Ecological Benefits, Environmental Perceptions and Green Behavior

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ABSTRACT

Global natural environment is deteriorating day by day. The citizen's environmental awareness and behavior is so important to solve environmental problems. Based on the situation of human cognitive on the natural environment, we proposed the concept of "ecological economy", and establish the "ecological economic man" dynamic model. In this paper, the three regions of Xi'an, Shenyang and Shanghai were selected to analyze the cognitive status of the natural environment changes. The results show that, human beings have different degrees of improvement in environmental concerns, environmental awareness and environmental behavior, but it is not enough to participate in environmental protection and willingness to pay for environmental protection.

Keywords: Human, Natural environment change, Cognition, Economic man

1. INTRODUCTION

The IPCC report, STERN report, UN Millennium Ecology Report, Global Environment Outlook, IGBP report, etc. have made people realize that the deterioration of the natural environment has become a major challenge to the sustainable development of human society and will bring great threats to human production and life from a scientific perspective. Global natural environmental change is a series of biophysical changes on land, ocean and atmosphere driven by the intertwined system of human activities and natural processes, mainly including global warming, ozone layer hole, acid rain, forest destruction and biodiversity reduction, desertification and water shortage, marine pollution and transboundary movement of hazardous materials, etc.

In 2016, we experienced the hottest year in history. The average global surface temperature rose by 0.74℃ from 2005-2015, and the last decade was the hottest on record. The average Northern Hemisphere temperature in the last 50 years of the 20th century was the highest in the last 1,300 years. The warming has caused a significant reduction in Arctic Sea ice area, a significant reduction in snow cover in the Northern Hemisphere, accelerated melting of mountain glaciers and the Greenland ice cap, and the melting of perennial permafrost in the Northern Hemisphere. Ocean warming has caused seawater

expansion, and the global average sea level rose by about 0.17 meters in the 20th century. Warming is leading to more and stronger extreme weather events, and since the 1950s, there have been frequent heat waves, increased frequency of heavy precipitation events and local flooding, and increased storm intensity in many parts of the world. Especially since the 1970s, droughts in the tropics and subtropics have become more frequent, prolonged, and severe, with an expanding range of impacts. Typhoons and hurricanes have increased in intensity and the frequency of severe typhoons has increased from less than 20% in the early 1970s to more than 35% in the early 21st century. Over the past two decades, global warming effects have led to reduced yields and even extinction of some of the world's major agricultural production, with global production of wheat, corn, and barley decreasing by about 50 million tons per year combined from 2005 to 2015 due to rising temperatures. Desertification and water scarcity have led to severe soil erosion in some areas of the globe and face huge problems with drinking water for domestic use.

The natural environmental changes are caused by human activities, which not only threaten the ecological construction of China and even the world, but also make significant changes to human production and life, increasing the risk of human production and life. In the context of the increasing deterioration of the global

natural environment, "adaptation will become the necessary path for human beings to address the inevitable natural environmental changes" (IPCC, 2007). At the same time, recognizing the impact of natural environmental changes on human beings, abandoning the idea of "economic man" which advocates human activities to maximize economic benefits, and building "ecological economic man" with ecological consciousness, ecological conscience and ecological rationality are the necessary requirements for human beings to cope with environmental changes. It is a necessary requirement for human beings to cope with environmental changes. As a kind of social consciousness, environmental awareness is crucial to the solution of environmental problems, and its level has become one of the important symbols to measure the level of environmental protection in a country or region, which has attracted the attention of government departments and research institutions in various countries. Using the China Journal Full Text Database as a statistical source, 126 surveys on natural environmental changes were conducted during 1990-2015, with an overall trend of increasing year by year. In this paper, we select three surveys in Xi'an, Shenyang and Shanghai to analyze citizens' perceptions of natural environmental changes, and further analyze the emergence and development of "eco-economic human" behavior based on the perceptions, so as to explore the issue of human natural environmental protection from the level of behavioral consciousness and to promote a more in-depth consideration of natural environmental protection. We will further analyze the generation and development of "eco-economic human" behavior based on the perceptions, and explore the issue of human nature conservation from the behavioral consciousness level, so as to promote a deeper consideration of nature conservation.

