

## Consumers' purchasing intentions for efficient water-saving products: the mediating effects of altruistic and egoistic values

Kwabena Agyarko Sarpong, Gordon Amankwaa , Obeng Frimpong, Wanzhen Xu, Yunfei Cao, Xiaoni Ni and Nana Kwame Nkrumah

### ABSTRACT

Efficient water-saving appliances are an essential part of changing water consumption toward a more sustainable future. Unlike previous studies, this research focuses on egoistic and altruistic values as determinants of consumers' willingness to buy efficient water-saving appliances. In this study, a convenient sampling technique was used to solicit data from 308 potential consumers. Using a two-step structural equation model method for data analysis, the results show that both egoistic and altruistic values affect the willingness of consumers to purchase efficient water-saving appliances. However, compared with altruistic values, egoistic values had a greater influence on consumers' purchasing intention. From the Chinese perspective, this study is one of the primary efforts to understand the association and importance of ethical values and consumers' willingness to support water-saving innovations. The findings of this study put forward significant policy effects that could serve as a benchmark for measures that are likely to promote purchasing intentions toward efficient water-saving appliances.

**Key words** | altruistic value, efficient water-saving appliances, egoistic value, environmental concern, perceived benefit

**Kwabena Agyarko Sarpong**

**Gordon Amankwaa** 

**Wanzhen Xu** (corresponding author)

School of the Environment and Safety Engineering,

Jiangsu University,

Zhenjiang 212013,

China

E-mail: xwz09@ujs.edu.cn

**Obeng Frimpong**

Department of Forest Management,

Kwame Nkrumah University of Science and

Technology,

Kumasi,

Ghana

**Yunfei Cao**

**Xiaoni Ni**

Zhenjiang Food and Drug Supervision and

Inspection Center,

Zhenjiang 212004,

China

**Nana Kwame Nkrumah**

School of Management Science and Engineering,

Jiangsu University,

Zhenjiang 212013,

China

### HIGHLIGHTS

- Egoistic and altruistic values had a significant effect on consumers' purchasing intention.
- Egoistic value was the dominant variable.
- There is an association between ethical values and consumers' willingness to support water-saving innovations.
- Consumers purchase water-saving appliances for their own benefit and not inherently for environmental benefit.
- It serves as a benchmark for measures to managing residential water use.

### INTRODUCTION

Since the 1992 International Water and Environment Conference promoted integrated water resource management

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on the political level, significant improvements have been made in deliberations, studies and actions aimed at advancing the relation between humans and the natural water environment. More so, the literature from both empirical and predictive science has demonstrated the sense of inevitability for a transition toward efficient water development

and management to strengthen water-use resiliency and efficiency through the consolidation of innovation and behavioral values. Arguably, the subject of protecting and understanding of water environment is constantly growing, hence explains why water environmental resource protection has become a major concern not only for the governments and environmental protection agencies but as well, citizens have also been identified to play significant roles toward the protection of the water environment (Mondejar-Jiménez *et al.* 2018). Be as it may be, the work of Stern *et al.* (1995) highlighted significant findings that address the gap between human attitudes and behavior in the sphere of water resource management; however, the findings show that, while awareness is notably increasing, active respect for the water environment increases at a slower rate. This relationship is quite understandable because individuals are heterogeneous and have a complex mental constellation of values and different interpretations of pro-environmental issues.

Consequently, it is expected that, as the population continues to grow, demands on precious water resources will as well increase. The use of efficient water-saving products has, therefore, become an important bridge aiding both organizations and individuals to appreciate saving water and protecting water supplies. As advised by the USA – Environmental Protection Agency, using water-saving techniques can save consumers money and divert less water from rivers, bays, and estuaries, which helps keep the environment healthy. The adoption of these products as well reduces water and wastewater treatment costs and the amount of energy used to treat, pump, and heat water, which tends to lower energy demand and aid in preventing air pollution. As important as the subject of adopting efficient water-saving products may be, studies focusing on consumer's purchasing intentions of such products are still evolving, yet, one cannot question the incentives that consumers derive from the purchase and use of these products, more so, the benefits it accrues to the environment. As presented by previous studies that seek to examine consumer's purchasing intention toward energy-efficient products, similar arguments relating to the influence of information availability, consumer awareness (Bouton *et al.* 2010; Ma *et al.* 2011; Janaki & Shanthi 2013; Zainudin *et al.* 2014; Bedenik *et al.* 2015), and as well the psychological factors attributed to consumers'

intentions toward energy-consumption behavior can be advanced (Claudy *et al.* 2013; Tran 2014).

