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Ecologically conscious behaviour of urban Chinese consumers: the implications to public policy in China

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The huge population of China, together with its rapid economic growth, has created problems of exhaustion of resources and environmental pollution, which not only harm the Chinese but the rest of the world as well. Studying the underlying forces of environment-related behaviours at all levels in China is very important. An awareness of resource conservation and environmental protection has gradually emerged in China. Nevertheless, consumers' poor environmental consciousness is a major obstacle for China to build an environmentally-friendly society. Consolidating the experience of research in developed countries, a survey of 1392 Chinese consumers was conducted to explore the determinants of ecologically conscious behaviour (ECB) through an extended knowledge-attitude-practice (KAP) model. Results of the analyses showed that some socio-psychological factors have impacts on consumers' ECB. Specifically, affection for resource conservation and environmental protection (eco-affection) and social responsibility consciousness have direct effects; eco-awareness has indirect effects; and eco-knowledge and materialistic values on consumption have both direct and indirect effects on consumers' ECB. These findings provide important public policy implications for government and NGOs to guide consumers to engage in ECB.

Keywords: ecologically conscious behaviour; KAP model; urban Chinese; public policy

1. Introduction

Consumption is a key lever to achieving sustainable development. If consumers exhibit ecologically conscious consumption behaviour, it is likely to promote profit-driven enterprises to adopt the concept of green marketing in their operations. On the other hand, non-ecologically conscious consumption behaviour is one of the major reasons for global exhaustion of resources and environmental deterioration. Consumers in underdeveloped countries tend to purchase only essential products due to economic reasons. They do not have too much money to spend. Resources are scarce, so are being treasured. Unfortunately, when a country develops too quickly, as the case in China, its people may not have the necessary ecological knowledge to

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act accordingly for a period of time. Indeed, a snapshot taken by Harris (2006) depicted environmental destruction and rampant resource exploitation in many parts of China. At present, a great deal of lavish, polluting, destructive, nearsighted and excessive consumption can be seen everywhere in China (Wang 2010). According to *China's Public Environment Protection Index 2008* released by China Environmental Culture Promotion Association, the public environmental awareness score was only 44.5 out of 100 (an increase of 2.4 from 2007), and the environmental behaviour score was only 37.0 out of 100 (an increase of only 0.4 from 2007) (CEAP office 2008). Consumers' poor environmental awareness and behaviour has become a huge obstacle for China to build an environmentally-friendly society.

Consumptions in China have begun to play an important role in world development. According to the *China statistical yearbook 2011*, the total living expenditure of Chinese household consumption in 2010 amounted to 13,329 billion RMB yuan (about US\$1960 billion). Urban Chinese households, which represented 49.95% of the total population, accounted for 76.8% of the total consumption; while rural Chinese households, 50.05% of the total population, only accounted for 23.1% of the total (Table 1). China enjoyed the world's fastest growth rate of household consumption (more than 10%) in the past 30 years. According to the latest report published by the World Luxury Association, in 2010, the total consumption in the Chinese mainland luxury market reached US\$10.7 billion (not including private planes, yachts and luxury cars), which is more than a quarter of the global total. In 2012 China is expected to become the world's largest luxury goods trade and

Table 1. Total living expenditure of Chinese household consumption. 100 million RMB Yuan.

Item	2007	2008	2009	2010
All items	95,609.8	110,594.5	121,129.9	133,290.9
<i>Rural household</i>	<i>24,122.0</i>	<i>27,495.0</i>	<i>28,833.6</i>	<i>30,897.0</i>
Food	9998.7	11,581.7	11,732.0	
Clothing	1392.6	1534.3	1667.3	
Residence	4415.8	5102.2	4916.7	
Household facilities, items and services	1073.5	1260.4	1468.7	
Health care and personal items	1571.6	1880.9	2355.8	
Transportation and communications	2364.0	2609.2	2889.3	
Recreation, education and culture items	2200.3	2278.5	2442.5	
Financial services	405.5	505.4	474.9	
Insurance services	156.7	186.7	283.5	
Others	543.4	555.6	603.1	
<i>Urban household</i>	<i>71,487.8</i>	<i>83,099.5</i>	<i>92,296.3</i>	<i>102,393.9</i>
Food	21,239.4	25,568.6	27,152.2	
Clothing	6100.1	6998.1	7785.8	
Residence	12,306.1	14,565.3	16,165.7	
Household facilities, items and services	3523.1	4152.4	4770.8	
Health care and personal items	6156.5	7580.9	8867.4	
Transportation and communications	7946.6	8505.9	10,335.6	
Recreation, education and culture items	7781.2	8152.9	9046.9	
Financial services	1711.2	2132.9	1995.8	
Insurance services	1344.5	1528.8	1582.0	
Others	3379.0	3913.9	4594.0	

Source: *China statistical yearbook 2011*, p. 24.

consumption centre, where total consumption is expected to reach \$US14.6 billion total.

China has amazed the world with its stunning economic growth, progressing from an underdeveloped to a well-established developing country in a relatively short period. It is timely to examine Chinese consumers' purchasing behaviour to identify whether anything needs to be done by the government, or NGOs, in order to build a green economy. Specifically, the present study examines the determinants of ecologically conscious purchase behaviour through the extended knowledge-attitude-practice (KAP) model, in the Chinese context.

2. Literature review

There has been a continuous stream of academic papers trying to identify demographic and socio-psychological factors as predictors of consumers' ecologically conscious behaviour (ECB). Most researchers hold that demographic factors are less effective compared with psychological factors in predicting consumers' ECB (Straughan and Roberts 1999). Existing research showed that psychological factors, such as environmental attitude, environmental affection, environmental knowledge, social responsibility, etc. can be used to predict consumers' ECB inclination (Schwepker and Cornwell 1991, Pickett *et al.* 1995, Straughan and Roberts 1999, Chan and Lau 2000, Thøgersen and Ölander 2002, Marguerat and Cestre 2004).