2. ANALYSIS OF THE BEHAVIOR OF "ECO-ECONOMISTS" BASED ON THE PERCEPTION OF ECOLOGICAL BENEFITS

Based on the analysis of human cognition of natural environmental changes, human beings have improved to different degrees in terms of environmental concern, environmental awareness and environmental protection behavior, but there is still a need to further improve the public's environmental awareness and promote the development of environmental protection behavior. All this shows that the traditional "economic man", who advocates maximizing economic benefits, must be transformed into an "eco-economic man" with ecological consciousness, ecological conscience and ecological rationality in order to fundamentally curb human destruction of the natural environment. The following is an analysis of the transformation from "economic man" to "eco-economic man.

2.1 Comparison of "economic man" and "eco-economic man

Before the industrial revolution, productivity was low, but it was a good thing for the natural environment, simple labor tools and a small population could hardly cause great damage to the natural environment, so ignorant human beings imagined these natural resources as infinite resources, greedily plundering and wantonly wasting, which is also the objective economic environment proposed by Adam Smith's "economic man This is also the objective economic environment proposed by Adam Smith's "economic man" hypothesis theory.

The industrial revolution has brought great changes to human society and the ecological environment, and the social changes led by the "economic man" hypothesis have enabled people to obtain abundant material satisfaction. However, the industrial revolution has also given mankind a butcher's knife to kill nature, making mankind face the most serious crisis of natural environmental degradation in history. If mankind wants to survive and develop, it is necessary to carry out a profound social change again, and the most expensive scourge of social change is the idea of "economic man". Now the human living environment is surrounded by fog, sewage, radiation and pollution, and it is obviously unwise to pursue only material benefits regardless of everything else.

Therefore, a new idea that can lead to new social development emerged from the cocoon, which is the ecological economic thought. Under the ecological economic thought, we should pursue the maximization of economic goals of human activities and also explore the sustainability of human ecological environment. "The "eco-economic man" is different from the previous "economic man", which is the assumption of the subject in the market economy, and aims at maximizing his own interests in economic activities, and has the characteristics of the "economic man" is a subject in the market economy who aims at maximizing his own interests in economic activities and has self-interest. The "eco-economic man" is an "economic man" with ecological consciousness, ecological conscience and ecological rationality, who pursues his own interests in economic activities while considering the externalities on the natural environment and others, and has altruistic characteristics [8]. The "economic man" seeks to satisfy his own material needs, while the "eco-economic man" seeks his own survival and development on the basis of natural environment protection and economic development. The former is the pursuit of material satisfaction at the expense of ecological balance, while the latter is the pursuit of self-satisfaction under the premise of protecting the natural environment.

Traditional economic theory neglects the fundamental role of the natural environment in determining the economy, thus, the fundamental defect of traditional economics is rootlessness: only the economy but not nature, detached from the root of the natural ecosystem; only the "economic man" but not the ethical man, detached from the root of survival ethics. These fundamental flaws make it mislead industrial economy and market economy and cause damage to the natural ecosystem, leading to unsustainable economic growth, which needs to be fundamentally transcended to build an "eco-economic human" behavior compatible with the new circular economy. In calculating the efficiency of inputs and outputs in human behavior, we should deduct the cost of damage to the natural environment and the impact on others, and advocate ecological consciousness, ecological conscience and ecological rationality in the pursuit of economic interests, so that human behavior can be changed from the traditional economics of "economic man" to "ecological economic man". Ecological economic man".

2.2 Dynamic model of "eco-economic man"

Specifically, the problem of the formation of "eco-economic man" can be summarized into two points: first, how "eco-economic man" emerges and develops; second, the stability of "eco-economic man" behavior. In this paper, based on the limited rationality model proposed by Simon, a dynamic model is used to explain the emergence and development of the behavior of "eco-economic man".

