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## Environmental impairment loss research under the background of industrial development

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### ABSTRACT

There is inevitable relation between Industrial development and environment. From aspect of environmental impairment losses, If environment value that people enjoy in process of industrial development is certain, and industrial development is not too fast, the environment value people enjoy will fall. In the process of welfare change will generate decreases tend, while compensation value people demand will be increased. This is the negative effect that industrial development does to the environment produces during process. This paper combines with CVM questionnaire survey to study the process, making the data in the process of study have certain objectivity, meanwhile, it can fully reflect people's cognitive attitude to environmental impairment loss under background of industrial development.

### KEYWORDS

Industrial development; Environmental impairment loss CVM investigation questionnaire; Explore research.



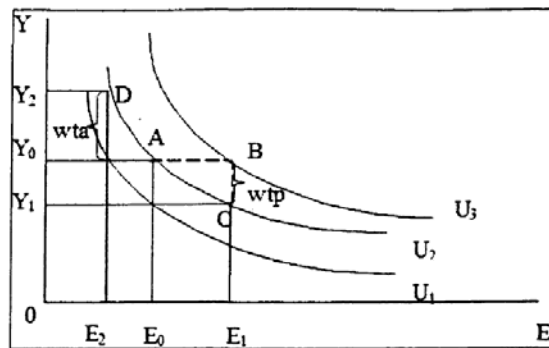
**INTRODUCTION**

Industrial development play a positive role in the rapid growing China's economy, this is a sign of fast economic social development of our country. However, it will generate the corresponding negative effect, this is also provide hard conditions for environmental damage. So, how to minimize the environmental impairment loss requires us to do further research and exploration when industrial is developing. This paper is on analysis WTP's and WTA's two specific evaluation indexes application principles, combining research of and discuss about basic principle of CVM, and it discuss CVM method applying process combining the WTP and WTA differences, it thus make effective study on inner relationship between them<sup>[1]</sup>.

And combined with empirical analysis of the difference of the WTP and WTA process, All made this paper has strong theoretical and practical for research and exploration.

**CVM PRIMARY PRINCIPLES**

So called CVM is referring to the changes of people's welfare through environmental economics to compensate and specific indicators as the basis of deviation, from intuitive point, CVM is referring to the will that people would pay to pollution for environment at the largest extent, or the minimum compensation people can accept. And what we say in this paper is that WTP essence is the greatest degree of payment for change environment, while The WTA is the minimum compensation scope can accept by the people in the process of changing circumstances. And in the process of analyzing the basic principle of CVM, it can be derived by the corresponding graphical process between the concrete analysis, as shown in Figure 1.



**Figure 1 : WTA, WTP geometric figure**

From Figure 1 geometric reasoning we can get the following conclusion, supposing that a consumer is going to face two corresponding choice. First, through the form of currency trading to exchange for the corresponding products and services process, another option is to enjoy the environment goods, which is a kind of enjoyment that does not need to get by monetary transactions. There are two different optional processes can get three curves with no difference (we use the  $U_1, U_2, U_3$ ) to reflect. The three curves have totally different level of utility. If we assume that remittee the very beginning welfare of A, then in monetary income  $Y_0$  when enjoy the environment quality is  $E_0$ , and its level of utility in  $U_2$  above this level. However when consumers money income in point B, then enjoy the environment quality is  $E_1$ , and the utility level  $U_3$  we used to say, this is also the highest level of utility<sup>[2]</sup>. However, when the utility levels rising from the  $E_0 E_1$ , and in the process of his greatest degree is willing to pay money by  $Y_0 - Y_1$ . Correspond with the utility value of C to above two points are at A  $U_2$ . So is the largest amount represents individuals enjoy the environment items  $E_0, E_1$  is the greatest willingness to pay. However in this process, the customers for environmental goods to corresponding monetary assessment process, it is easy to draw from this reasoning process, when the environmental quality is a negative change process, the consumer can compensate for its minimum value is  $Y_1 - Y_0$ .

**WTP AND WTA CURRENT RESEARCH STATUS OF DIFFERENCES**

The differences of the WTP and WTA has been rather concerned out of related researches in the world. In theory the WTP and WTA is due to the same item benefits brought by the changes, should be small gap. But the study results show that the gap is bigger, and WTA is greater than the average WTP by 2 to 10 times, this also is the main reason why CVM is questioned.