Most researchers assumed that environmental attitude was the main factor influencing environmental behaviour, and they held that an environmentally-friendly attitude would inevitably lead to environmentally-friendly behaviour (Li 2007). Many studies confirmed that attitude towards the environment indeed influences one's ECB. It was found that attitude towards pollution could affect one's attitude towards ecologically conscious living; and those who are genuinely concerned about pollution are inclined to take measures to circumvent further pollution (Balderjahn 1988, Schwepker and Cornwell 1991). The study by Pickett *et al.* (1995) further proved that the most effective predictive factor is personal attitude towards pollution, when distinguishing consumers' environment protection behaviour inclinations. Hines *et al.* (1987) proposed that there were essentially two types of attitudes: attitudes towards ecology and the environment as a whole, and attitudes towards taking environmental action (e.g. attitudes towards recycling, towards conserving energy). According to Hines *et al.* (1987), when the environmental attitude was defined as the general attitude, a weak relationship existed between environmental attitude (or environmental concern) and specific environmentally-related behaviours. A slightly stronger relationship was detected between attitude towards action and environmental behaviour than was observed between attitude towards environment in general and environmental behaviour. Bamberg (2003) found that only situation-specific cognitions are direct determinants of specific behaviours, so researchers should no longer view environmental concern as a direct, but as an important indirect determinant of specific behaviour. Some other scholars (e.g. Yu *et al.* 2008) noted that attitude, including environmental attitude, should not be taken as a whole, but should be subdivided. Researchers should subdivide attitude and analyse the effects of different dimensions of attitude on environmental behaviour. Some researchers have compared the relative predictive ability of cognitive attitude and affectional attitude when predicting different types of behaviours (Yu *et al.* 2008). The results have shown that, generally speaking,

affectional attitude has greater predictive effects compared with cognitive attitude when predicting different types of behaviours.

With regard to environmental issues, the environmental affection factor includes the anxieties, expectations and emotive responses of consumers (Dembkowski and Hanmer-Lloyd 1994). For environmental affection, research findings have been almost consistent, i.e. there is a positive relationship between environmental affection and ECB (Hines *et al.* 1987, Chan and Lau 2000). The meta-analysis conducted by Bamberg and Möser (2007) reported that feelings of guilt, another type of environmental affection, is a significant predictor of moral norm construct. Moreover, many researchers (Chan and Lau 2000, Chan 2001) have proved that people with little environmental knowledge might still exhibit a strong emotional attachment to the environment. It seems that people's environmental affection is more important than environmental knowledge in predicting ECB. The study by Martin and Simintiras (1995) showed that environmental knowledge and environmental affection are two distinct variables that have separate significant effects on environmental behaviour. The study by Chan and Lau (2000) on Chinese consumers proved once more that there is a strong positive relationship between ecological affection and green purchase intention, as well as their actual green purchase.

With regard to environmental knowledge, most scholars hold that personal knowledge is an essential force shaping individuals' ECB. Synodinos (1990) held that by increasing consumers' knowledge on environmental issues, more positive attitudes towards environmental behaviour would be promoted. Press and Arnould (2009) held that consumers' (poor) knowledge is one of the major constraints to sustainable energy consumption. Meta-analysis of Hines *et al.* (1987) found that the average correlation coefficient between knowledge and environmental behaviour was 0.299. The study by Margueral and Cestre (2004) further revealed that knowledge had a particular impact on both attitude (e.g. scepticism) and post-purchase behaviour (e.g. recycling). Tang *et al.*'s (2011) empirical research on Chinese rural households also showed that knowledge of the environmental harm of not recycling influences recycling behaviour significantly. However, some scholars have held different viewpoints about the influence of environmental knowledge. The study by Pickett *et al.* (1995) showed that environmental knowledge had no significant effect on environmental behaviour. However, their study was mainly aimed at general environmental knowledge (or abstract environmental knowledge) rather than the specific and particular environmental knowledge. Schahn and Holzer (1990) noted that 'general' and 'specific' environmental knowledge should be differentiated, and only the latter has an important impact on ecologically-friendly behaviour.

Social responsibility is another important factor. This has been defined as the willingness of an individual to help other persons, even when there is nothing to be gained (Schwepker and Cornwell 1991). Comparatively few studies have been done concerning the impact of social responsibility on ECB. Some scholars are still exploring it. Schwepker and Cornwell (1991) assumed that those who are highly involved in community activities and/or are socially responsible might respond to ecologically packaged goods if such behaviour has become the accepted norm. They found evidence supporting the above assumption in their research. Some scholars have studied the role of altruism – a terminology closely related to social responsibility. In Straughan and Roberts' (1999) empirical study, altruism was the second most important variable of all of the predictive variables in profiling green consumers. Bamberg and Möser (2007) confirmed that moral norm is a significant

predictor of intention construct. It seems evident that social responsibility, or altruism, is an indispensable variable to predict ECB.

With regard to values and lifestyles (VALS), Dembkowski and Hanmer-Lloyd (1994) put forward the environmental value-attitude-system model, and noted that the direct determinant of green purchase was an individual's evaluation of product attributes, while the indirect determinants were the 'domain-specific' values and global values. Similar to Dembkowski and Hanmer-Lloyd's research, Fulton *et al.* (1996) put forward an inverse triangle cognition-behaviour hierarchy model, i.e. value-attitude-behaviour-system model. Thøgersen and Ölander (2002) also held that correlations exist between human values and a sustainable consumption pattern. However, human values are 'distant' determinants of a sustainable consumption pattern, and its direct influence on consumption behaviour is weak. In addition, such variables as attitude/intention etc. play an important role between the relations. Moreover, some scholars have held that, for specific behaviours, not all dimensions of values play the same role in predicting their ECB (Li 2007). In our view, the direct correlation between values as a whole and ECB may not be significant. Rather, it is individual consumption values (people's materialism inclination or consumerism), which may significantly influence consumers' ECB. Some scholars have also held that highly materialistic individuals tend to be selfish, possessive and place great value on the accumulation of material possessions (Hirsh and Dolderman 2007). In their pursuit of material possessions, they probably ignore environmental issues.