2.2.1 Model assumptions

Suppose there are two types of human beings, namely, "economic human beings" and "ecological economic human beings". The behavior of the "eco-economist" can bring benefits to others at b , but the "eco-economist" himself must pay a price at c . We assume that $b > c$, i.e., the total benefit of the behavior of the "eco-economist" to society is greater than the total cost, and only then is it beneficial to society and should be encouraged.

When two individuals in the population meet, their benefit matrix can be represented by Table 1.

Table 1 Benefit matrix of "eco-economist" behavior

	A (Ecological Economist)	S (Economist)
A (Ecological Economist)	$(b-c, b-c)$	$(-c, b)$
S (Economist)	$(b, -c)$	$(0, 0)$

2.2.2 The "economic man" hypothesis cannot explain the behavior of "eco-economic man"

First, the game is analyzed under the assumption of an "economic man". In this game, choosing the "economist" behavior S is a dominant strategy, so the only pure strategy Nash equilibrium is (S, S). However, when both parties choose the "economist" behavior, their payoff is 0. This is smaller than the payoff when they both choose the "eco-economist" behavior $(b - c)$. This is what we often call the "prisoner's dilemma" game.

Assuming that the proportion of "eco-economists" in the population in period t is qt, the expected returns of "eco-economists" and "economists" in period t after the randomized pairwise game are: The expected returns of the "eco-economist" and the "economist" in period are

The benefits of "eco-economists$= qt(b - c) + (1 - qt)(-c) = qtb - c$ (1)

Benefits of "Economist"$= qtb + (1 - qt)0 = qtb$ (2)

As we can see, the benefits of "eco-economists" are smaller than those of "economic people". According to the assumption of "economic man", people will only choose the behavior that maximizes their own economic interests, and even if there is a certain percentage of "eco-economic man" in society, they will gradually die out because they cannot compete with "economic man". Even if a certain proportion of "eco-economic people" existed in society, they would gradually die out because they could not compete with "economic people". Therefore, in the mainstream economic discourse, the existence of "eco-economists" cannot be explained.

2.2.3 Finite rationality and the stability of ecological economic behavior

The following is a model based on limited rationality to explain the ecological economic behavior of human existence. Since people have only limited rationality, they do not always seek to maximize their own interests, but often improve their own behavior by imitating the behavior of others. It is assumed that after each period of the game, some people will imitate the behavior of others and selectively change their own behavior. Assume that the proportion of imitators in the population is β. Among these people, the proportion of α tends to imitate the behavior of the majority of the population $(\alpha > 0.5)$, while the proportion of $(1 - \alpha)$ tends to imitate the behavior of the highest gainers in the population.

Under these assumptions, the initial proportion of "eco-economists" in the population q_0 has a significant impact on the dynamic evolution of the model. The

following is a discussion of the q_0 sub-case.

(1) When $q_0 < 0.5$.

At this point, the behavior of the "eco-economist" is neither the majority behavior nor the most profitable behavior. Therefore, the altruists with the tendency to imitate will imitate the behavior of the "economic man", thus becoming self-interested "economic man". This is because:

$$q_1 = (1 - \beta)q_0 \quad (3)$$
And then there are $q_{t+1} = (1 - \beta)q_t \quad (4)$

Solving this difference equation yields:

$$q_{t+1} = q_0(1 - \beta)^t \quad (5)$$

In this case, the proportion of "eco-economists" in the population will become smaller and smaller, and will eventually reach zero.

(2) When $q_0 \geq 0.5$.

