

Estimation of the Non-Use Value (Existence Value) of the University's Old Campus by Contingent Valuation Method

—A Case Study in Central and Western China

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Abstract—The old campus of universities have a long history and thick culture. As the cultural heritage, its existence value should be given a high attention. This paper uses Contingent Valuation Method to explore the existence value of eight old campus in the central and western China, including Lanzhou University (LZU), Lanzhou University of Technology (LZUT), Lanzhou City University (LZCU), Northwest Normal University (NWNNU), Xi'an Polytechnic University (XAPU), Xi'an University of Architecture and Technology (XAUAT), Zhengzhou University (ZZU) and Henan University (HNU). The results show that 91.9% of the respondents were willing to pay (WTP) a certain amount of money for the perpetual existence of the old campus, and the average WTP was 184.9 RMB per month. WTP was correlated with the interviewees' expected monthly incomes and region, WTP was significantly difference on household registration, the expected income, the level of education and the region where these colleges and universities located in. WTP was different among each college and university, HNU, XAPU and XAUAT had significantly higher WTP than the other five colleges and universities. The total existence value of the old campus in the central and western China was about 49.7 × 108 RMB per year. The results showed that existence value of the old campus was very large, so they should be given a priority on protection and development. Due to the value evaluation of old campus have never been explored, but the old campus's social function, cultural function and historical contribution, development of social economy shows that the existence value of the old campus of colleges and universities is very large. However, because of the limited samples, the results of this paper maybe are not so accurate and reliable. In order to comprehensively understand the existence value of old campus in our study areas and even at the national level, further work should be needed.

Keywords—contingent valuation method; the number of willingness to pay; colleges in central and western China; the old campus; the existence value

I. INTRODUCTION

Contingent Valuation Methodology (CVM) and the closely related "contingent choice" methods have become

increasingly popular in cultural economics, and empirical researchers use CVM to explore the non-use values of various cultural resources [1]. It was originally proposed by Ciriacy-Wantrup (1947), who believes the prevention of soil erosion generates some 'extra market benefits' that are public goods in nature. Therefore, one possible way of estimating these benefits is to stimulate the individuals' willingness to pay (WTP) for these benefits through a survey method [2-4], but Davis (1963) was the first to use the CVM empirically when he estimated the benefits of goose hunting through a survey among the goose-hunters [5]. Briefly, it allows respondents to simulate their maximum WTP for the protection of environmental resources in the hypothetical market in the form of questionnaires by utilizing the maximization of utility principle [6-9], and becomes the mainstream of value evaluation of public goods [10-11].

In non-use value (including existence, bequest, option and altruistic value), the existence value is usually as a dominant value, because it often accounts for about 60% of the total non-use value [12-13]. Existence value refers to the value that respondents are willing to pay to ensure that the service function of the resource lasts for a long time [14-15]. This evaluation has nothing to do with its present or future use, but knows the persistence of the environmental characteristics of objects from the perspective of a sense of satisfaction, regardless of whether others benefit from it or not. In addition, the evaluation results can be used in policymaking [16]. Many scholars have studied the existence values of aquatic animals (e.g., sea otters, monk seals and sturgeon), terrestrial animals (e.g., giant pandas, tigers, wolves and Chinese Asian elephants, etc.), plants (e.g., mushrooms and trees), and ecosystems (e.g., forests, oceans, wetlands, arable land, meadows and estuaries) [14-15, 17-24]. In addition, some scholars have in-depth research on the existence value of biodiversity, farm leisure landscape, park, cultural heritage and nature reserve [1, 19, 25-27].

