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Research on Status and Influence Factors of Citizen's Environmental Behaviors in Beijing

WANG Qi-yan, LI Yan-li[*]

a School of Statistics, Renmin Universty of China, Beijing 100872,China

Abstract

The citizen's environmental behaviours will directly affect the urban ecological environment construction. In order to provide the references for construction of ecological city in Beijing, this paper takes the citizen's environmental behaviours in Beijing as a breakthrough point to analyze the status of citizen's environmental behaviours and research their influence factors by constructing a structural equation model with the sampling survey data.

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Keywords: environmental behaviors; structural equation model; influence factors

1. Introduction

With the development of economy and the improvement of people's living standard, a series of the environmental problems, such as resource exhaustion and ecological deterioration, have already aroused enough attention of the people and related organizations. The environmental protection work is imminent. Recently, the research about environmental awareness is more and more, but environmental protection need to carry out by real action. Therefore, in order to provide the references for construction of ecological city in Beijing, this paper takes the citizen's environmental behaviors in Beijing as breakthrough point to analyze the status of citizen's environmental behaviors and researches their influence factors by constructing a structural equation model with the sampling survey data.

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* Corresponding author.Tel: +86-13810145890; fax: +86-10-8250-9324.
 E-mail address: liyanli5656@126.com.

2. Data Source and Pretreatment, Selection of Variables

2.1. Data source and pretreatment

The data which is used for this paper derives from 'The questionnaire of citizen's environmental awareness in Beijing' that is organized by Research Center of Leisure Economy of China in 2009. There are 1,100 questionnaires sent out, 1,031are responded and 964 are effective. The response rate is 93.7% and the effective response rate is 93.5%. Measurement adopts Likert 5 score scaling technique during data processing. In order to validate the data quality of questionnaires and rationality of selected variables, the reliability and validity of the survey data were tested before modeling. The results of test show that the data quality of questionnaires is reliable and the selection of variables is great rational. .

2.2. Selection of variables

The special study about environmental behaviors is less. The majority of scholars often regard environmental behaviors as an evaluation indicator of environmental awareness or environmental literacy. As long ago as the 1968, an American Scholar, Charles E.Roth first put forward this concept about environmental literacy. Until now, the environmental literacy that is referred by the foreign reference contains environmental knowledge, environmental awareness, environmental behaviors and environmental attitudes. Nowadays, the 'Research on National Public Environmental Literacy Indicator System' that is organized by the China Environmental Awareness Program Group suggests that environmental literacy is stratified. By learning the knowledge about the environment, people internalize it as their environmental values and attitudes, and then use them to guide their actions. Based on this, environmental literacy can be classified into four levels, namely, environmental knowledge (EK), environmental values (EV), environmental attitudes (EA) and environmental behaviors (EB) [1].

In fact, EK, EV and EA of citizen's are not inevitable to convert to environmental behaviors because of impact of many objective factors and citizen's own factors, but they first affect willingness of environmental behaviors (WEB), and then affect EB. The previous research displays that EK and EA have significantly positive effect on WEB [2], but it did not consider the effect of EV on WEB. Therefore, based on this view, this study will directly research the influence of EV and WEB on EB. EB can be further divided into routine environmental behaviors (REB) and participatory environmental behaviors (PEB). The former covers recycling / reuse, energy-saving consumption, and daily green consumption; the latter mainly contains collective maintaining legal rights or interests expression, political action, legal appeal and so on[1].

In addition, residents' income may influence its EB. A lot of research finds out incorrect 'knowledge – awareness – behaviors' mode about environmental awareness which is affected by residents' income. For example, somebody thinks, public environmental protection behaviors about reducing living expenses or benefiting oneself health are more than ones about increasing living expenses or nothing to do with their own health [3]. Jing Li-jie and Li Yang think that environmental awareness has obvious character of times. It is closely related to the stage of development and condition by the general development level of society and economy [4]. Hong Da-yong believes that urban residents' income levels affect their evaluation for the environmental protection work and attend the lecture about environmental protection or not [5]. This paper will study the influence of income levels on EB, using real evidences.

In conclusion, the selected variables during empirical research process are as follows (see table 1.):

Table1. Schedule of selected variables

Latent variable	Observation variable
REB	Y1：buy environment-friendly household products
	Y2：recycling/reuse
	Y3：water-saving
	Y4：energy-saving
	Y5：try to use public transport
	Y6：green consumption
PEB	Y7：attend environment reports
	Y8：attend environmental protection volunteer activities
	Y9：sign in environmental petition
	Y10：donate to environmental groups
	Y11：attend demonstration about environmental problem
EV	X1：Even if the pace of economic growth slowed, also should make efforts to the environment
	X2：In order to save lives, also cannot use animals to do medical experiments
	X3：For posterity, now lives become inconvenience is necessary
	X4：In the long run, earth cannot fully support sustained growth of the population
	X5：Economic development is always accompanied by environmental damage
WEB	X6：want to save water and energy or not
	X7：want to popularize environmentally friendly products or not
	X8：want to environmental protection technology development or not
	X9：want to promote forest protection and forestation or not
	X10：want to support environmental groups or not
	INC：residents' income levels

3. The Status and Influence Factors of Environmental Behaviors

3.1. The comprehensive evaluation about environmental behavior status

The investigation shows, the proportion of respondents who thinks oneself is a citizen with environmental protection awareness is 93.76%. At the same time, the proportion of respondents who were willing to take part in environmental protection activities, even if this had to spend his part time of rest and energy, is 88.67%. In the REB, in the past year, the proportions of respondents who bought environment-friendly household products, recycled, saved water, saved energy, used public transport, had green consumption are 85.75%, 83.71%, 95.98%, 86.59%, 85.57% and 62.06%. In the PEB, the proportions of respondents who attended environment reports, attended environmental protection volunteer activities, signed in environmental petition, donated to environmental groups, attended demonstration about environmental problem are 12.24%, 25.49%, 18.24%, 16.39% and 2.06%.