In China there have also been many empirical studies on consumers' ECB. However, most of the researchers have merely described the current situation regarding Chinese consumers' ECB (for example, how many Chinese consumers are willing to pay more for products which have environmental labels). Studies on the factoring leading to ECB are inadequate (Wang 1999, Li 2007, CEAP office 2008). In recent years, some scholars have begun to explore the determinants (including demographic and socio-psychological factors) of urban Chinese consumers' ECB (Li 2007, Wang 2008, Yang and Xing 2009, Liu 2010), but their conclusions have been diverse. For example, an empirical study by Li (2007) indicated that the determinants of consumers' green consumption include values, environmental attitude, environmental knowledge and green consumption awareness. Qualitative research by Yang and Xing (2009) showed that attitude, perceived behaviour control and subjective norm could affect sustainable consumption behaviour. Results of an empirical study by Liu (2010) showed that perceptions about the negative consequence of environmental pollution, eco-values, pertinent knowledge or skills, and environmental responsibility would influence consumers' behaviour intention and further influence their sustainable consumption behaviour.

So far, research on the determinants of ECB has provided inconsistent results. One possible explanation is that these studies were conducted in different cultural contexts and different economic situations. Another possible explanation is the diverse dependent variables and measurement scales being used in different research. For example, different scholars use different terminologies, including pro-environmental behaviour (Karp 1996, Clark *et al.* 2003), ecologically concerned consumers (Schwepker and Cornwell 1991), environmentally sensitive behaviour (Bohlen *et al.* 1993), environmentally concerned consumers (Murphy *et al.* 1978), environmentally responsible behaviour or responsible environmental behaviour (Hines *et al.* 1987, Berger and Corbin 1992), environmentally conscious behaviour (Ellen *et al.* 1991), ecologically conscious consumer behaviour (Straughan and Roberts 1999), green

consumption behaviour (Nyborg *et al.* 2006, Li 2007), sustainable consumption behaviour (Yang and Xing 2009, Liu 2010), etc. Not surprisingly, researchers using different dependent variables and questionnaire scales inevitably provide inconsistent results. Furthermore, scholars have been inclined to examine the direct impact of independent variables on ECB, but they seldom examine the indirect impact of explanatory variables on ECB, the mediation role of specific variables and the interaction between independent variables.

More recent research on environmental issues has focused on consumer buying behaviour of specific green products, such as green electronics (Saphores *et al.* 2007) or hybrid cars (Sangkapichai and Saphores 2009).

3. Modelling determinants of ecologically conscious behaviour

Based on literature described in the previous section, it seems that determinants of ECB include, but are not limited to, environmental attitude (which can be subdivided into cognitive attitude and affection attitude), environmental knowledge and social responsibility, or altruism, VALS. This study consolidates the different schools of thought in this area and tries to define the above determinants more comprehensively.

To examine the determinants of ecologically conscious behaviour one should first understand the 'black box' of decision-making processes by consumers. The widely used concepts are the theory of reasoned action, TRA (Ajzen and Fishbein 1980) and the theory of planned behaviour, TPB (Ajzen 1991). The latter is an extension of the former, that includes measures of control belief or perceived behaviour control. TRA or TPB may not adequately explain ECB of consumers. The reasons are as follows: (1) TRA or TPB do not analyse the formative process of attitude, especially as they ignore the role of emotion, social responsibility and VALS in this process; (2) The relationships between subjective norm and intention remain to be validated. Some scholars found that the influence of subjective norm to intention/behaviour was not significant (Armitage and Conner 2001, Yu *et al.* 2008); (3) Finally, there is still a lack of enough evidence to prove its effectiveness in predicting consumers' ECB (although it is effective in predicting consumers' general behaviour).

The knowledge-attitude-practice model (KAP model) could perhaps overcome the weakness of TRA and TPB and could better interpret consumer behaviour and its corresponding intervention. It was initially used to interpret an individual's health management behaviour, and was later extended to explain an individual's other behaviour (Cleland 1973, Ratcliffe 1976, Green 2001, Eckman and Walker 2008). The KAP theory holds that the shaping of individual behaviour is a process consisting of three sub-processes of 'knowledge or cognition' (K); 'attitude or belief' (A); and 'practice/behaviour' (P). Only when one has the knowledge, and meanwhile actively thinks about the knowledge, that there then comes the belief that one may take a positive attitude to change his/her behaviour. The model is shown in Figure 1.

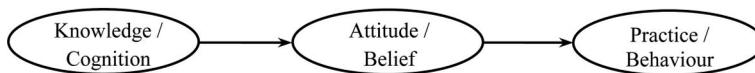


Figure 1. Knowledge-attitude-practice (KAP) model.

The KAP model has been widely used throughout the world in public health management, water supply and sanitation, education, psychology and behavioural science etc. by many national governments/NGOs. Some scholars also use KAP to study the consumer's ecologically conscious behaviour (Stanton *et al.* 1987, Laroche *et al.* 2002, Ehrampoush and Moghadam 2005, Ifegbesan 2008, Tatlonghari and Jamias 2010). In environmental intervention programmes, the KAP model indicates what an individual knows about environmental issues (such as his awareness about environmental pollution issues), how he feels about environmental protection (such as his attitude about environmental protection), and his practices (such as his ecologically conscious behaviour).