Again, a substantial amount of studies have focused on studying the green purchasing intentions of consumers worldwide through their behavior and awareness (Ha & Janda 2012; Giang & Tran 2014; Lin 2015; Wang & Wang 2016). As asserted by Makijenko *et al.* (2016), consumer awareness of green products (i.e., efficient water-saving products and energy-efficient products) is highly linked to consumer behavior and existing knowledge about the benefits of using these products irrespective of their cost. Green initiatives have as well been shown to lead to greater consumer satisfaction (Luo & Bhattacharya 2006; Lee & Heo 2009) and return intentions (Berezan *et al.* 2013). According to Gao & Mattila (2014), consumer satisfaction with green hotels is enhanced when a firm engages in green initiatives for public-serving.

Theoretically, the theory of reasoned action (TRA) as proposed by Fishbein & Ajzen (1975), the theory of planned behavior (TPB) by Ajzen (1991), and the technology acceptance model (TAM) demonstrated by Davis *et al.* (1989) remain significant in explaining the attitude of consumers, and behavioral intentions toward technology. Previous studies have extensively discussed and compared these theories in various research contexts in an attempt to explain the association between users' attitudes, intentions, and the actual behavior of technology acceptance and usage (Chuttur 2009; Marangunic & Granic 2015). Irrespective of the significance of these theories in explaining consumers' intentions and behavior toward purchases, this current study rather seeks to extend the previous literature by exploring the mediating effects of altruistic and egoistic values and consumer purchasing intentions for efficient water-saving products. Some studies have attempted to establish predictors of pro-environmental intention and demonstrated that pro-environmental intention is influenced, at least in part, by egoistic or altruistic values (Stern & Dietz 1994; Stern 2000; Yadav 2016; Rahman 2017; Prakash *et al.* 2019). Although these orientational values may reflect the most fundamental attributes of behavioral choices, they are considered as more likely to predict purchase intention compared with other behavioral antecedents (e.g. social-economic characteristics).

In addition, there are contradictions and research gaps between the values of egoism and altruism. Several studies

contend that egoistic and altruistic values are conceptually different and that there is no connection between them (Schwartz 1992; Suitner & Maass 2008; Kareklas *et al.* 2014). On the contrary, some theories do not distinguish between altruistic and egoistic values (Thompson & Barton 1994) or treat them as different values, but are related in their intrinsic purpose (Milfont & Duckitt 2004; Amerigo *et al.* 2005). More generally, an examination of the overall prioritization of altruistic values (self-transcending) is essentially self-enhancing (egoistic), considering that the wellbeing of the environment is a vital element for human wellbeing (Rahman 2017). Bouman *et al.* (2018) further explain that egoistic values reflect a focus on the costs and benefits a choice has on someone's resources and power, whereas altruistic values enable individuals to act for the wellbeing of others without any personal benefit. In view of this, an overarching objective of this work is to assess the association and rationalities behind consumers' intention toward the purchase of efficient water-saving appliances while using a structural model and questionnaire items that capture altruistic and egoistic values. By doing so and statistically verifying our models, we are confident this work could inform water management initiatives through interventions such as information provision which seek to influence consumers' intention toward purchasing efficient water-saving appliances.

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## REVIEW OF THE RELATED LITERATURE

Globally, sustainable water management and the development of water resources have gained contemporary relevance, particularly in water-stressed regions, due to issues of climate change (Dolnicar *et al.* 2012; Slavikova *et al.* 2012; Howard *et al.* 2016; Shadkam *et al.* 2016), rapid population growth (Hu & Cheng 2013; Amankwaa *et al.* 2020), industrialization (Sarpong *et al.* 2019; Amankwaa *et al.* 2021), diminishing water resources (Gleick 2009), and increasing water demand (Howard *et al.* 2016). In China, the need for sustainable water management is no different given that water resources are dwindling, over-allocated, inefficiently used, and grossly polluted (Gleick 2009; Hu & Cheng 2013; He *et al.* 2014). It has been reported that China's annual water deficit is over 6 billion cubic

meters (Feng 2013), with approximately 400 out of 669 urban communities not being able to meet their water supply need (Fan *et al.* 2017). These deficit and water relational problems have necessitated a need to develop and adopt several conservation strategies, technological innovations, and ambitious investments all aimed at improving sustainable water use (Stevenson *et al.* 2016).