At this point, the behavior of "eco-economists" is the majority behavior in the population, but not the most profitable behavior. The proportion of altruists in the population in the next period can be expressed as:

$$q_1 = q_0 + \beta[(1 - q_t)\alpha] - \beta[q_0(1 - \alpha)] \quad (6)$$
And then there are: $q_{t+1} = q_t + \beta[(1 - q_t)\alpha] - \beta[q_t(1 - \alpha)] \quad (7)$

The solution can be obtained:

$$q_t = (q_0 - \alpha)(1 - \beta)^t + \alpha \quad (8)$$

Under the effect of imitation, some "economic people" become "eco-economic people" in each period, and some "eco-economic people" become "economic people" at the same time. The "economic man" becomes an "eco-economic man" and "eco-economic man" becomes an "economic man". When $q_0 >= \alpha$, the proportion of "economists" gradually decreases, while when $q_0 < \alpha$, the proportion of "eco-economists" gradually increases, but regardless of the value of q_0 , the proportion of "economists" tends to be closer to that of as time passes. However, regardless of the value of α , the proportion of "economic man" will tend to converge to over time.

In summary, when the proportion of "economists" in the population is dominant, the proportion of "economists" will be fixed over time driven by the herd mentality. This suggests that the behavior of the "economists" in the model is robust to the invasion of a few mutants. However, the model also tells us that when there are few "eco-economists" in the population, the proportion of "eco-economists" will gradually decline and eventually die out. In other words, the model can only solve the second problem mentioned above, but it cannot explain how the behavior of "eco-economists" develops in an unfavorable environment.

Let's imagine a group of "economic people", and a small number of "eco-economists" appear in the group

due to government incentives and penalties. What mechanism is there to gradually increase the proportion of "eco-economists" in the group?

2.2.4 The emergence and development of "eco-economist" behavior with the inclusion of a model of punishment mechanism

Suppose there is a government-like institution in the population that observes the behavior of people and punishes the behavior of the "economic man". The punishment will cause the "economic man" to suffer a loss of p and $p > c$ (The "economic man" is guaranteed to suffer a punishment greater than the benefit of his actions).

The benefits of the "eco-economist" and "economist" at this point are as follows.

Benefits for altruists $= q_t(b - c) + (1 - qt) = q_tb - c \quad (9)$

Gain for the self-interested $= q_tb + (1 - q_t)0 - p = q_tb - p \quad (10)$

In this case, the benefits of the "eco-economist" are higher than those of the "economist".

We also discuss the initial proportion of "economists" in the population at q_0.

(1) When $q_0 < 0.5$:

At this point, the "economist" behavior has higher returns, but is not the behavior of most people. There are:

$$q_1 = q_0 + \beta(1 - q_0)(1 - \alpha) + \beta q_0\alpha \quad (11)$$

Further there are: $q_t + 1 = qt + \beta(1 - q_t)(1 - \alpha) + \beta q_t\alpha \quad (12)$

The solution can be obtained: $qt = (q_0 - 1 + \alpha)(1 - \beta)^t + (1 - \alpha) \quad (13)$

Over time, the percentage of "economists" will converge to $1 - \alpha$.

(2) When $q_0 \geq 0.5$:

The behavior of the "economic man" is the most profitable behavior and the behavior of the majority of people. There are:

$$q_1 = q_0 + \beta(1 - q_0) \quad (14)$$

Further there are: $q_{t+1} = q_t + \beta(1 - q_t) \quad (15)$

The solution can be obtained: $q_t = 1 - (1 - \beta)^t(1 - q_0) \quad (16)$

The model analysis shows that when people's awareness of eco-economy is low, the government should punish selfish economic behavior to offset the disadvantageous situation of "eco-economists" competing with "economic people", thus promoting the increase of the proportion of "eco-economists". The

proportion of "eco-economists" increases. When the proportion of "eco-economists" in a society reaches a certain level, the proportion of "eco-economists" will be maintained at a relatively high level even without the existence of a punishment mechanism under the effect of imitation.

3. EMPIRICAL ANALYSES OF ENVIRONMENTAL PERCEPTIONS OF ECO-ECONOMISTS

3.1 Research Methodology

Through the investigation of Xi'an Municipal Environmental Protection Bureau, Shenyang Municipal Environmental Protection Bureau and Shanghai Municipal Environmental Protection Bureau, after expert guidance to establish the research objectives, using the method of random sampling and random distribution of questionnaires, in October 2015, a questionnaire survey was randomly distributed among the permanent residents of Xi'an, Shenyang and Shanghai in China, with a total of

630 questionnaires distributed, and 593 effective questionnaires were actually recovered, with an actual recovery rate of 94.13%; the basic information of the survey samples is shown in Table 2. Through the comprehensive analysis of the survey data, the citizens of the three places are studied on their cognition of the changes in the natural environment, as well as the changes in their behavior in the face of the changes in the natural environment. Survey data is processed and analyzed using the social statistics software package SPSS.

