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Factors Affecting Environmental Awareness of Urban Residents: A Case in Can Tho City, Vietnam

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Abstract:

The study is carried out to find out factors affecting environmental awareness of urban citizens in Can Tho City. Research data were collected from direct interviews with 355 urban residents. The applied multivariate linear regression has pointed out impacting factors which are environmental knowledge, environmental management, and personal characteristics. Among them, environmental knowledge has the strongest influence on the environmental awareness of urban people in Can Tho City.

Keywords: awareness, environmental protection, resident, urban

1. PROBLEM STATEMENT

Environmental issues are controversial in most countries around the world, including Vietnam. Accordingly, the growth of construction, industry, transportation, healthcare, services, and energy consumption has put pressure on the environment in Vietnam, especially urban areas. According to the Report on Urban Environmental Situation in 2016 by the Vietnam Environment Administration, the amount of domestic solid waste generated in urban areas is about 38,000 tons/day with an average increase of 12% per year. Urban domestic solid waste has an organic rate of about 54-77% and this rate of recyclable waste (consists of plastic and metal) is about 8-18%. Concerning the urban air environment, most Vietnamese major cities are facing increasing air pollution. This

situation mainly results from inner-city manufacturing establishments, transportations, and construction. Besides, waste from residential activities and economic development activities cause water pollution. Environmental pollution negatively impacts public health, people's daily life, urban aesthetic as well as causes socio-economic problems. As presented by Zhou (2013), one of the causes of environmental pollution is people's limited awareness. Therefore, raising environmental awareness is extremely necessary. The study "Factors affecting environmental awareness of urban residents" is performed. The research results are a scientific basis for environmental management agencies to refer to and make appropriate action programs in the future.

2. THEORETICAL FRAMEWORK AND RESEARCH MODEL

An ecosystem is a community of inorganic components, living organisms, and humans that coexist and develop in a certain space and time (Ba et al., 2002). Environmental pollution is a violation of environmental standards that alter its nature. They may be direct or indirect changes related to physical/chemical properties, temperature, biology, solvents, radioactive substances, etc. in any component of the environment or the whole environment.

Awareness is considered the decisive factor of ecological restoration and environmental protection (Xu et al., 2013). Accordingly, people with low social status have low environmental awareness, whereas those with high social status have a deeper awareness of environmental degradation (Bayard, 2003). Besides, environmental awareness depends on demographic factors such as age (Ziadat, 2010) and educational background (Wong and Wan, 2008). Environmental education also has an impact on people's perceptions. Kustrová (2012) said that environmental education is essential in raising environmental awareness. With a similar perception, Hailu (2016) argues that limited knowledge affects students' perception of environmental protection negatively. Education programs should focus on improving environmental knowledge (Esa, 2010). Environmental awareness is strongly influenced by information, attitudes, and understanding of the environment (Vicente-Molina et al., 2013). In addition to this, environmental management also

improves awareness of environmental protection. According to Hien et al. (2015), strict regulations or propaganda, inspection, and supervision help raise awareness of the environment.

Based on the above arguments, the study used a group discussion with the representatives of 12 households living in urban areas in Ninh Kieu, Cai Rang, and Binh Thuy District. The discussion result has set up research hypotheses and suitable scales for the model. Research hypotheses include the following. H1: Environmental knowledge positively affects urban residents' awareness. H2: Environmental management positively influences awareness level. H3: Personal characteristics beneficially impact environmental perception. Hence, the research model is as below.

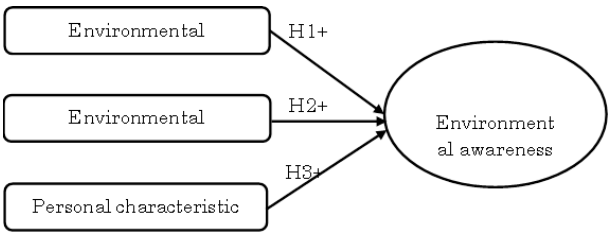

Figure 1: Proposed research model

Table 1: Interpretation of the variables in the research model

Factor	Observed variable	Sign	Scale	Reference resources
Environmental knowledge	Understand the environment and environmental pollution.	EK1	Likert 1-5	Kustrová (2012), Hailu (2016), Esa (2010), Vicente-Molina et al. (2013)
	Understand the causes of pollution.	EK2	Likert 1-5	
	Understand pollution control solutions.	EK3	Likert 1-5	
	Take part in environmental education programs.	EK4	Likert 1-5	
Environmental management	Strict regulations on environmental protection help raise awareness.	EM1	Likert 1-5	Hien et al. (2015); Zhou, (2013).
	Campaigns and propaganda on environmental protection help raise people's awareness.	EM2	Likert 1-5	
	Regular inspection and supervision raise environmental perception.	EM3	Likert 1-5	
	Protecting the environment is a social responsibility.	EM4	Likert 1-5	
Personal characteristic	The higher the education level, the better awareness of environmental protection.	PC1	Likert 1-5	Wong and Wan (2008), Ziadat (2010), Bayard (2003)
	Residents who have more life experiences have higher environmental awareness.	PC2	Likert 1-5	
	Residents with more social relationships	PC3	Likert 1-	

	achieve a high awareness level.		5	
	People with high social status are more aware of environmental protection.	PC4	Likert 1-5	
Environmental awareness	Polluted environment affects health.	EA1	Likert 1-5	Xu et al. 2013; Zhou (2013), Bayard (2003), Ba ett al. (2002).
	All individuals and organizations are responsible for protecting the environment.	EA2	Likert 1-5	
	Protecting the environment is an urgent issue.	EA3	Likert 1-5	
	A green and clean environment makes life happier.	EA4	Likert 1-5	

3. RESEARCH METHODOLOGY

3.1 Analytical method

The quantification of impacting factors to the environmental awareness of urban citizens runs in a three-step order: (1) Cronbach's alpha analysis to test the reliability of the observed variables; (2) Exploratory Factor Analysis (EFA) to group observed variables into statistically significant factors ensuring the suitability of market data; (3) Multivariate linear regression to identify factors affecting the awareness of environmental protection.