China has shown great initiatives through the comprehensive implementation of measures such as high irrigation efficiency in the agricultural sector (MWR 2007, 2012), advanced technologies that re-use wastewater and pollute less in the industrial sector (MWR 2007, 2012) and an upgrade in the urban water supply (Hairong 2019). Additionally, water-saving programs have been implemented in public spaces, government institutions, universities, and water-consuming service industries (Hairong 2019). Among these strategies, the National Development and Reform Commission (NDRC) in its 2005 policy outline stressed that green innovations (efficient water-saving technologies) are important factors needed in the promotion of sustainable water resource consumption (NDRC 2005). The NDRC further asserted that the adoption of such innovations is needed to release tensions between water supply and demand path. Achieving water prosperity through an adoption and implementation of green innovations is an ambitious goal and may require everyone rolling up their sleeves and getting involved.

At present, China has entered an important stage in which consumption plays a key role in economic growth. Green consumption and other new models have extensive space and great potential for development (Hua & Wang 2019). In 2016, the NDRC, Ministry of Science and Technology together with seven other departments published guidelines on promoting green consumption. As highlighted in the document, China plans to establish an effective long-term mechanism for green consumption by 2020, which will significantly increase the market share of green products and ensure that the systems of production and the circular use of resources overlap with sustainable consumption patterns. For policymakers, companies, and marketers to create strong marketing campaigns, sell green innovative, and expand the market shares, it is important to understand the values and to what the consumer will respond.

Considering that the cumulative competition and acute scarcities of water resource could lead to sweeping systemic

transformation in the Chinese water landscape through efficient water-saving appliances, the imperative to spur reasoning based not only on economic elements but also ethical values could not be overemphasized but an important element in the thrust of these innovations. Values as defined by Schwartz (1994) are a desirable trans-situational goal varying in importance, which serves as a guiding principle in the life of an individual. This definition captures the rationality behind a choice and the confidence to defend a chosen position after forfeiting a potential choice. That is, when different competing values are activated in a situation, the choice is based on the values that are considered most relevant (De Groot & Steg 2008). Several studies have emphasized on the importance of values and behavioral choices (Lind *et al.* 2015; Van den Broek *et al.* 2017; Stöckigt *et al.* 2018; Wang *et al.* 2018) and have shown egoism and altruism as key determinants of ethical behavior (Yadav 2016; Prakash *et al.* 2019). Research also shows that egoistic and altruistic values affect the intention of consumers toward ethical purchasing (Yadav 2016; Prakash *et al.* 2019).

However, there is a clear difference between egoistic and altruistic values. Egoistic values consider an individual's wellbeing, whereas altruistic values consider others' welfare (De Groot & Steg 2008; De Groot *et al.* 2013). Though these values have been described as good economic instrument in describing the diversities in actions and choices (Rokeach 1973) a clear position on these values and their influencing impact on green behavior have not been comprehensively discussed (De Groot *et al.* 2013; Jaiswal & Kant 2018). Therefore, this study attempts to determine how these orientational values influence consumer's intention in buying efficient water-saving appliances.

## CONCEPTUAL MODEL DEVELOPMENT

### Perceived benefit (egoistic value)

Perceived benefit is the belief and perception of positive values associated with specific actions (Leung 2013). The TRA (Fishbein & Ajzen 1975) and its extension, the TPB (Ajzen 1985) are perhaps the best-known attitude-behavior model to explain the causal link between perceived benefit

and intention to purchase. The theories submit that behavior is proximally contingent on an individual's behavioral intention, which involves assessing attitudes toward a behavior, subjective norms, and the consequences (positive or negative). In this context, perceived benefit of purchasing concept has a good tendency to produce reasonable participation in specific purchasing behavior following an assessment of functional reasons (e.g. cost, performance, variety, and quality of product) and nonfunctional reasons (social and emotional needs) (Forsythe *et al.* 2006). For most consumers, cost, rebates, and product performance are attractive features in their purchasing decisions. Biswas & Blair (1991) asserted that rebates could influence consumers' price beliefs and invariably predict their purchase intention. Additionally, need satisfaction, which is partly dependent on product quality and performance, has been established by the literature to predict purchase intention (Gogoi 2013; Tariq *et al.* 2013; Mirabi *et al.* 2015). Against this background, egoistic values are more likely to be revealed because egoistic consumers are more likely to consider these benefits before purchasing efficient water-saving appliances.