Although the KAP model has been widely used in a multitude of domains, including environmental intervention programmes around the world, it has some defects, which are summarised below.

- (1) The KAP theory assumes that the 'K', 'A' and 'P' take place in a linear order (follow the single ordinal path of 'K→A→P'), without considering the indirect and direct effect of 'K' on 'P'. Apparently 'K' may have a direct effect on 'P', and also has an indirect effect on 'P' through mediator 'A'.
- (2) In the KAP theory, 'K' is 'cognition' in a single-dimension, 'A' is 'attitude or belief' in a single-dimension, and 'P' is 'practice' in a single-dimension. This is a simplified assumption. With regard to 'K', it can be classified into more than one dimension, i.e. awareness, knowledge.
- (3) In the KAP theory, the role of affection factor is ignored, and this makes the KAP theory's reality and applicability questionable to some extent. Therefore, some scholars revised the KAP theory by adding a mediator (e.g. affection) between cognition and belief, and put forward the knowledge-affection-belief-practice model (KABP model) (Lu and Zhen 2004).

Through an extensive review of the experience gained in developed countries, the classic KAP model was extended in this study to overcome its limitations described above. This extended model is shown in Figure 2.

In this extended model (EKAP), the knowledge/cognition construct (K) is extended to three dimensions: awareness, knowledge and concept, i.e. Aw, Kn and Mv. The attitude/belief construct (A) is extended to two dimensions: affection and social responsibility, i.e. Af and Sr. The practice/behaviour construct refers to

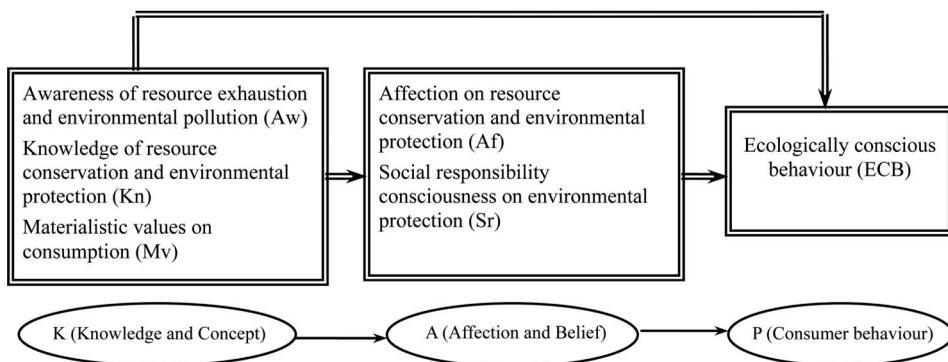


Figure 2. The extended knowledge-attitude-practice (EKAP) model.

consumers' ecologically conscious behaviour (ECB). Different from the classic KAP theory, we believe that sophisticated relations exist between the variables. Three sets of hypotheses are to be tested in this study.

First, both the three knowledge dimensions (K) and the two attitude dimensions (A) will have direct effects on ECB. The first set of hypotheses is stated as follows.

- H1.1 Awareness of exhaustion of resources and environmental pollution (Aw) has a significant effect on consumers' ECB.
- H1.2 Affection for resource conservation and environmental protection (Af) has a significant effect on consumers' ECB.
- H1.3 Knowledge of resource conservation and environmental protection (Kn) has a significant effect on consumers' ECB.
- H1.4 Social responsibility consciousness (Sr) has a significant effect on consumers' ECB.
- H1.5 Materialistic value on consumption (Mv) has a significant effect on consumers' ECB.

Second, knowledge (K) will directly affect attitude (A), through which it can then affect practice/behaviour (P). In other words 'A' is the intermediary variable between 'K' and 'P'. Thus, the second set of hypotheses to be verified in this study is stated below.

- H2.1 Awareness of exhaustion of resources and environmental pollution (Aw) has a significant effect on affection for resource conservation and environmental protection (Af).
- H2.2 Awareness of exhaustion of resources and environmental pollution (Aw) has a significant effect on social responsibility consciousness (Sr).
- H2.3 Knowledge of resource conservation and environmental protection (Kn) has a significant effect on affection for resource conservation and environmental protection (Af).
- H2.4 Knowledge of resource conservation and environmental protection (Kn) has a significant effect on social responsibility consciousness (Sr).
- H2.5 Materialistic value on consumption (Mv) has a significant effect on affection for resource conservation and environmental protection (Af).
- H2.6 Materialistic value on consumption (Mv) has a significant effect on social responsibility consciousness (Sr).

Third, the different dimensions within the knowledge construct are related. If a consumer has a strong awareness of exhaustion of resources and environmental pollution problems, they would strive to find more information about resource conservation and environmental protection. If a consumer has materialism inclinations about consumption, they would be less likely to find information about resource conservation and environmental protection. Hirsh and Dolderman (2007) also noted consumerism and environmentalism are negatively correlated. Based on these arguments, the following hypotheses are to be verified in this study.

- H3.1 Awareness of exhaustion of resources and environmental pollution (Aw) has a significant effect on knowledge of resource conservation and environmental protection (Kn).
- H3.2 Materialistic value on consumption (Mv) has a significant effect on knowledge of resource conservation and environmental protection (Kn).

Similarly, the two dimensions within the attitude construct are related. Affection for resource conservation and environmental protection (Af) would influence

consumers' social responsibility consciousness (Sr). If a consumer has a strong affection about resource conservation and environmental protection, they would be more likely to have a sense of responsibility concerning these issues. Thus, the following hypothesis is to be verified in this study.

H3.3 Affection for resource conservation and environmental protection (Af) has significant effect on consumers' social responsibility consciousness (Sr).