Establish an evaluation index system composed of 1 comprehensive index, 4 first-level indicators, 10 second-level indicators and 20 third-level indicators, and use the DELPHI method to take the average value of the weights of the indicators at all levels (Table 3), and the sum of the weight coefficients of the indicators at all levels is equal to 1 compared with the indicators at the previous level. The index assignment adopts a hierarchical grading system in the quantitative evaluation, and is assigned 20, 18, 15, 13, 10, 8 and 5 respectively from high to low.

Table 2 Basic information of the survey sample

Category	Region			Education level			Gender		Age		
	Xi'an	Shenyang	Shanghai	High School and below	College to Bachelor	Master and above	Male	Female	< 30	30-50	> 50
Number of samples/persons	190	193	210	108	426	59	300	338	189	298	106
Proportion (%)	32.1	32.5	35.4	18.21	71.84	9.95	49.41	50.59	31.87	50.25	17.88

Table 3 Evaluation index system of the degree of perception of changes in the natural environment

Comprehensive index	Level 1 evaluation indicators	Weights	Secondary evaluation indicators	Weights	Three levels of evaluation indicators	Weights
The degree of human awareness of changes in the natural environment	Environmental concern	0.3682	Feeling of environmental pollution	0.4166	Air quality feeling	0.2646
					Summer temperature change	0.2562
					Change in the number of disasters	0.2146
					Changes in environmental conditions	0.2646
			Perception of environmental conditions and their changing trends	0.3146	Future summer temperatures are expected	0.2688
					Feelings of current environmental conditions	0.3146
					Perception of future environmental conditions	0.4166
			The role of the self in environmental protection	0.2688	Global Change Impact Factors	0.2688
					The role of the individual in environmental protection	0.4166
					The relationship between environmental protection and life	0.3146

					Environmental awareness of the people around us	1
	Environmental Awareness	0.3064	Environmental awareness of the people around us	0.4862		
			Self-awareness of environmental protection	0.5138	Self-awareness of environmental protection	1
			Overall level of participation in environmental activities	0.4862	Littering	0.5138
	Environmental Behavior	0.3254			Prohibit the use of convenience lunch boxes	0.4862
			Willingness to pay for environmental protection	0.5138	Willingness to pay for environmental protection	1

The evaluation values of the composite indicators, primary indicators and secondary indicators are calculated by the following formula.

$$S^- = \sum_{i=1}^{n} W_i \times A_i^- \quad (17) \qquad A_i^- = \frac{1}{M} \times \sum_{x=1}^{M} A_x \quad (18)$$

Where, S^- is the mean score of indicators at each level, n is the number of indicators at the next level, A_i is the score of each indicator, W_i is the weight value of each indicator, M is the number of questionnaires, and A_x is the score of the sample individual. SPSS was used as the main tool for data processing and statistics.

Based on the statistical results, the composite index and the first level index scores were obtained. The composite index has a score of 20 points, and higher scores indicate a higher overall level of awareness of environmental change (see Table 3). In the composite index, citizens in Shanghai scored slightly higher than those in Xi'an and Shenyang (73.29%>73.01>72.95%). Among the first-level indicators, citizens of Shenyang region have higher environmental concern and environmental awareness than citizens of Xi'an and Shanghai regions, and citizens of Shanghai region have higher environmental protection behavior and higher evaluation of government environmental work than citizens of Xi'an and Shenyang regions.