In the process of CVM research and analysis, we can see the objectivity of the differences between the average number of WTP/WTA. From the essence, the average between the two can achieve four to five times in theory. Horowitz and having a Mr McConnell 45 points investigation report for the further research, it is concluded that the average value between

the gap in 7.17 times, while the smallest gap of 0.74 times. The biggest draw gap is 112.67. Then after the corresponding case analysis and research, Gnage summed up the former is two to four times that of the latter<sup>[3]</sup>. And the differences between the two in the process of measure and the rationality of the index selection problem arises spontaneously, Hahnemann's own point of view is that, there exists the gap between the two keep in five times the most ideal. Thomas process through a series of case analysis summarizes the differences between them are between 1.4 and 6 times shall be maintained. Carson's own point of view is the selection process for the reasonable index should be combined with the corresponding selection, property rights of evaluation of the object itself and if consumer self do not get the authorization process of calculates effective evaluation objects, so the index should be the WTP. While the idea index should be adopted by the WTA. Through the literature data of corresponding site inspection process, it is easy to can find a lot of cases are the WTP corresponding measure index system and the evaluation process, but in the process of review only two case for two analyzes the corresponding evaluation index and discussed. The two WTP and WTA contrast analysis example, Ya-ping LIU through the budget process of Wuling YUAN scenic spot, calculate the WTP of mean value of 55.04, while the WTA average of 202.35. The ratio between the two is 3.7. The corresponding estimates for the Huangguo SHU scenic area of the process, calculate the average WTP is 90.52, and the average of the WTA is 175.6, the average ratio between the two is 1.93. We through the two case to come to the conclusion that, the average relative to the mean value of the WTP of WTA, obviously much larger, but the ratio can be kept within the effective range. But in actual measuring process, we are still mainly aimed at the average WTP calculation process, the main factor is the average is another objectivity is not strong, and the average value range is larger. This will lead to estimate effect exist certain instability.

However, with the developed countries for CVM application scope expands unceasingly, the WTP differences existing between WTA and also got more extensive research<sup>[4]</sup>. Between the can according to the principle of economics to analyze the causes of the differences, in which there are many factors that can lead to differences. Such as loss aversion effect, substitution effect and income effect, and so on, these are all influence quantity index, there exists large differences between the key factors. As well as existence value and the existing differences between the transaction cost.

The process of CVM study in our country mainly adopts the index is the WTP, and other western developed countries adopted by the index. The WTA/WTP reflects a more subjective factors, so the subjectivity is stronger. And in different regions, the regional culture, economic development has its own characteristics, the extent of difference also exists certain strange sex. At present our country on the study of this aspect is not sufficient, there are still many aspects are in the blank stage. In this paper, combining with the real case to the corresponding research, makes the differences between the impact can be further reflected, through the survey asked to find out the main factors of evaluation index difference of the two, and effective analysis of the reason.

## **WTP AND WTA AN EMPIRICAL ANALYSIS OF THE DIFFERENCES**

Primary goal in the research process and the effective evaluation of environmental impairment loss, using CVM method accordingly in this research, the corresponding investigation by questionnaires. In this paper the research process, a total of 400 questionnaires, and 200 is to target specific provisions of the WTP for the corresponding questionnaire survey, and another 200 WTA effective investigation is indicated for the audience. The purpose is to find the most conforms to the environment is the key indicators of impairment loss evaluation, in this process also face to face questionnaire survey procedure, accordingly makes the reliability of the survey data has stronger.

### **Disposable distribution differences between WTP and WTA**

#### **(1) Overall distribution characteristics of WTA and WTP**

In WTP questionnaire statistics and finishing process, it can be seen that there are 86 people choose and pay, and part of respondents chose the willing to pay a part of the cost. From WTA questionnaire statistical process pending investigation results, we can see there are 52 people chose the zero of will, a further 143 people choose is demanding compensation. So can directly show the latter accounts for the proportion of significantly greater than the former, to conform to the general consumer own psychology. In the process also embodies the consumer from another Angle for industrial development for the environmental impact of hold a more negative attitude, does not support the development of industry based on the basis of the damage to the environment.

#### **(2) Distribution characteristics of positive WTP and WTA**

On the positive WTP questionnaire, it can be seen in the data statistics, that 109 copies of questionnaires for this item on the corresponding answer, answer efficiency reached 100%, and is on positive WTA questionnaire statistical process, only 114 of the 143 respondents give the effective answer, another 29 respondents did not answer accordingly, so the questionnaire effective is only 79.72%. Seeing from questions efficient, the latter is obviously lower than the former. It mainly because is that the latter question is difficult, a lot of subjects for the environment 'understanding of the impairment loss is low, the compensation process exists corresponding question<sup>[5]</sup>. TABLE 1 shows the explain variables defined in the questionnaire.