The above hypotheses are summarised in the EKAP conceptual model shown in Figure 3.

4. Methodology

This study gathered data from urban Chinese consumers via a questionnaire survey. Measurement items were largely based on previous studies (Schwepker and Cornwell 1991, Johnson and Johnson 1995, Pickett *et al.* 1995, Chan and Lau 2000). However, all items were modified in consideration of the Chinese cultural characteristics and the research purposes of this paper. Some items (e.g. Kn) were designed by the authors (for most of the Kn, items in Western culture are not suitable for Chinese consumers).

The expert assessment and evaluation approach was used to test the content validity of measures. Before the constructs were formed, several professionals specialising in marketing research and some consumer representatives were consulted about which items were important/unimportant in measuring the variables. Their suggestions and opinions were embedded into the draft questionnaire. Using this preliminary questionnaire, a pilot study was conducted with urban Chinese consumers in the city of Hangzhou and the pilot data were analysed. Taking into consideration the suggestions from the respondents, the questionnaire items were further modified to form the final version of the questionnaire. In summary, the measurement items passed the content validity test and are suitable for the objective of the study. The final measurement items (with the reliability test

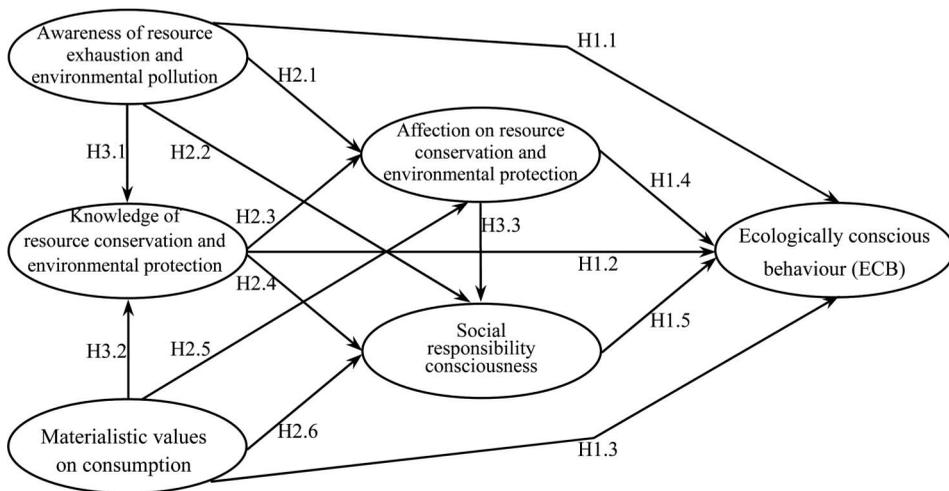


Figure 3. Assumed paths of socio-psychological factors influencing consumers' ECB.

results) are shown in Table 2. Each item was measured by a 7-point Likert scale ranging from (1) 'strongly agree' to (7) 'strongly disagree'.

The survey was carried out in the city of Hangzhou. As the capital of the Zhejiang Province, Hangzhou is a large city in the southeastern part of China. It covers an area of 16,600 km² and has a population of 8,700,400 (2010). The city had a GDP of 594.582 billion RMB yuan (approximately US\$88 billion) in 2008, and a per capita GDP amounting to 68,398 RMB yuan (approximately US\$10,103). According to the classification of the World Bank, the per capita GDP of Hangzhou has almost approached the level of high-income districts or countries (US\$10,726). To some extent Hangzhou city could represent the developed, prosperous areas/cities of China.

A face-to-face street intercept survey was conducted in public places (e.g. public squares, parks, community centres, etc.) of Hangzhou. Even though the present study utilised a structured questionnaire, the presence of an interviewer allowed respondents to seek clarification of confusions on the spot, thus data quality could be ensured. The sample frame included 30 high pedestrian public places chosen from the six major districts of Hangzhou. The systematic sampling method, with a time interval of 20 to 30 minutes, was used during high traffic hours. Finally, a total of 1392 valid samples were collected. Demographic characteristics of the sample are shown in Table 3. The distribution of gender, age, educational background, family size, occupation and income are approximately the same as the general status of urban Chinese consumers.

5. Data analysis and results

Descriptive statistics and bivariate correlations of the constructs are shown in Table 4. The mean score of awareness (Aw) is 1.87, the lowest among the nine constructs. This shows that, in general, consumers' awareness of exhaustion of resources and environmental pollution issues is relatively high. The mean score of affection (Af) is 2.40, which indicates that, while becoming aware of the problem of resources and the environment, consumers' emotions about resource conservation and environmental protection are not yet particularly strong. The mean score of knowledge (Kn) is 3.12 (between 'approximately agree' to 'neutral'). Obviously, consumers' knowledge in this respect is not adequate. The mean score of social responsibility consciousness (Sr) is 2.03, which shows that consumers have a relatively high level of consciousness. The mean score of materialistic values on consumption (Mv) is 4.05 which can be considered as neutral. For the consumption behaviour, the mean of ECB is 2.66. Results of bivariate correlation analysis show that correlations exist (positive or negative) between almost all constructs.

The reliability and validity of the sample was tested to assess the foregoing constructs. First, Cronbach's α coefficient was computed to measure the internal reliability of the constructs. The results showed that Cronbach's α coefficient of each construct exceeded 0.78, and some of them even reached 0.87 (see Table 2.). When any one item was eliminated, there was no significant increase in each construct's Cronbach's α coefficient. This indicates that the scale has excellent internal consistency, reliability and stability.

The construct validity of the measurements was tested via exploratory factor analysis (EFA). The results indicated that the KMO test statistics of constructs

Table 2. Questionnaire items and the Cronbach's α coefficient.