Table 4 Score of comprehensive indicators and first-level indicators

	Comprehensive index		Tier 1 Indicators					
	Level of citizen awareness of environmental change		Environmental concern		Environmental Awareness		Environmental Behavior	
	Score	Proportion	Score	Proportion	Score	Proportion	Score	Proportion
Xi'an	14.59	72.95	4.41	77.18	3.20	67.36	3.49	69.31
Shenyang	14.60	73.01	4.52	79.30	3.32	68.68	3.61	70.93
Shanghai	14.66	73.29	4.30	75.39	3.17	66.77	3.62	71.81

3.2 Analysis of human perception of natural environmental changes

3.2.1 Analysis of human concern for the natural environment

3.2.1.1 Perception of environmental pollution conditions

The survey showed that 55.32% of the people thought that the air quality of their home residences had different degrees of pollution, with 54.05%, 59.76% and 57.62% in Xi'an, Shenyang and Shanghai respectively, showing an overall consistency.

For the summer temperature in recent years, 96.13% of the people thought that it had increased to different degrees, among which 96.87%, 97.89% and 94.76% in Xi'an, Shenyang and Shanghai respectively, showing an overall consistency.

Regarding the number of disasters in recent years, 82.30% of the people thought that the number of disasters had increased to different degrees, among which 83.29%, 82.56% and 80.47% in Xi'an, Shenyang and Shanghai respectively, showing consistency on the whole.

Regarding the environmental condition of the family's residence over the past five years, 31.19% of people thought it had improved to varying degrees, 35.25% thought it had not changed, and 33.56% thought it had deteriorated to varying degrees. Among them, 31.59%, 28.63% and 14.29% of people in Xi'an, Shenyang and Shanghai respectively thought that there was some improvement, while 28.72%, 35.62% and 47.14% of people respectively thought that there was no change, and there were some differences.

In general, citizens in the three regions are more concerned about global environmental changes and generally believe that the environmental pollution situation is not optimistic. There are some differences in the awareness of environmental changes in the places where they live.

3.2.1.2 Perception of environmental conditions and their changing trends

The survey shows that 96.63% of people believe that the temperature will increase to different degrees in the future summer, among which 96.34%, 98.3% and 97.14% in Xi'an, Shenyang and Shanghai, respectively, and only 1.69% believe that there will be no change, among which 1.57%, 1.29% and 1.90% in Xi'an, Shenyang and Shanghai, respectively, showing consistency on the whole.

Regarding the current environmental condition of the family residence, 66.68% said they could accept it, 12.65% said they were very satisfied, among which 65.54%, 66.97% and 69.05% in Xi'an, Shenyang and Shanghai respectively said they could accept it, 11.23%, 14.52% and 15.24% said they were very satisfied, showing an overall consistency.

It is noteworthy that 35.25% of people think that the environmental conditions of their family residence will not change in the future, 34.40% think that it will improve to varying degrees, among which 30.29%, 35.23% and 44.29% of people in Xi'an, Shenyang and Shanghai respectively think that it will not change, 44.12%, 43.56% and 16.66% think that it will There is some variability.

Thus, although the citizens of the three regions generally think that the environmental pollution situation is not optimistic, they can accept the current environmental situation and have higher expectations for the change of the environmental situation, among which the expectations of the citizens of Xi'an and Shenyang are higher than those of Shanghai.

3.2.1.3 Awareness of their role in environmental protection

Comparing the influencing factors of global change, 79.77% of people think that human factors are the dominant force, among which 83.81%, 80.64% and 72.3% in Xi'an, Shenyang and Shanghai respectively. In addition, 2.02% of people are not sure which factor is more influential, among which 0.52%, 1.23% and 4.76% in Xi'an, Shenyang and Shanghai respectively, with some variability.

At the same time, 84.15% of people think that individuals play a greater role in environmental protection, while 15.85% think it has little or no relationship. 73.36% of people think that environmental protection has a practical relationship with their daily lives, while 1.01% think it has no relationship at all. 78.59%, 75.62% and 63.81% of people in Xi'an, Shenyang and Shanghai respectively think it has a practical relationship. Among them, 78.59%, 75.62% and 63.81% in Xi'an, Shenyang and Shanghai respectively think there is a practical relationship between environmental protection and daily life.