### Environmental concern (altruistic value)

The extant literature shows that environmental concern is an important determinant of consumer behavior (Pickett-Baker & Ozaki 2008; Yadav & Pathak 2016). Many studies have emphasized environmental concern as an effect of altruistic values. Yadav & Pathak (2016) argue that altruistic values are an important mechanism that directs consumers' environmental behavior. In recent years, environmental concern has caused altruistic individuals to go green through the purchase and use of green products (Shin *et al.* 2017; Birch *et al.* 2018; Wang *et al.* 2018; Prakash *et al.* 2019; Zou & Chan 2019). In addition, consumers are becoming more aware of frequently used efficient water-saving appliances and their impact on the environment (Millock & Nauges 2010; Martínez-Espiñeira *et al.* 2014; Yadav & Pathak 2016; Li *et al.* 2019). Therefore, the study assumes that consumers' concern for the environment is an important aspect to influence their intention to purchase efficient water-saving appliances.

Based on the literature discussed, the following hypotheses are proposed:

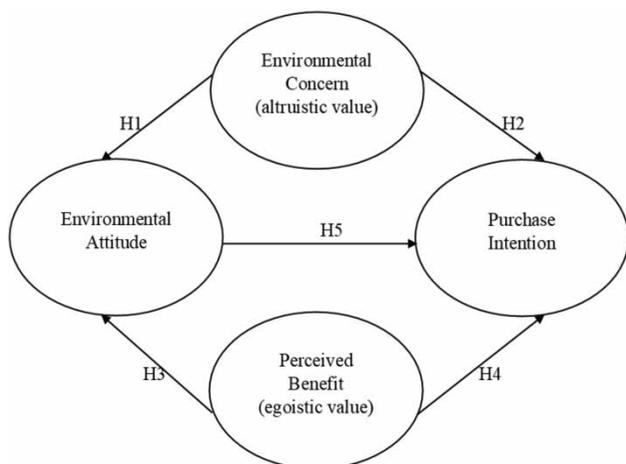
- H1:** Environmental concern (altruistic value) has a positive impact on individuals' attitudes toward purchasing water-efficient products.
- H2:** Environmental concern (altruistic value) has a positive impact on individuals' willingness toward purchasing water-efficient products.
- H3:** Perceived benefit (egoistic value) has a positive impact on individuals' attitudes toward purchasing water-efficient products.
- H4:** Perceived benefit (egoistic value) has a positive impact on individuals' willingness toward purchasing water-efficient products.
- H5:** Attitude toward water-efficient products has a positive impact on individuals' willingness to purchase water-efficient products.

Based on the discussed literature and proposed hypothesis, the following conceptual framework has been developed (refer to [Figure 1](#)).

## STUDY METHODS

### Study area

The study was conducted in Harbin, a major city with a population of over 10.46 million and a land area of



**Figure 1** | Conceptual model of study: latent constructs and their respective path of relationships.

53,068 km<sup>2</sup> in the northeast of China. One important fact about Harbin is that the city has to shut down its water supply to more than 4 million people in 2005 due to contamination and toxic leakage. The water supply shutdown in 2005 signaled that Harbin was in the throes of water shortage. Over time, the combination of Harbin's rapid industrialization, the vast population, and the exorbitant lifestyle of water consumption has compromised its water quality and quantity of water. To make matters worse, the gap between supply and demand has widened in recent years. In 2007, the Harbin government agreed to develop a water-saving city for a sustainable water system in Harbin. Some initiatives have been introduced over the last few years, such as increasing sewage facilities and encouraging residents and businesses to conserve water according to the NDRC evaluation indicators. However, the potential for the use of efficient water-saving appliances and how it could improve the water situation in the city has not been studied. The study, therefore, applies a proposed approach of customer willingness to buy effective water-saving appliances linked to ethical values. The location of Harbin is shown in [Figure 2](#).

### Characterization of efficient water-saving appliances

At the basic stage of growth, a rapidly developing economy may assume an upward trend in per capita water use to a 'turning point' where it begins to decline. This pattern of development and water use has been argued to some



**Figure 2** | Harbin's location on the map of China.

degree to match the trend of the Environmental Kuznets Curve (Yang & Jia 2005; Anisfield 2010).