As the birthplace of colleges and universities, the old campus integrate with intangible culture and spirit that

inherited the historical context and embedded in the evolutionary process of multi-scale (from local to global) phenomenon, which is usually associated with intangible and tangible, temporal and spatial, and technical or natural orientation [28]. The old campus possess natural landscape (e.g., trees, lawns, water features), humanism landscape (e.g., regional distinctive buildings, sculpture, monuments) and cultural landscape (e.g., signs, bulletin boards, lighting) and other campus external space vitality [29]. In addition, they are inclusive and compatible rich history, which can highlight the old campus' deep cultural deposits and rich cultural atmosphere, and strengthen the sense of identity and belonging of teachers and students. Although old campus in different regions differ in configuration, style, function, and even the vein trace, they have played a mainstay role in serving teachers, students and the society. In addition, they are the main position of the past, present and future social education [30]. The old campus has great social and cultural functions and outstanding historical contributions, which indicate that it is of great value for existence. However, there are few reports on the assessment of existence value of the old campus up to now. This study intends to use the CVM to explore the existence value of the old campus in the central and western colleges and universities in China, thus providing decision-making basis for the development of our old campus.

II. MATERIALS AND METHODS

A. Questionnaire Design and Investigation

1) *Pre-investigation*: In order to enhance the rationality and scientificity of the questionnaire, twice small-scale pre-surveys were conducted at Northwest Normal University before the formal questionnaire was formed. For the first time, an open interview survey was conducted because it can make sure that interviewers can have direct communication with interviewees. At the same time, a large number of vivid, diverse and accurate data is available. Moreover, it prevents respondents from being limited by the set willingness to pay [31-32]. We have a better understanding on different groups'

opinions of the integrated functions and the existence value of old campus with the help of the interviewees (students, teachers, support staff and security, a total of 20 participants). On this basis, the semi-structured questionnaire was designed and the second pre-survey was carried out. The main purposes, on the one hand, is to clarify respondents' approval degree of the questionnaire and whether there is ambiguity or conceptual blindness in the questionnaire. On the other hand, expects that the respondents can point out the shortcomings of the design of the questionnaire [33-34]. The pre-survey uses a face-to-face filling method, which can ensure the quality of the questionnaire and keep them active. A total of 110 questionnaires were distributed and 103 were returned. The effective return rate is 94%.

2) *The formation of formal questionnaires*: Based on the two pre-surveys, the formal questionnaires were eventually formed after several revisions. Taking the bid value of the two pre-surveys as the reference, the formal questionnaire adopted the anchored payment card (APC) method as the guidance tool, which can avoid the deviation of the bid's starting point and establish the selection set of the bid value [15, 35]. The formal questionnaire consists of four parts:

- The first part introduces the main research background of the existence value of the old campus.
- The second part is the socio-economic characteristics of the respondents, including their age, gender, nationality, household registration, level of education, expected monthly incomes and so on.
- The third part is about the respondents' understanding on the comprehensive function of the old campus.
- The fourth part is the key of the questionnaire, mainly relating to the respondents' expected monthly incomes, the number of maximum willingness to pay and payment methods.