The above data show that citizens in all three regions are clear about the dominant power of human factors on the global natural environment and the importance of personal environmental protection, but citizens in Xi'an and Shenyang are clearer than those in Shanghai about the dominant power of human factors and the practical relationship between environmental protection and daily life.

3.2.2 Evaluation of human awareness of people around us and our own environment

According to the survey, 65.60% of people think that

people around them have an average level of environmental awareness, with 66.32%, 65.46% and 64.29% in Xi'an, Shenyang and Shanghai respectively. The percentage of those who think their own environmental awareness is very strong and can often talk about it and set an example is 19.05%, of which 20.10%, 20.30% and 17.15% in Xi'an, Shenyang and Shanghai respectively. The proportion of those who only talk about it and do not act on it is 56.32%, of which 54.31%, 56.50% and 60% in Xi'an, Shenyang and Shanghai respectively. The overall survey results show that citizens' awareness of environmental protection is not high.

3.2.3 Analysis of human's green behavior

3.2.3.1 Overall level of participation in green activities

The survey results show that only 3.71% of people said they could stop littering on the spot, with 4.18%, 3.82% and 2.86% in Xi'an, Shenyang and Shanghai respectively. 21.43% of people said they would not litter, with 24.02%, 22.36% and 16.67% in Xi'an, Shenyang and Shanghai respectively. The proportion of those who would be embarrassed to discourage this phenomenon was the highest, at 70.49%, with 67.62%, 70.23% and 75.71% in Xi'an, Shenyang and Shanghai respectively. At the same time, 4.38% of people often litter and consider it normal, with 4.18%, 4.52% and 4.38% in Xi'an, Shenyang and Shanghai, respectively.

49.07% of people strongly agreed to ban the use of lunch boxes and disposable chopsticks, with 50.13%, 49.68% and 47.14% in Xi'an, Shenyang and Shanghai respectively. 46.21% of people said they did not care, with 45.95%, 46.56% and 46.67% in Xi'an, Shenyang and Shanghai respectively. The percentage of people who said they did not care was 45.95% in Xi'an, 46.56% in Shenyang and 46.67% in Shanghai. Another 4.72% thought it should not be banned, with 3.92%, 4.81% and 6.19% in Xi'an, Shenyang and Shanghai respectively, with some variation.

The analysis shows that most citizens are aware of environmental protection, but they are indifferent to environmental destruction.

3.2.3.2 Citizens' willingness to pay for environmental protection

The survey shows that 60.01% of people are willing to pay more for environmental protection, with 49.61%, 59.26% and 73.34% in Xi'an, Shenyang and Shanghai respectively, while 5.23% are strongly against it, with 7.05%, 5.34% and 1.90% in Xi'an, Shenyang and Shanghai respectively, the comparison shows that Shanghai citizens are slightly more willing to pay for environmental protection than Xi'an and Shenyang. The comparison shows that the willingness to pay for

environmental protection is slightly higher in Shanghai than in Xi'an and Shenyang.

4. CONCLUSIONS

The dynamic model of "eco-economist" formation reveals that when human awareness of natural environment protection is low, the government should increase the punishment of natural environment destruction, so as to promote the citizens' awareness and behavior of natural environment protection. When the level of environmental protection reaches a certain level, people's awareness and behavior will be maintained at a relatively high level due to the effect of herding behavior, and the behavior of "eco-economists" in the population will stabilize.

Human beings have been generally concerned about the basic fact of global natural environmental change, and have basically reached a consensus on the dominance of human factors in global natural environmental change, the seriousness of environmental pollution, the urgency of environmental treatment, the effectiveness of environmental education, and the wide range of target groups. However, there are some differences in the expectation of the improvement of environmental conditions, the enthusiasm to participate in green environmental activities, the awareness of the dominant power of human factors, the awareness of the practical relationship between environmental protection and daily life, and the willingness to pay for environmental protection, and there is still a need to further improve human environmental awareness and behavior.

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