Japan and the United States of America are examples of highly developed countries that have seen their water-use decline over the years. At one time, these countries had peaked water usage levels until they levelled-off and began to decline (Climate Technology Centre and Network (CTCN) 2020). While some of these advances are attributed to improvements in industrial and agricultural efficiency, the use of efficient water-saving appliances and fixtures has played an important role in these achievements (CTCN 2020).

Efficient water-saving appliances essentially consider appliances that use less water while providing comparable performance. The most common water-efficient appliances include dishwashers and washing machines. The most popular appliances include toilets, showers, and faucets. Some efficient water-saving appliances could be complex, like devices that use gray water from the sink for toilet flushing. Other products offer visual or auditory input on resource use to the user and rely on behavioral improvement (Elizondo & Lofthouse 2010).

### Questionnaire design

A 5-point Likert scale was used as the measurement scale. Taking guide from the previous literature, a structured questionnaire containing four constructs of attitude, perceived benefit, environmental concern, and purchase intention was designed to collect data (Table 1). The questionnaire also contained a section that captures demographic details. In order to improve the quality and clarity of the questionnaire, we conducted a preliminary study on 25 potential respondents. The reason was to see how easy it was for the respondents to answer the survey questions. The results of this turned out to be that few of the respondents could easily answer the survey, but most of the respondents complained about the questionnaire's language in English. Hence, we translated the questionnaires to the Chinese for easier comprehension.

### Data collection procedure and response

The formal questionnaire was administered in the city of Harbin (water-stressed city) between August and September 2019.

**Table 1** | Questionnaire items

Latent construct	Measurement item
Attitude (ATT)	ATT1 I consider purchasing water-efficient products as a good idea ATT2 I am confident purchasing water-efficient products is a smart choice ATT3 I like the thought of purchasing water-efficient products ATT4 It would be a pleasant experience to purchase water-efficient products
Perceived benefit (PB)	PB1) Buying water-saving-efficient products can lower the cost of potable water and trade waste PB2) Buying water-efficient products often come with rebates that bring the purchase price more in line with conventional appliances PB3) Buying a certified water-efficient product usually means a better result in delivery and performance
Environmental concern (EC)	EC1 The stability of water resources is fragile and vulnerable EC2 The integrity of water resources is seriously endangered by human beings EC3 When the water environment is disturbed, the consequences can be devastating EC4 In order to survive, man must maintain a balance in the water environment
Purchase intention (PI)	P1 I am willing to purchase water-efficient products P2 In the future, I will try to purchase water-efficient products

Using convenience sampling, questionnaires were distributed to customers in different shopping centers and markets as they walked out. Questionnaires were handed to customers after confirming whether they had purchased an efficient water-saving appliance from any of these shopping outlets or markets. This was done on three different days (Monday, Thursday, and Friday) over a period of 2 months. The reason for this was to avoid meeting the same set of customers and to ensure that a good amount of information was collected. A total of 500 questionnaires were distributed. After removing outliers and incomplete responses, data from 308 respondents were considered valid for further analysis. Among the 308 responses, 168 were males (54.55%), and 98 are females (45.45%). The

overall age profiles showed that the majority of the respondents (49.3%) were in the age categories of 30–40 years. Respondents in age categories of below 30 years, 41–50 years, and 51–60 years represented a total percentage of 27.4, 18.9, and 4.4%, respectively. As to education, 52.3% of respondents were either enrolled in or have completed a Master's study. In addition to this, 21.4, 17.2, 5.6, and 3.5% indicated either being enrolled in or have completed a Bachelor's study, doctoral program, basic and high school, respectively. Though the present study made no effort to establish the links between demographics and purchasing intention, as the literature has reported, we are optimistic that varied views were received from respondents on value orientation and purchase intention.

## STATISTICAL ANALYSIS

To measure the validity and reliability of the questionnaire responses, a confirmatory factor analysis (CFA) was conducted. That is, CFA tentatively acknowledges or statistically rejects a measurement model before an examination of the hypothesized model. The proposed model was statistically verified by highlighting the entire measuring variables in order to fit its consistency with the data conclusively. All models were calculated using AMOS (Analysis of Moment Structure) statistical software 23.

### Measurement model: CFA

The initial results of CFA based on four hypothesized latent constructs were considered adequate to fit the model (CMIN/df = 2.858, Comparative Fit Index (CFI) = 0.908, Tucker Lewis Index (TLI) = 0.894, Incremental Fit Index (IFI) = 0.908, Goodness of Fit Index (GFI) = 0.886, and Root Mean Square Error of Approximation (RMSEA) = 0.086). However, after making modifications, the overall results were CMIN/df = 1.854, CFI = 0.985, TLI = 0.978, IFI = 0.985, GFI = 0.956, and RMSEA = 0.047. These values are higher than the initial results and indicative of how questionnaire responses fit the hypothesized model.