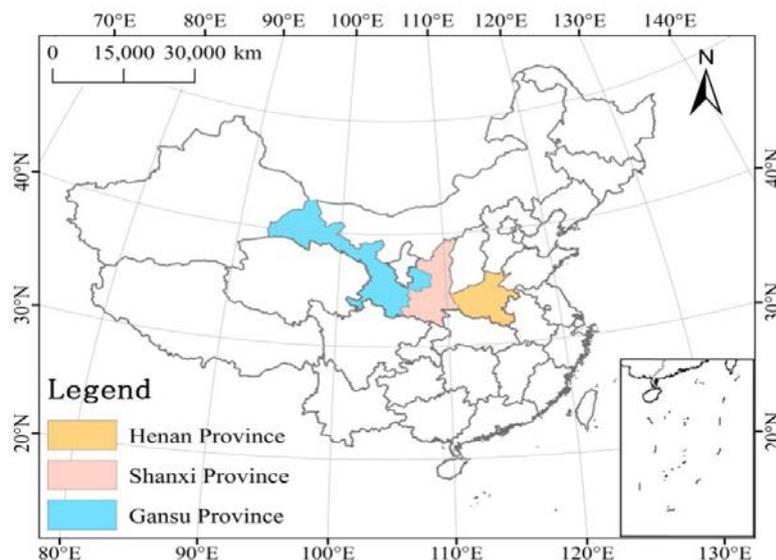


Fig. 1. The study area

TABLE I. HISTORY OF EACH UNIVERSITY

University	Established time (year)	Running time (end by 2016)	The number of interviewees
Lanzhou University	1909	107	96
Lanzhou University of Technology	1919	97	96
Lanzhou City University	1904	112	133
Northwest Normal University	1902	114	66
Xi'an University of Architecture and Technology	1895	121	100
Xi'an Polytechnic University	1912	104	101
Zhengzhou University	1956	60	101
Henan University	1912	104	112

^a. 128 questionnaires were issued by Northwest Normal University, and 62 of them were not related to the contents of the study. They were excluded in the analysis.

From May to September of 2016, the study takes eight universities in central and western China as the research objects (Fig. 1, Lanzhou University, Lanzhou University of Technology, Lanzhou City College and Northwest Normal University in Gansu Province; Xi'an Engineering University and Xi'an University of Architecture and Technology in Shanxi Province; Zhengzhou University and Henan University in Henan Province.) Each university's history is more than 50 years (Table 1, Lanzhou University of Technology, Lanzhou City University, Xi'an Polytechnic University whose predecessors were Gansu provincial technology schools, Lanzhou Teachers College, Beijing Higher Industrial College woven Section). A total of 891 questionnaires were issued, 805 were returned, and the effective return rate is 90.3%.

3) *Data analysis*: Data processing and statistical analysis used Microsoft Excel and SPSS 22.0 (SPSS Inc. USA), respectively. Correlation among sample features was analyzed by contingency table. The differences of WTP in Colleges and Universities were analyzed by the adoption of one-way analysis of variance (ANOVA). The univariate interaction analysis is used to analyze the interaction among the variables, and multiple linear regression is used to establish multiple linear regression models between willingness to pay and variables.

III. RESULTS

A. Socio-economic characteristics of samples

The socio-economic characteristics of the interviewees (Table 2): among the respondents, 48% are men, 52% are women, while undergraduate, and graduate students account for 76.1% and 23.9% respectively. Household registration of cities accounts for 50.3%, and household registration of village areas accounts for 49.7%. The expected monthly incomes can be divided into three levels. The first is 1000-3000 RMB, accounting for 57%. The second level is 3000-5000 RMB, accounting for 14.2%. In addition, the last is more than 5000 RMB, which accounts for 28.8%. According to the actual situation in Northwest Normal University's employment fairs in 2015, most companies provide the newly graduates with a base salary of about 1600 RMB monthly, most graduates in this research consider the expected monthly income as the basic net income. The data released by the National Bureau of Statistics of China in 2016 shows that the national average wage is 5780 RMB/month, of which 3000-5000 RMB constitutes the largest proportion. According to this result, the expected incomes in the questionnaire are divided into three stages, 1000-3000 RMB (low-income), 3000-5000 RMB (middle-income), and more than 5000 RMB (high-income).

TABLE II. THE SOCIO-ECONOMIC CHARACTERISTICS OF THE INVESTIGATORS

Gender	Proportion (%)	Age	Proportion (%)	Level of education	Proportion (%)	household registration	Proportion (%)	Excepted monthly income	Proportion (%)
male	48	17-23	76.6	Undergraduate	76.1	City	50.3	1000-3000	57
female	52	23-26 >26	20.9 2.5	Postgraduate	23.9	Village	49.7	3000-5000 >5000	14.2 28.8

B. Respondents' willingness to pay and payment method

According to the expected monthly income, the proportion of the monthly maximum willingness to pay (0, 3%, 5%, 7%, 9% and 10% and above) can be converted to the specific amount of funds. The non-zero payment fund is approximately 150 RMB, 250 RMB, 350 RMB, 450 RMB and above 500 RMB. In the 805 returned questionnaires, non-zero payment accounts for 91.9%, and the zero payment accounts for 8.1% because of income restrictions or low recognition of the old campus. 34.4% of respondents choose

to donate directly, 39.8% of them choose to deliver the donation to specialized management agencies, and the rest choose other payment methods. In non-zero payment intention, 250 RMB takes the highest rate, accounting for 22.2% of the whole (Table 3).