**TABLE 2 : Explain variables defined in the questionnaire**

| Explaining variable | Variable declaration             | Variable assignment  |
|---------------------|----------------------------------|--|
| Place               | Place                            | Liaoning province=1, Liaoning province outlier=2   |
| Sex                 | Sex                              | Man=1, Women=2   |
| Age                 | Age                              | Below or 16, 17-15=2, 26-45=3, 46-60=4, 61 and above=5   |
| Edu                 | Edu                              | Junior high school=1, technical high school or college degree=2, junior college or university degree=3, graduate student and above=4                               |
| Job                 | Job                              | Government staff=1, enterprise manager=2, technique worker=3, medical staff=4, teacher=5, sodier=6, business man=7, worker=8, farmer=9, student=10, service man=11 |
| Pay                 | Month payment                    | 0-999=1, 1000-149=2, 1500-1999=3, 2000-2400=4, 2500-2999=5, 3000-3999=6, 4000-4999=7, 5000-6999=8, 7000-9999=9, 10000 above=10                                     |
| Time                | Time to factory heritage site    | None=1, once=2, twice=3, more than twice=3, work place=5   |
| History             | Knowledge about Liaoning history | Quiet know=1, some know=2, little=3, not at all=4  |
| gy                  | Knowledge about factory heritage | Quiet know=1, some know=2, little=3, not at all=4  |

In WTP and WTA, however, the choice of the WTP basic embodied in bid for value continuously improve with first increasing and decline trend. In the process to choose most respondents are willing to pay 50 yuan, the number in 25 people, the number of 22.9% of the non-zero sample. While choice are willing to pay \$100 account for 21.1% of the total survey, choose to pay 200 yuan, 14.7% of the non-zero samples, the rest is to select the respondents are willing to pay 10 yuan, the number of non-zero 13.8% of the sample. From the above data of investigation and statistics, we can see that respondents numerical mainly are willing to pay within 10-200 yuan, the proportion is zero samples as much as 89%. See from the data to be able to pay will mainly within the minimum value, it has to do with the industrial development of our country's national conditions have stronger adaptability. And WTA survey results are mainly presented the rising trend, here is not right to specific narrative, the questionnaire data through questionnaire to come to the conclusion that, WTA amount number significantly higher than that of the WTP indicators of total amount<sup>[6]</sup>.

**(3) WTP and WTA average and median value**

In the process of this paper research, to 109 copies of questionnaires WTP average is at 122.29 yuan in this stage, however, the median is 50 yuan. For the 114 WTA questionnaire statistical process, the average value is 1451.67 yuan, and the index of the median is RMB 500. After an abnormal index, we can get the corresponding average 108 points in the questionnaire of WTA average value is 421.2 yuan. The regression analysis of differences between the WTP/WTA determinants is shown as TABLE 3.

**TABLE 3 : Regression analysis of differences between the WTP/WTA determinants**

| Model | Variable   | Regression coefficient | Standard error | t-test | Significance level |
|-------|------------|------------------------|----------------|--------|--------------------|
| 1     | <Constant> | 37.299                 | 21.797         | 1.711  | 0.092              |
|       | Edu        | -6.013                 | 2.656          | -2.264 | 0.027              |
|       | Cishu      | 3.461                  | 2.384          | 1.452  | 0.151              |
|       | Lishi      | -5.655                 | 3.792          | -1.491 | 0.141              |
|       | Gy         | 1.648                  | 3.334          | 0.494  | 0.623              |
|       | Sex        | -2.409                 | 4.377          | -0.550 | 0.584              |
|       | Age        | -0.972                 | 3.103          | -0.313 | 0.755              |
|       | Job        | -0.225                 | 0.708          | -0.317 | 0.752              |
|       | pay        | -0.761                 | 1.108          | -0.687 | 0.495              |
|       | Place      | 1.141                  | 4.242          | 0.269  | 0.789              |
| 8     | <Constant> | 14.738                 | 6.522          | 2.260  | 0.027              |
|       | Edu        | -4.411                 | 2.132          | -2.069 | 0.042              |
|       | Cishu      | 3.352                  | 1.931          | 1.736  | 0.087              |

#### (4) WTA /WTP distribution characteristics

After eliminating outliers, we statistics effective questionnaire, the number of questionnaires is 76. In which, average value is 8.88, and counts 3.0. The non-zero minimum value is 0.2, its biggest accused of 100 (see Figure 2)<sup>[7]</sup>. Also can be seen from the picture, the two main indicators and differences within 1-3 interval, and the two equal indicators questionnaire has 16, that is take 21.1% of total number, and investigation file number between ratios that is greater than one and no more than three 19, which takes 25% of the total number of the questionnaire. The frequency distribution WTA/WTP is shown as Figure 2.