Internal reliability of the scale was measured using Cronbach's alpha. The scale has strong internal reliability with measured alpha values in the ranges of 0.824–0.890

(Table 2). These values are above the acceptable limit of 0.70, as suggested by Hair et al. (2006).

### Convergent validity (factor loading, composite reliability, and average variance)

Factor loading, composite reliability (CR), and average variance (AVE) were used to validate how individual measuring items converge with each hypothesized construct (Table 2). The measured values of AVE (0.604–0.757) and factor loadings (0.606–0.994) were above the critical level of 0.5 and hence considered acceptable (Fornell & Larcker 1981). The values of CR (0.821–0.884) were all greater than the benchmark of 0.7, thus, considered as good (Hair et al. 2006). AVE and CR were calculated using Equations (1) and (2), respectively

$$AVE = \frac{(\sum_i^n \lambda_i^2)}{(\sum_i^n \lambda_i^2) + (\sum_i^n \delta_i^2)} \quad (1)$$

where  $\lambda$  is the standardized factor loading for item and  $\delta$  is the indicator measurement error for the item. Comprehensively, AVE is the sum of the square of the standard load divided by

**Table 2** | Representative results of the measurement model

Measuring item	Loading	Cronbach's alpha	Composite reliability	AVE
Attitude (ATT)				
ATT1	0.856	0.885	0.884	0.656
ATT2	0.835			
ATT3	0.833			
ATT4	0.708			
Perceived benefit (PB)				
PB1	0.793	0.824	0.821	0.604
PB2	0.786			
PB3	0.752			
Environmental concern (EC)				
EC1	0.606	0.890	0.871	0.638
EC2	0.667			
EC3	0.994			
EC4	0.866			
Purchase intention (PI)				
PI1	0.903	0.863	0.862	0.757
PI2	0.836			

the sum of the square of standard loads plus the sum of measurement error of the index

$$\text{Composite reliability} = \frac{(\sum \lambda_i)^2}{(\sum \lambda_i)^2 + \sum (\delta_i)} \quad (2)$$

where  $\lambda$  is the standardized factor loading for item and  $\delta$  is the indicator measurement error for the item. This can be interpreted as the square of the sum of standardized factor loads divided by the square of the sum of loads plus the sum of measurement errors of the index.

### Discriminant validity

Discriminant validity is obtained when the estimate of the AVE factor is greater than the correlation squared of two constructs (Fornell & Larcker 1981). Table 3 shows the results of the estimated variance extraction (VE) to confirm the discriminant validity of the model. From the results, AVE values were higher than the squared correlations between latent variables, thus the requirement of discriminant validity has been satisfied.

### Model statistics: goodness of fit indices

Using comparative fit indices such as relative Chi-square (CMIN/df), GFI, CFI, TLI, IFI, and RMSEA, the structural

**Table 3** | Factor loading

Latent variable	ATT	EC	PB	PI
ATT	0.809			
PB	0.561**	0.784		
EC	0.239**	0.228**	0.807	
PI	0.516**	0.493**	0.374**	0.869

\*\* $P < 0.01$ .

**Table 4** | Model fit indices

Fitness index	CMIN/df	GFI	CFI	TLI	IFI	RMSEA
Obtained values	1.970	0.952	0.981	0.974	0.953	0.051
Acceptable values	<5	≥0.90	≥0.90	≥0.90	≥0.90	<0.08

model was estimated to fit its consistency with the data. From Table 4, the results of all fit indices were above the acceptable limit of 0.9 (Bagozzi & Yi 1988). The value of RMSEA was 0.051, which is less than the acceptable limit of 0.08 (Browne & Cudeck 1992). Thus, the model shows an overall acceptable fit.