TABLE III. FREQUENCY ANALYSIS OF RESPONDENTS' WILLINGNESS TO PAY

The number of willingness today	Frequency (time)	Frequentness (%)	The cumulative frequency (%)
0	65	8.1	8.1
150	174	21.6	29.7
250	179	22.2	51.9
350	125	15.5	67.4
450	116	14.4	81.8
>500	146	18.2	100
Total	805	100	100

C. Existence value of the university's old campus in central and western China

The monthly non-zero payment willingness per capita in all samples is $E(W_p) = E(W_p > 0) \times 91.9\% = 184.9$ RMB, and the annually per capita payment is 2218.8 RMB. According to the Ministry of Education of China in 2016, the total number of teachers and students in the eight schools is about 350,000 RMB (Table 4). In central and western China, there were 238 universities established for more than 50 years, and the total number of students in these universities is about 2.24×10^6 . Therefore, it can be inferred that the existence value of the old campus in the central and western China is 49.7×10^8 RMB/year. The value of WTP and existence value

are different in each university. The average number of WTP (350-450 RMB) of Xi'an Polytechnic University, Henan University, Xi'an University of Architecture and Technology and Zhengzhou University is higher than other universities. The average number of willingness to pay in Lanzhou University of Technology, Northwest Normal University, Lanzhou University, Lanzhou City College is lower (150-250 RMB). WTP of Xi'an Polytechnic University and Henan University is significantly higher than that of Zhengzhou University. Among the universities with low willingness to pay, the WTP of Lanzhou University of Technology is much higher than that of the Lanzhou City University (Table 5).

TABLE IV. THE EXISTENCE VALUE OF OLD CAMPUS OF THE INVESTIGATED UNIVERSITIES

University	The Number of Enrolments	The Number of Average Willingness To Pay (RMB / Monthly)	The Existence Value of Old Campus / (Million / Year)
Lanzhou University	35371	185.42	890
Lanzhou University of Technology	29705	218.23	880
Lanzhou City University	15246	163.91	470
Northwest Normal University	40156	195.45	730
Xi'an University of Architecture and Technology	42800	396.00	2400
Xi'an Polytechnic University	22000	423.76	1300
Zhengzhou University	57000	368.81	4000
Henan University	54300	416.96	4300

^a The cut-off date for counting the enrolments is June 2016.

TABLE V. THE VARIANCE ANALYSIS OF WTP AMONG SAMPLED UNIVERSITIES

Universities	Lanzhou University	Lanzhou University of Technology	Lanzhou City University	Northwest Normal University	Xi'an University of Architecture and Technology	Xi'an Polytechnic University	Zhengzhou University	Henan University
Lanzhou University								
Lanzhou University of Technology	—							
Lanzhou City University	—	*						
Northwest Normal University	—	—	—					
Xi'an University of Architecture and Technology	*	*	*	*				
Xi'an Polytechnic University	*	*	*	*	—			
Zhengzhou University	*	*	*	*	—	*		
Henan University	*	*	*	*	*	—	*	

a. * means significant difference at $P < 0.01$
 b. — means no significant difference