3.2. Data collection method

This study uses non-probability sampling that is the convenient sampling to collect data. Tabachnick and Fidell (2007), Green (1991) argued that the suitable sample size for multivariate regression should be N = 50 + 8*m, where m is the number of independent variables. According to Hair et al. (2006), the suitable size of research observations in EFA is N > 5*x (x: is the total number of observed variables). The study interviewed 355 people in urban areas of Ninh Kieu, Cai Rang, and Binh Thuy District to achieve representativeness. Thus, the sample size of the study is appropriate for the hypothesis test.

Table 2: Sample size description

No.	Survey locations	Number of observations	Frequency (%)
1	Ninh Kieu District	135	38.03
2	Cai Rang District	113	31.83
3	Binh Thuy District	107	30.14
	Total	355	100.00

4. RESEARCH RESULTS AND DISCUSSIONS

4.1. Scale reliability test

The study runs Cronbach's alpha analysis to test the internal correlation of variables. The result shows that all scales have Cronbach's alpha values greater than 0.6. The corrected item-total correlation of each variable is higher than 0.3. Therefore, no variable is excluded from the research model (Peterson, 1994; Slater, 1995). All scales are satisfactory and used for further exploratory factor analysis.

Table 3: Reliability test result

Factor	Number of variables	Min corrected item-total correlation	Cronbach's alpha
Environmental knowledge	4	0.418	0.692
Environmental management	4	0.534	0.792
Personal characteristic	4	0.550	0.797
Environmental awareness	4	0.552	0.798

4.2 Exploratory factor analysis (EFA)

According to the EFA result for independent variables (environmental knowledge, environmental management, and personal characteristic), coefficients are guaranteed. The significance level (Sig.) is less than 0.05, KMO = 0.823 (from 0 to 1), factor loading values are all greater than 0.5, total variance explained is 59.6% > 50%. This finding proves that the research data is consistent (Anderson and Gerbing, 1988). The analysis result forms three factors, namely F1, F2, and F3. Proposed factors remain the same, so there is no change in their names. Similarly, the EFA applied for the measurement variable (environmental awareness) gave a satisfactory result. The Sig. was less than 0.05; KMO = 0.717 (in the range of 0 to 1); factor loading values of variables are greater than 0.5; total variance explained reaches 62.43% > 50%. This means the research data is consistent (Anderson and Gerbing, 1988). As a result, the analysis results form one factor which is environmental awareness (F4). All factors are in the table below.

Table 4: Factors formed from the EFA result

Sign	Observed variable	Factor
F1	4 variables: EK1, EK2, EK3, EK4	Environmental knowledge
F2	4 variables: EM1, EM2, EM3, EM4	Environmental management
F3	4 variables: PC1, PC2, PC3, PC4	Personal characteristic
F7	4 variables: EA1, EA2, EA3, EA4	Environmental awareness

4.3 Multiple linear regression

Based on the table, the adjusted R^2 receives the value of 40.3%, which proves that factors in the model explained 40.3% of the environmental awareness. The value of Sig.F is much smaller than the significance level $\alpha = 5\%$, so the suggested regression model is significant. Durbin-Watson = 1.908 and VIF < 4, which means that there is no autocorrelation and multicollinearity.

Table 5: Multivariate linear regression result

Factor	Standardized coefficients	Sig.	Variance inflation factor (VIF)	Hypothesis
Environmental knowledge	0.484	0.000	1.000	H1: accepted
Environmental management	0.297	0.000	1.000	H2: accepted
Personal characteristic	0.293	0.000	1.000	H3: accepted
Adjusted R^2				0.403
Durbin-Watson stat				1.908
Sig.F				0.000

Table 5 shows that independent variables in the model are statistically significant at the level of 1%. Environmental knowledge, environmental management, and personal characteristic are all positively correlated with environmental awareness. The impact level of each factor is explained below.

Hypothesis H1: Environmental knowledge positively affects environmental awareness with a standardized estimate value of 0.484 at a 1% significance level. These numbers present the key role of environmental education in raising urban residents' awareness of environmental protection.

Hypothesis H2: Environmental management (standardized estimate value is 0.297 and Sig. = 1%) puts a beneficial impact on environmental awareness. It reveals that the more effective the management and control activities, the higher awareness of environmental protection.

Hypothesis H3: Personal characteristics positively influence awareness of environmental protection. Its standardized estimate value reaches 0.293 at a significance level of 1%. These results have proven that education levels, life experiences, social relationships, and social status positively impact environmental awareness.

5. CONCLUSION AND IMPLICATIONS

Overall, the study has pointed out factors affecting the environmental awareness of people in urban areas. They are environmental knowledge, environmental management, and personal characteristics. In particular, the first factor has the strongest influence degree. From the above results, some policy implications are proposed to raise residents' awareness. Firstly, improving the quality of environmental education programs. Secondly, building action programs on environmental management and control. Thirdly, encouraging citizens to enhance and share knowledge about urban environmental protection.

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