### Analysis of hypothesis

Table 5 confirms the relationship between the independent and dependent constructs ( $\beta$ ). Given  $\beta$ -value of 0.117,  $t$ -value of 2.128, and  $P$ -value of 0.010, environmental concern (altruistic value) was established to have a positive impact on individuals' attitude toward purchasing water-efficient products. This supported Hypothesis H1. Equally, the results ( $\beta$ -value = 0.209,  $t$ -value = 3.539,  $P$ -value = 0.000) confirmed environmental concern to significantly predict individuals' intention toward the purchase of efficient water-saving products. Hence, Hypotheses H2 was supported. Attitude ( $\beta$ -value = 0.640,  $t$ -value = 9.396,  $P$ -value = 0.000) and individual's willingness to purchase efficient water-saving appliances ( $\beta$ -value = 0.372,  $t$ -value = 3.811,  $P$ -value = 0.024) were established to be predicted by individual's perceived benefits (egoistic value) of appliance ownership. This supported Hypothesis H3 and H4, respectively. Attitude toward water-efficient products was also confirmed to have a positive impact on individuals' willingness to purchase water-efficient products ( $\beta$ -value = 0.341,  $t$ -value = 24.174,  $P$ -value = 0.005), thus hypothesis H5 was supported.

Attitude was established to have a partial effect as a mediating variable on the independent constructs (perceived benefit and environmental concern) and dependent construct (purchase intention) (Table 6). Attitude showed partial mediation between perceived benefit and individual's

**Table 5** | Influence of constructs and their related paths

Hypothesis	Relationship	$\beta$ -value	$t$ -value	$P$ -value	Result
H1	EC → ATT	0.117	2.128	0.010	Valid
H2	EC → PI	0.209	3.539	0.000	Valid
H3	PB → ATT	0.640	9.396	0.000	Valid
H4	PB → PI	0.372	3.811	0.024	Valid
H5	ATT → PI	0.341	4.174	0.005	Valid

**Table 6** | Mediating effect

Independent variable	Mediating variable: ATT		
	Case 1 ( $\beta$ -value)	Case 2 ( $\beta$ value)	P-value
Perceived benefit	0.736		0.010
Environmental concern		0.234	0.000

intention to purchase ( $\beta = 0.736$ ,  $P$ -value = 0.010). Similarly, the mediation of attitude between environmental concern and the individual's willingness to purchase was partially registered ( $\beta = 0.234$ ,  $P$ -value = 0.000).

## DISCUSSION AND IMPLICATIONS

This study underscores the association between value orientation and consumers' willingness to purchase water-efficient appliances. In the quest to establishing this connection, a premium was given to values associated with altruism and egoism, particularly with those linked to concerns for the environment and the benefits an individual stands to achieve prior to the purchase of an efficient water-saving appliance. Results of the empirical analysis revealed that it is highly probable for altruistic and egoistic individuals to purchase efficient water-saving products, thus a positive and statistically significant relationship was found between values and purchase intention.

From the results, both value orientations as predictor variables had a significant impact on purchase intention. However, compared with altruistic values, egoistic values had a greater influence on consumers' purchasing intention. The prioritization of egoistic values over altruistic values from an *a priori* perspective, though not devoid of controversy, could be argued as giving subtle character to personal satisfaction against any model of necessity, hunger, or societal requirement. A succinct position on this is that consumers have (i) self-need and (ii) need specifics or preferences. For instance, when a career woman and a mother of young kids find it tiring to wash by hands given the size of her family and busy office schedules, her washing needs have an object: a washing machine. However, she would not want to buy a washing machine for its own sake, what she would really want to have after she had

placed a premium on cost, brand, and total performance of the washing appliance is self-satisfaction and security of her own happiness. This example, as confirmed by the study in various rationalities and disciplines, resonates with other consumers and could tone down altruistic considerations.

Nevertheless, the empirical field of proself (egoism) could be quite revealing to study not just the strains and inconsistencies between cost and benefit associated with a pro-environmental behavior or intent but also the covert support sometimes given to prosocial (altruism) rationalities. In this regard, acting *a priori* more on egoistic rationalities could seldomly support altruistic considerations and concerns for the environment through the purchase or willingness to purchase an efficient water-saving product. This does not necessarily mean that egoistic rationalities are factors that identify the actualization of a green cause or environmental concerns. By this account, the inventiveness to overlap egoistic rationalities with altruistic rationalities with respect to purchasing intention is highly needed. Using economic incentives could steer egoists' purchasing intention toward efficient water-saving appliances without necessarily changing their individual rationalities. Conversely, disincentives could be used to decrease the attractiveness of water-intensive appliances. Further to this, intervention programs could focus on changing purchasing intentions by way of highlighting the disadvantages associated with the ownership of high-intensive water appliances (e.g. emphasizing the extra cost in using a conventional toilet which takes between 3.5 and 7.0 gallons of water per flush) while simultaneously highlighting on the alternative efficient water-saving appliances that are cost-effective and environmentally friendly (e.g. stressing on the money that could be saved from using an efficient modern toilet which takes between 1.2 and 1.6 gallons of water per flush). Conclusively, campaigners, manufacturers, marketing managers, and policymakers may need to develop suitable strategies so that the perceived benefit of an efficient water-saving product could advance green trust among consumers.