IV. DISCUSSION

A. The correlation between the socio-economic characteristics and the WTP for the respondents

As mentioned in the part of 3.2, 91.9% of respondents are willing to pay a certain amount of money for the permanent existence of the old campus, while 8.1% of the respondents has no willingness to pay. The results are similar to those of Li et al. (2016) and Cao et al.(2017). In their study, the proportions of non-zero and zero payment are 98% and 2%, respectively. However, it is far from the studies of Ascuito et al. (2015) [13, 15, 36]. Different payment intentions may be related to the interviewees' perception and cognition of the objects of investigation, as well as the various attributes of the objects themselves (including economic, social and environmental attributes, etc.). The results show that the

willingness to pay has nothing to do with the respondents' gender, household registration and level of education. However, the expected monthly income and the region of respondents significantly correlation to their willingness to pay (Table 6, Table 7), and the higher the income, the more they are willing to pay. The total WTP ratio of universities in Gansu is lower than that in Henan and Shanxi province. The main reason is that the total WTP of Lanzhou City University and Lanzhou University of Technology is relatively low, each for 62.8% and 71.6%, respectively. Compared with other old campus, the traffic conditions of the two are relatively poor, and respondents may be reluctant to stay there, but prefer to move to new campus with better conditions. This view can be further demonstrated by the interviews of some respondents. Because the survey is conducted mainly on university campus and the respondents are similar in age, so here is no age analysis.

TABLE VI. THE CORRELATION ANALYSIS OF SOCIO-ECONOMIC CHARACTERISTICS AND WILLINGNESS TO PAY

Socio-economic characteristics		Sample number	The sample sizes of willingness to pay	The proportion of willingness to pay (%)	The sample sizes of unwillingness to pay	The proportion of unwillingness to pay (%)	Chi-square value	P
Gender	male	385	361	93.7	24	6.3	3.369	0.066
	female	420	379	90.2	41	9.8		
House-hold Registration	City	405	376	92.8	29	7.2	0.917	0.338
	Village	400	364	91	36	9		
Expected monthly income	1000-3000 (Low-income)	459	397	86.5	62	13.5	43.182	0.000
	3000-5000 (Middle-income)	114	111	97.4	3	2.6		
	>5000 (High-income)	232	232	100	0	0		
level of education	Undergraduate	613	565	92.2	48	7.8	0.206	0.650
	Graduate student	192	175	91.1	17	8.8		
Region	Henan province	213	211	99	2	1	58.024	0.000
	Gansu province	391	330	84.4	61	5.6		
	Shanxi province	201	199	99	2	1		

a. There are significant differences at p<0.001 level.

TABLE VII. THE CORRELATION ANALYSIS OF DIFFERENT REGION AND EXPECTED INCOME AND THE WILLINGNESS TO PAY

Region	Henan province	Gansu province	Shanxi province	Expected monthly income	Low-income	Middle-income	High-income
Henan province		*	—	Low-income		*	*
Gansu province			*	Middle-income			**
Shanxi province				High-income			

a.*, ** means significant difference at P < 0.01, P < 0.05.
b. — means no significant difference.

B. The influence of socio-economic characteristics of interviewees on WTP

The results of one-way ANOVA show that there is no significantly difference between gender and WTP, but there is significantly difference among different household registrations, different incomes, levels of education and respondents' regions (Table 8, Table 9). The WTP regression model shows that WTP is mainly determined by the respondents' accounts and expected monthly income. The interaction analysis shows that there is a significant

interaction between levels of education and expected monthly income. Although WTP is affected by many factors, it is mainly related to expected monthly income. The expected monthly income is low and WTP is also low, which is consistent with most research findings [37]. Generally, most of the students in rural areas choose to study in less developed areas, and most of them choose to work after graduation in order to relieve the burden of families. In this case, their expected monthly income and WTP will be lower than those who have better economic conditions and continue to study after graduation. In this study, the expected monthly income

of urban students is 3638.3 RMB, and that of rural areas is 3060.5 RMB. In addition, universities are mainly distributed in cities. Urban students are more susceptible to the old campus's cultural heritage and historical relics than students are from rural areas, which is similar to the finding of Sattout et al. (2007) that the WTP for snow forest between urban and rural residents is different [23].