Construct	Questionnaire Items	Cronbach's α	Source
Awareness of resource exhaustion and environmental pollution (Aw)	If uncontrolled, environmental pollution issues will become more serious. *If uncontrolled, the resources on Earth, such as energy, minerals and forests, etc. may be exhausted very quickly. Resource shortage and environmental pollution have seriously threatened mankind's living environment. *Resource shortage and environmental pollution have affected my life. *At present, resource wastage and environmental pollution issues resulting from people's consumption are very serious.	0.7800	Schwepker and Cornwell (1991), Johnson and Johnson (1995)
Knowledge of resource conservation and environmental protection (Kn)	*I know which materials are biodegradable and which materials are non-biodegradable. *I know which types of waste are recyclable and which types are non-recyclable. *I am familiar with the 'environmental labels' (e.g., energy conservation label, water-conservation label, etc.).	0.7996	Designed by the author
Materialistic values on consumption (Mv)	Compared with most people, I prefer materialism consumption. I think I am fashionable in consumption. I like to buy new products. I like having lots of high-end consumer goods. *I find myself inclined to buy unpractical or unnecessary goods.	0.8108	VALS2
Affection on resource conservation and environmental protection (Af)	*I am concerned with resource wastage and environmental pollution issues resulting from consumption all the time. I get frustrated and angry when I see someone wasting resources or polluting the environment. When I wasted resources or polluted the environment, I felt guilty. When I saved resources and protected the environment, I felt happy.	0.8267	Chan and Lau (2000)

(continued)

Table 2. (Continued).

Construct	Questionnaire Items	Cronbach's α	Source
Social responsibility consciousness (Sr)	*In order to save resources and protect the environment, I'm always ready to do it even if I have to restrain my consumption.	0.8672	Johnson and Johnson (1995)
	It's my duty to conserve resources or protect the environment. I am willing to contribute to resource-conservation and environmental protection.		
Ecologically conscious behavior (ECB)	When buying products, I choose products which are less harmful to the environment.	0.8445	Schwepker and Cornwell (1991), Pickett <i>et al.</i> (1995), Johnson and Johnson (1995)
	Once knowing that a certain product would do harm to the environment, I wouldn't buy or use it as much as possible.		
	I often advise family members to buy products which are less harmful to the environment.		
	I buy energy efficient household appliances as much as possible.		
	*I always choose to buy those products which have environmental labels (e.g. energy conservation label, water-conservation label, etc.).		
	When buying products, I choose products with biodegradable or recyclable packages.		

Note: The items marked * are designed by the authors first hand.

(0.880) exceeded the recommended threshold of 0.7. The significance level of Bartlett's test of sphericity of constructs is 0.000. This indicated that zero-hypothesis of Bartlett's test of sphericity of constructs was refused, and the construct validity of the questionnaire items is perfect.

Structural equation modelling (SEM) using AMOS7.0 was employed in the data analysis. Confirmatory factor analysis (CFA) was performed first to validate all constructs (Aw, Af, Kn, Sr, Mv and ECB). The six-dimension model (Aw, Af, Kn, Sr, Mv and ECB) has the most perfect goodness-of-fit, while the single-dimension model has very poor goodness-of-fit. It indicated that significant differences exist among the six constructs: Aw, Af, Kn, Sr, Mv and ECB. The results of CFA showed that each observable indicator could indicate its corresponding latent construct well, and the measurement model hypothesis proposed in our study is reasonable and meets the needs of further structural equation modelling completely. The structural equation modelling is then employed to test the structural relations among different constructs. The goodness-of-fit indexes of the ultimate model are as follows: the chi square statistic (χ^2) is 1745.307; the root-mean-square error of approximation (RMSEA)

Table 3. Demographic characteristics of the sample.

		Frequency	Percentage (%)
Gender	Male	769	55.2
	Female	621	44.6
Age	15–24 years old	271	19.5
	25–34 years old	431	31.0
	35–44 years old	350	25.1
	45–54 years old	225	16.2
	Over 55 years old	112	8.0
Education level	Junior middle school or below	193	13.9
	Senior middle school	456	32.8
	Technical college	355	25.5
	University	329	23.6
	Graduate school or higher	36	2.6
Family Size	1~2 persons	107	7.7
	3 persons	615	44.2
	4 persons	387	27.8
	5 persons or more	242	17.4
Occupation	Manual labour	128	9.2
	Service sector personnel and salespeople	363	26.1
	Managerial and office staff	268	19.3
	Professional and technical personnel	228	16.4
	Self employed and business owners	122	8.8
	Other occupations	283	20.3
Household monthly income (RMB)	1600 or below	37	2.7
	1601–3200	143	10.3
	3201–4800	211	15.2
	4801–6400	324	23.3
	6401–8000	233	16.7
	Over 8000	282	20.3

Note: Total sample size is 1392, but some respondents did not answer some of the questions.

Table 4. Descriptive statistics and bivariate correlations of the constructs.

Constructs	Standard		Aw	Kn	Mv	Af	Sr	ECB
	Mean	deviation						
Awareness Aw	1.87	0.69	1					
Knowledge Kn	3.12	1.11	0.22***	1				
Materialistic Mv	4.05	1.13	-0.059	0.13***	1			
Affection Af	2.40	0.86	0.50***	0.46***	0.021	1		
Social resp. Sr	2.03	0.95	0.38***	0.32***	-0.014***	0.44***	1	
Eco-conscious behaviour ECB	2.66	0.91	0.31***	0.41***	0.12***	0.54***	0.39***	1

Note: ***significance $P < 0.001$.

is 0.061; the Normal Fit Index (NFI) approaches the recommended threshold of 0.9; and the Comparative Fit Index (CFI) exceeds the recommended threshold of 0.9. In summary, the goodness-of-fit indicates that the ultimate model fits well with the present dataset.