According to Likert 5 score, the descriptive analysis about REB and PEB shows, the scores of people's REB in Beijing are generally higher. Particularly, residents' water saving behavior is very common, then it is using public transport, saving energy, buying environment-friendly household products,

recycling/reusing in turn, but having green consumption is relatively less. Meanwhile, the scores of people's PEB in Beijing are generally less for the comprehensive mean is 1.62.

Taking into account all these features, we may draw the conclusion that people's REB in Beijing are very common, but people's PEB are generally less.

3.2. Influence factors analyses of environmental behaviors by structural equation model

The structural equation model (SEM) integrates theories and methods of the factor analysis, path analysis and multiple linear regression analysis. SEM in this paper includes measurement model and structural model. The measurement model reflects the relation between the latent variables and the observed variables, and the structural model reflects the structural relation between the latent variables. From what has been discussed above, we make the theoretical path diagram of SEM (see fig.1), using these selected variables in the table.1.
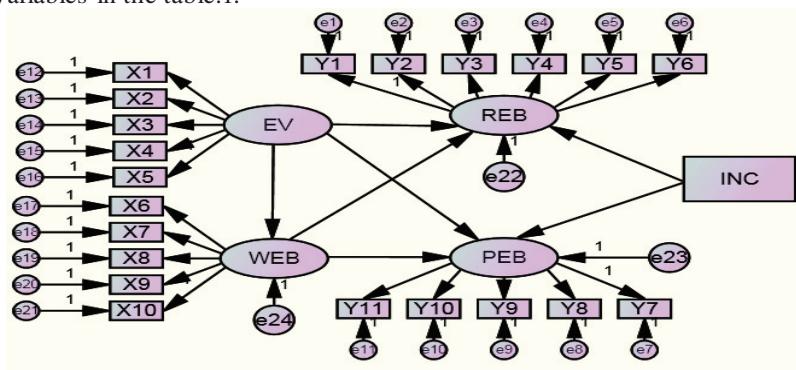

Fig.1 Theoretical path diagram of structural equation model

We adopt maximum likelihood method to estimate the parameters. Goodness of model fit is significant, but significant test results of model parameters show that EV and WEB has no significant effect on PEB, while INC has no significant effect on REB and PEB. Further, we build another new structural model. Goodness of new model fit (see table2.) and estimates of new model parameters have all passed significant and reasonable test, indicating that the new structural model fits well.

Table2. Goodness of model fit

Fit index		Value	Evaluation
Absolute fit index	RMR	0.056	≈0.05
	GFI	0.952	very good
	RMSEA	0.039	very good
Relative fit index	CFI	0.863	ok
	NFI	0.845	ok

The modeling processing reveals that EV and WEB has positive significant effect on REB of residents. Among them, WEB plays the most important positive role in REB, regardless of as direct effect or as transition factor. EV not only directly affects REB, but also indirectly affects it by way of WEB. Total effect of EV on REB which is 0.5 (direct effect 0.316 + indirect effect 0.184) is only less one of WEB on

REB which is 0.54. Somebody thinks that EV are not closely related to REB, but the empirical study results of this paper indicate that EV influence REB of residents in a large part.

EV and WEB have no significant effect on PEB, although both them affect REB. This is closely related to China's overall status of environment. On the one hand, the environmental status of China is not extreme aggravated so that to solve by demonstration. On the other hand, the residents' participatory awareness of environmental protection behaviors is less that lead to their rare taking part in environment reports or seminars.

Many theoretical studies consider that income levels of residents have great effect on their environmental behaviors, the higher income, and the more obvious environmental behaviors. But the empirical study results of this paper indicate that neither REB nor PEB are affected by residents' income. That is to say, REB is not directly related to their income for residents' environmental awareness is generally higher.

4. Conclusions and Suggestions

The descriptive analysis shows: people's REB in Beijing is very common, but people's PEB are generally less. In the REB, residents' water saving behavior is very common, but having green consumption is relatively less. In order to encourage consumer to buy green products, it is the most important to cultivate and strengthen consumers' faith of their treating green products, for income has no significant influence on REB. This requires the relevant departments to increase publicity and, to advance residents' green consumption awareness and willingness of activity, then to influence their environmental behaviors and to protect ecological environment. Overall, a great many people in Beijing think oneself is a citizen with environmental protection awareness. They give a practical action for environment protection and have good REB.

The structural equation model study shows: First, EV and WEB has positive significant effect on REB of residents, particularly effect of WEB on REB is the largest, but both them have no significant effect on PEB. Second, neither REB nor PEB are affected by residents' income. In other words, residents' income levels are not influencing factors of their environmental behaviors. Finally, EV not only influences REB of citizen, but also affects WEB of citizen, and effect is more significant. So to promote EV will further improve WEB and REB of residents. In view of this situation, combining previous studies [2], we suggest that the relevant departments should constantly increase publicity about environmental protection, enhance EK, EA and EV through various channels, cultivate public WEB, make people to protect ecological environment by routine practical activity.

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