The WTP varies greatly in every university, and the reasons are as follows:

1) *The regional development is different.* Lanzhou University and Zhengzhou University are the key institutions, but there are significant differences in WTP, indicating that location has an important impact on the WTP. Generally speaking, the expected monthly income in under developed areas is relatively low, and the correlated WTP is also low. While the expected monthly income and WTP in economically developed areas are generally higher.

2) *Differences in profession and employment.* According to the *Employment Blue Book*: research report on the

employment of Chinese university students in 2016, released by the *Ministry of Human Resources and Social Security of China* in May 2016, the average monthly salary of engineering graduates is 5,966 RMB, while that of normal college graduates is 3,453 RMB. The result shows that there is a broad career prospect for engineering majors. While the normal employment market has become saturated. The differences in profession and employment directly lead to the differences between the expected monthly income and the WTP.

3) *Effects of household registration and level of education.* Although Northwest Normal University is a normal university, students' WTP is relatively high. Probably because it is an old campus with over hundred years' history, which can not only continue the school's historical context, but also provide a subtle learning space for students. If such an old campus does not exist anymore, many students will have a strong sense of loss. Therefore, they attempt to use a high WTP to affect the decision-makers, to achieve the purpose of preservation.

TABLE VIII. THE VARIANCE ANALYSIS OF SOCIO-ECONOMIC CHARACTERISTICS ON WTP

Dependent variable	Independent variable	F	P
WTP	Gender	2.837	0.092
	House-hold Registration	14.237	0.000
	Expected monthly income	473.704	0.000
	level of education	5.493	0.004
	Region	380.056	0.000

TABLE IX. THE VARIANCE ANALYSIS OF DIFFERENCE REGIONS AND EXPECTED INCOME ON WTP

Area	Henan province	Gansu province	Shanxi province	Expected monthly income	Low-income	Middle-income	High-income
Henan province		*	—	Low-income		*	*
Gansu province			*	Middle-income			*
Shanxi province				High-income			

a.*, ** means significant difference at P<0.01, P<0.05.
b.— means no significant difference.

C. *The comparison of the existence value between old campus and other cultural assets*

Compared with other cultural assets assessment (Table 10), the existence value of the old campus in central and western China is relatively big. Although the payers of this study are limited in college students, we find that many social workers have the same willingness to pay for the existence of old

campus. Therefore, this article may underestimate the actual existence value of old campus.

TABLE X. COMPARISON OF WTP AND EXISTENCE VALUE BETWEEN OUR CASE AND OTHER RELATED RESEARCHES

Evaluation object	Year of assessment	Average WTP/ (RMB/year)	Total existence Value (Billion RMB/year)	Resource type	Studies
Museum	2004	128.6	—	Cultural Heritage	[38]
Dunhuang Mogao Grottoes	2005	30.00	0.12	Cultural Heritage	[39]
Emei Mountain scenic spot	2008	40.00	69300	Natural and Cultural Heritage	[40]
Wuyishan Scenery District	2009	29.67	2.35	Natural and Cultural Heritage	[41]
Chongyi Hakka Terrace System in Jiangxi Province	2017	—	0.29	Agriculture Heritage	[42]
This study	2016	2218.8	49.7	Cultural Heritage	

V. CONCLUSIONS

Contingent Valuation Method is used in this survey to evaluate the existence values of parts of old campus in central and western China. The results show that WTP is related to the respondents' expected monthly incomes and regions. Household registrations, expected monthly income, level of education, as well as the region have obvious effects on the WTP. The per capita monthly payment is 184.9 RMB, and the existence value of old campus in central and western China is 49.7×10^3 RMB per year. Such a huge existence value indicates that we should pay more attention to the protection and development of old campus while expanding or building new campus. Although various measures have been taken to improve the accuracy and reliability of the research results, there are still many shortcomings in the study, such as insufficient sample size and too small spatial scale. Therefore, In order to have a comprehensive understanding in the existence values of old campus it is necessary to do some further research on old campuses in other regions as well as in the whole country.

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