on the consumers' adoption of climate change adaptation measures, other independent variables were held constant. In the model, the coefficients associated with consumers' attitude was 0.634 and was significant at the 1% level of confidence.

The socio-demographic variables in the model included gender, age, education qualification, marital status and annual income. The outcome of the socio-demographics generally was significant but mixed for its defining variables. This study found that female consumers would adopt climate change adaptation measures as the variable was significant positively at 1% level of confidence. This result supported Stobbelaar et al. (2007) that "soft" values (such as eco-friendliness) seem to better fit female perspectives. Soft values such as caring for the environment by minimising activities that generate greenhouses gases will be supported by female consumers. Women tend to, more than men engage in pro-environmental behaviour, such as choosing a car with good fuel mileage or participating in a "green electricity" scheme. Also, women are more vulnerable than men to the effects of climate change primarily as they constitute the majority of the world's poor and depend more on natural resources for their livelihood. These natural resources have been subject of threat by climate change and women will do anything within their power to protect their sources of livelihood.

Gender difference in adoption of climate change adaptation measures persist though men tend to be better informed about environmental and climate change matters. Men appear to see the consequences and risks of climate change as less serious than women and are less concerned about the risks. This suggests the likelihood that men risk tolerance level is higher than that of women and may assign relatively higher value on utilitarianism compared to environmental morality. Therefore men are more inclined to purchase goods that provide social and functional satisfaction at the expense of the goods that provide benefits to the environment.

In regards to age, the study found that young people do not care much about climate change. Age group 30-39 years and 40-49 years had negative coefficient and for the later, it was significant at 5%. The age group 50-59 years and 60 years and above were positively significant at 1% and 5% level of confidence respectively. Age is an important determinant of social conditions and needs. Young people are in their social development stage, designing and creating their life path as students, graduates, job seekers, junior, middle and senior cadre employees or business owners. They can also be in the process of getting married, having children, buying a car and building a house. These life paths are functional and social and are more important to young people. It is the period in life where personal and household wealth and income are generated. All efforts are towards accumulation of wealth rather than dispersion; the consumption of goods and services from an environmental morality perspective that will cause them to pay more than the price of conventional alternative products will not attract their interest.

Older people on the other hand are willing to respond positively to climate change issues through adoption of the adaptation measures put in place. They are relatively stable and not as worrying about wealth creation. They have smaller average size household and at times an empty nest as children have grown and are on their own. Older people generally have high level of civic and environmental involvement which extend to greater concern and action about the societal effects of environmental problems such as climate change. Older people tend to

have soft values too, can be concerned about what the outlook of the environment of their future (grand) children will be in the light of the current climate change information that is available now. This can be a trigger for the older people to act against climate change by adopting adaptation measures. The result of the study supports Patchen (2006), Gatersleben, Steg and Vlek (2002).

Consumers in the various education strata indicated adoption of climate change adaptation measures at 1% positive confidence level except for OND/NCE that was significant at 5% level. With education come information and enlightenment. Educated consumers comprehend information better and the more educated they are, the more the understanding and appreciation of the effects of climate change. Therefore educated consumers know the implication of actions and inactions in combating climate change. They comprehend what roles need to be played and particularly their own roles in the process; so are able to adopt adaptation measures to combat climate change. This result supports the outcome of the European Opinion Research Group (2002) and Patchen (2006) that educated people are more likely to act in environmentally-helpful ways thus are more willing to take a variety of voluntary actions and to support a variety of social policies aimed at mitigating climate change.

In terms of household annual income, the study found that the lower the annual income of the consumers, the more unlikely it was they will care about climate change. Household annual income group ₦90,001 to ₦180,000 had negative coefficient and was significant at 5%. The annual income groups - ₦180,001 to ₦207,000, ₦270,001 to ₦360,000.00 and more than ₦ 360,000.00 were positively significant at 1% level of confidence but for ₦180,001 to ₦207,000 which was significant at 5%.

Low income consumers are sensitive to price changes and are increasingly cost-conscious. Adoption of climate change adaptation measures can be considered a strain on their lean income. So low income consumers are not enthusiastic about offsetting carbon footprint by paying more or purchasing items that cost more than the price of the conventional alternative. Therefore a small price premium for carbon neutrality may be considered an extra cost low income consumers will not want to pay. On the contrary, consumers in the high income group indicated their willingness to adopt climate change adaptation measures. It was suggested that the higher the income, *ceteris paribus* the more disposable income in the hands of the consumer. Consumers with more disposable income can use their means to support energy-savings programs, buy domestic appliances that are efficient and consume less electrical power.

This study also found that marital status of consumers was statistically significant positively to determine adoption of climate change adaptation measures at 1% positive confidence level. This result outcome differed from that of Ogbeide, Ford and Stringer, (2014) and the difference could be attributed to the unique utilitarian value of their research product - wine. Adopting climate change measures encompassed adoption of environmental morality which is comparable to buying luxury goods. Consumers in different group can respond differently to the various attributes of luxury goods. They may want to purchase or not purchase them for different luxury values. Their perception of the different values can be a function of creating a sense of family protection or the amount of household income available. Married people can be protective of their family – children and grandchildren, and would go at any length to invest in their future including the environment. Working married couples are better able to adopt climate change adaptation measures as their disposable financial resources have a strong impact on purchase behaviour and will influence the adoption of climate change adaptation measures.

Conclusion

The study considered consumer attitude and socio-demographics as possible variables that can influence adoption of climate change adaptation measures. These assumptions were tested and the results showed some relationships. Consumer attitude is a very important determinant of behaviours towards climate change and consumers with positive behaviours will adopt climate adaptation measures. As there is a mix consumer's population in any given society – some with substantial level of awareness and knowledge and others with little or no knowledge about the phenomenon, it is important that creation of awareness and enlightenment remain a key approach for solving climate change problem. Awareness and enlightenment will spark critical thinking and discussion of the matter leading to conviction and positive attitude formation and willingness to act against climate change.

Furthermore the importance of role models and opinion leaders in attitude formation and demonstrated behaviours cannot be overemphasised. Leadership in climate change campaign must be visible across all social strata. Leaders must be appointed at national through to the community level. They must demonstrate and be seen as true ambassadors of climate change in words and deed such that their actions can influence other members of the community. As the leaders influence the consumers by their behaviours, it becomes comprehensible that adopting adaptive measures against climate change can be accomplished thus creating optimism and willingness to take actions.

The role of government in ensuring that consumers play their part is crucial. Positive attitudes towards the adoption of adaptation measures often times do not translate into meaningful behavioural changes. Motivational and financial barriers do create a behaviour gap. Government must therefore ensure the provisions of infrastructures such as good public transport system and policy that targets efficient use of resources. These measures will enable consumers to adopt adaptation measure and reduce their carbon footprint.

Future study

The respondent consumers provided responses to the survey questions. However the questions were explicit in nature, which means the explicit attitude of the consumers was investigated. Therefore the responses of the surveyed consumers may or may not reflect their actual thought or behaviour about climate change. This is a limitation to the study. It is recommended that for future study, an implicit approach which involves the actual observation of the demonstrated behaviours of the survey respondents should be used to assess consumers in relation to climate change adaptation behaviours.

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