Registering altruistic value orientation as the recessive predictor, the study, nevertheless, has cognizance of the great concern altruists have for the environment and issues related to sustainability, thus consumers' intention to purchase efficient water-saving products. Most often, efficient water-saving appliances are costlier compared

with their conventional counterparts, and egoistically oriented individuals are unlikely to compromise their personal benefit for these products just to uphold the integrity of an environmental resource. [de Groot & Steg \(2009\)](#) pointed out that when actions that promote the wellbeing of the environment depend ultimately on egoistic rationalities, individuals will not engage in such actions when cost tends to exceed benefits. For these reasons, while egoistic rationalities may be consistent with intent or actions to promote the wellbeing of water resources, it appears too fickle to act on these considerations exclusively. There should be no compromises when introducing values of altruistically oriented individuals in policies or innovative interventions, considering that the collective wellbeing of the environment is at the core of prosocial rationalities. Marketing managers and campaigners may want to increase the cognitive accessibility of altruistic individuals toward the purchase of efficient water-saving equipment through meaningful negotiations and campaigns. In doing so, common consequences associated with an individual's actions and behavioral alternatives in a variable world of declining water resources should be the central element underpinning discussions and campaigns. Individuals are more likely to act on altruistic rationalities prior to receiving information on why to engage in specific pro-environmental actions ([de Groot & Steg 2009](#)). Additionally, the ability to instill altruistic values in consumers at an early age could be a springboard to ferment prosocial concerns and convictions that connect purchasing intentions to the overall management of water resources.

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## CONCLUSION

### Theoretical implications of the study

Efforts to encourage the purchase and use of efficient water-saving appliances are essential for water and pollution management. Particularly for developing and water-stressed countries, improving the willingness of residents to buy high-efficiency water-saving appliances is of great significance to economic growth, improvement of water-saving technologies, and the management of water resources. Based on the concepts of orientational values and pro-environmental behavior and intention, this study explored

how the prioritization of altruistic and/or egoistic values influences intention toward the purchase of efficient water-saving appliances.

### Practical implications of the study

A survey of potential consumers of efficient water-saving appliances was conducted in Harbin in order to validate the research and hypothesized model statistically. The results showed that altruistic and egoistic values play a significant role in consumers' purchasing intention with the latter registering as the dominant predictor variable. The difference that defined altruistically oriented and egoistically oriented individuals were their self-position in terms of benefits prior to the thought of purchasing efficient water-saving appliances. Thus, the study submits that in most cases, equal priority should be given to both value orientations in order to ensure consistency in consumers' purchasing intention. The study concludes that the joint coordination between altruistic and egoistic value orientations in predicting purchase intention could not be overemphasized but a significant component needed in the definition and re-structuring of environmental policies and innovations that seek to enhance the management of water resources.

### General conclusion

Our study has examined the role of orientational values and how they influence intention toward the purchase of efficient water-saving appliances. Environmental concern (altruistic value) has been described as having a positive effect on the individual's attitude toward the purchasing of water-efficient products, suggesting that an individual's intention to purchase efficient water-saving products is predicated on environmental concerns. In addition, the attitude and willingness of individuals to purchase efficient water-saving appliances have been identified to predict the perceived benefits (egoistic value) of appliance ownership. Attitude toward water-efficient products has also been found to have a beneficial effect on the willingness of individuals to purchase water-efficient appliances. The attitude was identified as having a partial impact on independent constructs (perceived benefit and environmental concerns)

and dependent constructs (purchase intention) as a mediating variable. Attitude reflected partial mediation between perceived benefit and buying purpose, and environmental considerations and desire to purchase. Nonetheless, this study has not examined the purchase behavior of efficient water-saving appliances among consumers. Further research should seek to both expand the survey and investigate actual behavior together with the intention to purchase water-efficient appliances. We are confident this research has policy effects and could serve as a benchmark for measures to managing residential water use. Additionally, this work is timely in light of the broader UN-wide discussion of sustainable development goal six, which seeks to ensure the availability and sustainable management of water and sanitation.

## DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

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