The standardised effects (including direct effects, indirect effects and total effects) among the constructs are shown in Table 5.

Awareness (Aw) does not have any direct effect on ecologically conscious behaviour (ECB), but its indirect effect is the greatest. Affection (Af) has the greatest direct effect on ECB. Concerning the total effects on ECB, affection comes first; the next is knowledge and then awareness. The ultimate model was able to explain 46.6% of the variance of ECB. The determinants and mechanism of consumers' ECB (the EKAP model) are shown in Figure 4.

The results of hypotheses testing are shown in Table 6.

6. Discussion

Our study found that the EKAP model could profile the determinants of, and their impact on, consumers' ECB. People's eco-awareness, eco-knowledge, eco-affection

Table 5. Standardised effects among the constructs.

		Aw	Mv	Kn	Af	Sr
Direct effects	Knowledge Kn	0.274***	0.199***	0.000	0.000	0.000
	Affection Af	0.484***	0.006	0.414***	0.000	0.000
	Social resp. Sr	0.249***	-0.153***	0.184***	0.287***	0.000
	ECB	-0.020	0.139***	0.160***	0.462***	0.175***
Indirect effects	Knowledge Kn	0.000	0.000	0.000	0.000	0.000
	Affection Af	0.113	0.082	0.000	0.000	0.000
	Social resp. Sr	0.222	0.062	0.119	0.000	0.000
	ECB	0.402	0.057	0.244	0.050	0.000
Total effects	Knowledge Kn	0.274	0.199	0.000	0.000	0.000
	Affection Af	0.597	0.088	0.414	0.000	0.000
	Social resp. Sr	0.471	-0.091	0.303	0.287	0.000
	ECB	0.382	0.196	0.404	0.513	0.175

Note: ***significance $p < 0.001$.

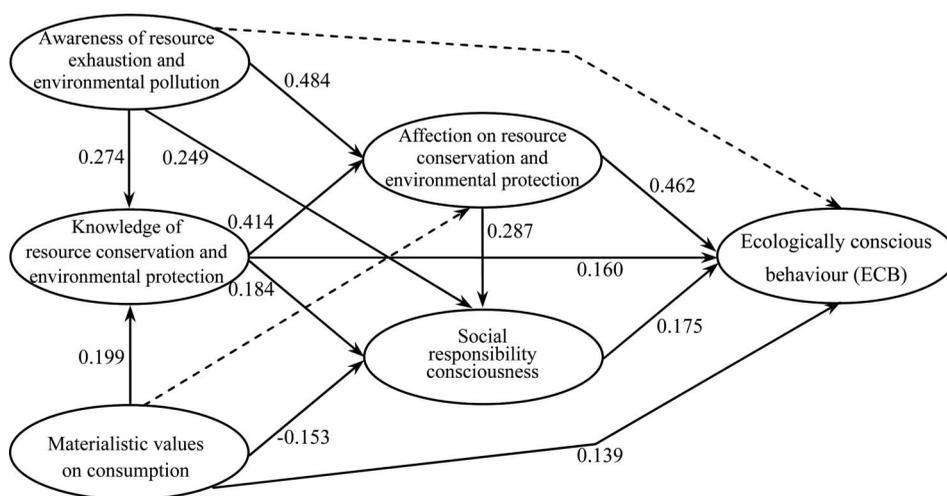


Figure 4. Determinants and the mechanism of consumers' ECB. The insignificant paths are illustrated by dotted lines.

Table 6. Hypotheses testing results.

	Hypotheses	Path in Model	Standardised coefficient	Testing result
H1.1	Awareness of resource exhaustion and environmental pollution affects ECB	ECB <- Aw	-0.020	NOT supported
H1.2	Affection on resource conservation and environmental protection affects ECB	ECB <- Af	0.462***	Supported
H1.3	Knowledge of resource conservation and environmental protection affects ECB	ECB <- Kn	0.160***	Supported
H1.4	Social responsibility consciousness affects ECB	ECB <- Sr	0.175***	Supported
H1.5	Materialistic value on consumption affects ECB	ECB <- Mv	0.139***	Supported
H2.1	Awareness of resource exhaustion and environmental pollution has significant effect on affection for resource conservation and environmental protection	Af <- Aw	0.484***	Supported
H2.2	Awareness of resource exhaustion and environmental pollution has significant effect on social responsibility consciousness	Sr <- Aw	0.249***	Supported
H2.3	Knowledge of resource conservation and environmental protection has significant effect on affection on these issues	Af <- Kn	0.414***	Supported
H2.4	Knowledge of resource conservation and environmental protection has significant effect on social responsibility consciousness	Sr <- Kn	0.184***	Supported
H2.5	Materialistic value on consumption has significant effect on affection on resource conservation and environmental protection	Af <- Mv	0.006	NOT supported
H2.6	Materialistic value on consumption has significant effect on social responsibility consciousness	Sr <- Mv	-0.153***	Supported
H3.1	Awareness of resource exhaustion and environmental pollution has significant effect on knowledge of resource conservation and environmental protection	Kn <- Aw	0.274***	Supported
H3.2	Materialistic value on consumption has significant effect on knowledge of resource conservation and environmental protection	Kn <- Mv	0.199***	Supported
H3.3	Affection on resource conservation and environmental protection has significant effect on consumers' social responsibility consciousness	Sr <- Af	0.287***	Supported

Note: ***significance $p < 0.001$.

and social responsibility consciousness are all significant predictors of ECB. In particular:

- (1) The influence of socio-psychological factors on consumers' ECB does not simply follow the single ordinal path of 'K→A→P'. In fact, the different knowledge dimensions have significant direct effects on practice/behaviour and not necessarily only through the mediator affection. This indicates that influencing consumers' cognition or concept is the basis of altering their affection, social responsibility and ECB. In other words, the disparity in consumers' knowledge of resource conservation and environmental protection directly or indirectly determines their disparity in ECB.
- (2) The indirect effect of knowledge is greater than its direct effect on ECB (see Table 5). This indicates that influencing consumers' cognition or concept alone is not the most effective way to promote them to alter their consumption behaviour. Only when affection and social responsibility consciousness are further strengthened simultaneously can we alter consumers' behaviour more effectively.
- (3) Interaction exists between different factors within the respective constructs of 'K' and 'A'. Within the 'K' construct, Aw and Mv have significant direct effects on Kn. Within the 'A' construct, Af has a significant direct effect on Sr. This finding suggests interesting and important implications. For example, if we want to enhance consumers' Sr, we could reinforce their affection first of all. The stronger the consumers' affectional attitude toward environment pollution, the more likely they will adopt ECB.
- (4) Materialistic value on consumption has a negative effect on social responsibility consciousness, which is expected and in line with previous studies. However, a weak positive relation of materialistic value and ECB is observed, indicating that Chinese consumers may not ignore environmental issues in their pursuit of material possessions. This finding warrants further research.

7. Implications to public policy in China

Our study provides some important public policy implications for the government, as well as NGOs, to guide consumers to engage in ECB. Based on our findings, they should develop a series of activities aiming at increasing people's eco-awareness, improving their eco-knowledge and stimulating their eco-affection and social responsibility consciousness.

(1) Consumers' awareness/perception of exhaustion of resources and environmental pollution issues are the basis of their ECB. Policy makers should apply various methods of strengthening the communication or propagation of exhaustion of resources and environmental pollution issues to enhance consumers' eco-awareness. Until now, many consumers in China have still not been aware of the severity of the exhaustion of resources and environmental pollution problems (CEAP office 2008, Wang 2010). Accordingly, policy makers should ensure consumers know about the existence and seriousness of the problems.

In the process of enhancing Chinese consumers' awareness of exhaustion of resources and environmental pollution issues, the local government should play a more active role. Consumers may be indifferent to these issues in the whole country, but they will be more concerned with what is happening around them locally.

Previous studies also confirm that consumers' awareness of local, rather than global, environmental problems influences their behavioural commitment to ECB (Uzzell 2000, Lee 2011a).

(2) The more people know about resource conservation and environmental protection, the more they are emotionally involved with such issues. Both eco-knowledge and eco-affection influence consumers' ECB. Policy makers should try to deliver environmental protection knowledge to consumers more effectively.

Currently, environmental education, or environmental communication programmes in China often just deliver general/macro/abstract knowledge on resource conservation and environmental protection. For example, the public is told repeatedly in newspapers or TV information such as "Everyone should protect the environment", "Save our planet", etc. For ordinary consumers, they find such information 'remote' from their everyday life. Thus these programmes have often failed to fulfil the objective. Indeed, in her study of Hong Kong adolescents, Lee (2011a) found that the participants' concrete environmental knowledge (as opposed to abstract environmental knowledge) exerts a direct effect on their green purchase behaviour. Therefore, information selected for propagation should focus on the micro, specific and pertinent knowledge (especially knowledge and skills about how to engage in ECB in the process of consumption). For example, government/NGOs should communicate with consumers about the specific knowledge concerning biodegradable material, environmentally-friendly products, environmental labels, etc.

(3) Policy makers should reinforce consumers' affection for resource conservation and environmental protection (Af). Among all socio-psychological variables, Af had the greatest total effects on ECB. Therefore, in the process of altering consumers' behaviour we have to have special emphasis not only on increasing consumers' awareness and specific knowledge about local resource and environmental issues, but also on strengthening consumers' affection for these issues. Currently, the cramming environmental education on awareness has a substantial drawback in that consumers' affection for resource conservation and environmental protection was ignored, denying consumers' psychological emotion and subjective attitudes. Regarding how to reinforce consumers' affection on resource conservation and environmental protection (Af), the authors hold that the most important thing is to guide consumers, through personal participation in environmental practice or experience (such as field investigation, personal visits, voluntary labour, photographic exhibitions, community service, commitment to the public, participation in Eco-teams, etc.). Tang *et al.* (2011) found that concern for the community is a key predictor of recycling behaviour and knowledge of the environmental harm of not recycling has a positive effect on recycling behaviour. Thus, perhaps the local government and community organisations could develop a series of activities aiming at increasing residents' concern with maintaining a good place to live and residents' interests in the health and well-being of the community.

(4) Policy makers should cultivate consumers' social responsibility consciousness of resource conservation and environment protection. In China, resource conservation and environmental protection have long been regarded as the responsibility of the government departments by most of the consumers. Many people believe that the exhaustion of resources and environmental pollution problems are caused by other people (CEAP 2008, Wang 2010). As such, they consider themselves to be not responsible for these issues. Besides, it seemed that the exhaustion of resources and

environmental pollution issues in the past were not very serious. Therefore many consumers are inclined to ignore the existence of the exhaustion of resources and environmental pollution issues. Due to the above reasons, the social responsibility consciousness of most Chinese has not been developed. Thus, cultivating and promoting consumers' Sr about resource preservation and environmental protection is an important task and demands prompt action.

The success of the above-recommended actions depends on the effective use of communication channels. Existing studies have shown that frequent exposure to environment-specific media content (through traditional media such as TV and advertising) is positively related to environmental concern (Lee 2011b, Holbert *et al.* 2003) and environmental knowledge (Ostman and Parker 1986). The positive relationship between exposure to environment-related media content and environmental concern applies to the new media context, such as the Internet and the mobile phone (Good 2006). The government and environmental organisations should make better use of traditional and new media to help cultivate positive environmental values in the society. Specifically, the salience of the issue of environmental protection has to be more effectively communicated.

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