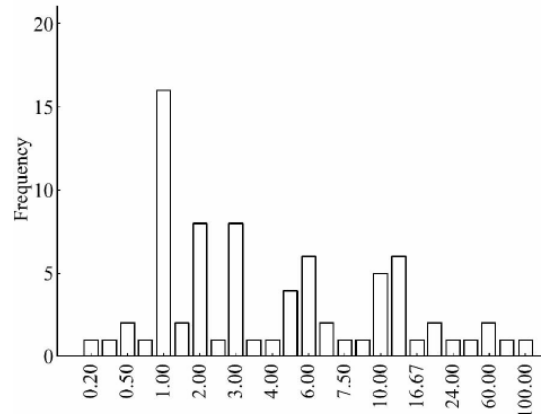


Figure 2 : The frequency distribution WTA/WTP

#### Affections of sample factors to WTP and WTA

Through the adoption of contingency table analysis and correlation analysis, the related influence factors of the WTP and WTA significance test, It discovered that the WTP has extremely significant correlation between monthly income, the environment, understanding of the industrial development, namely, the higher the income, more the industrial development affect the environmental awareness of the process for respondents strongly, the higher the WTP value. Specifically respondents for industrial development and the environment and the influence of income between affect WTP presents the most significant positive correlation, show the respondents to the seriousness of the WTP. Level of education, age has significant correlation to the WTP, the higher the level of education, the greater the WTP. The Various factors and correlation analysis of the WTP/WTA is shown as TABLE 4.

TABLE 4 : Various factors and correlation analysis of the WTP/WTA

| Factor    |     | Chi-square test | Degree of freedom | Significance level | Degree of conrelation | Preferece characteristics |
|-----------|-----|-----------------|-------------------|--------------------|-----------------------|---------------------------|
| place     | WTP | 9.317           | 16                | 0.9                | no                    | -                         |
|           | WTA | 14.677          | 16                | 0.548              | no                    | -                         |
| SEX       | WTP | 13.493          | 16                | 0.636              | no                    | -                         |
|           | WTA | 18.517          | 16                | 0.294              | Not abvious           | Man                       |
| AGE       | WTP | 78.437          | 64                | 0.106              | Relative abvious      | 17-45                     |
|           | WTA | 44.43           | 64                | 0.97               | no                    | -                         |
| EDU       | WTP | 60.16           | 48                | 0.113              | Relative abvious      | Higher degree             |
|           | WTA | 63.481          | 48                | 0.066              | Relative              | Lower degree              |
| JOB       | WTP | 184.915         | 192               | 0.63               | no                    | -                         |
|           | WTA | 163.194         | 192               | 0.935              | no                    | -                         |
| MONTH PAY | WTP | 180.588         | 144               | 0.021              | Most abvious          | Higher income             |
|           | WTA | 129.698         | 144               | 0.798              | no                    | -                         |
| TIME TO   | WTP | 70.418          | 48                | 0.019              | Very abvious          | More time                 |
|           | WTA | 70.645          | 64                | 0.265              | Not abvious           | More time                 |
| KONWLEDGE | WTP | 30.909          | 32                | 0.522              | no                    | -                         |
|           | WTA | 47.94           | 48                | 0.475              | no                    | -                         |
| KNOWLEDGE | WTP | 65.98           | 48                | 0.043              | Very abvious          | More acknowledge          |
|           | WTA | 50.996          | 48                | 0.037              | no                    | -                         |

Age and WTP negative correlation, between 17 to 45 years old of respondents of WTP relatively large. To understand the relationship between the industrial development and environmental harm degree has no correlation with the WTP, namely, these factors affect WTP is not obvious. For the WTA, level of education is characterized by a significant correlation, and the rest of WTA no correlation.

### CONCLUSION

So, above is the paper is research process of environmental impairment loss Under the background of industrial development, through the CVM questionnaire survey, This paper is on analysis WTP and WTA two specific evaluation indexes application principles, combining research of and discuss about basic principle of CVM, and it discuss CVM method applying process combining the WTP and WTA differences, it thus make effective study on inner relationship between them. And combined with empirical analysis process of the difference of the WTP and WTA. Thus, to reach an ultimate goal that research process and research train are thought clear and accurate.

### ACKNOWLEDGEMENTS

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