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MEASUREMENT OF THE WILLINGNESS TO PAY BY THE POPULATION OF TEÓFILO OTONI CITY, MINAS GERAIS - MG STATE, BRAZIL, FOR THE PRESERVATION AND IMPROVEMENT OF TIRADENTES SQUARE, USING CONTINGENT VALUATION METHOD

Vasconcelos Reis Wakim
PhD student in Applied Economics at Universidade Federal de Viçosa (Federal University of Viçosa, Viçosa City, Minas Gerais State, Brazil). Assistant Professor II at Universidade Federal dos Vales do Jequitinhonha e Mucuri (Federal University of the Jequitinhonha and Mucuri Valleys, Dianantina City, Minas Gerais State, Brazil).

Elizete Aparecida de Magalhães
PhD student in Applied Economics at Universidade Federal de Viçosa (Federal University of Viçosa, Viçosa City, Minas Gerais State, Brazil). Assistant Professor II at da Universidade Federal dos Vales do Jequitinhonha e Mucuri (Federal University of the Jequitinhonha and Mucuri Valleys, Dianantina City, Minas Gerais State, Brazil).

Simão Pereira da Silva
Master in Business Administration. Assistant Professor III at Universidade Federal dos Vales do Jequitinhonha e Mucuri (Federal University of the Jequitinhonha and Mucuri Valleys, Dianantina City, Minas Gerais State, Brazil).

Dayane Neres Pereira
Student in Accounting Sciences. Universidade Federal dos Vales do Jequitinhonha e Mucuri (Federal University of the Jequitinhonha and Mucuri Valleys, Dianantina City, Minas Gerais State, Brazil).

ABSTRACT: *This study aimed to economically measure the Tiradentes Square of Teófilo Otoni City, in the State of Minas Gerais, Brazil, considering its tangible and intangible aspects. The Contingent Valuation Method (CVM) was chosen to achieve the proposed goal, because it allows determining the monetary value of natural resources based on the user's preferences. This study showed that respondents are willing to pay for the maintenance and conservation of Tiradentes Square, showing their vow of justified protest mainly by assigning this responsibility to the City Hall for its maintenance and repairs. The results of this study showed that economic value for the Tiradentes Square reached R$ 9.974.537,22 (R=Real, expressed in Brazilian currency). It was concluded that the population realize the importance of that good, but believe to be assigned to the public power the responsibility for its preservation.*

KEYWORDS: Environmental economic valuation, Contingent Valuation Method, Willingness to pay

INTRODUCTION

In general, the society is increasingly concerned with issues related to the environment and its preservation. Nevertheless, it is common that people initially correlate environment with goods directly related to biotic elements. It is important to explain that this concept is broader and encompasses not only the natural elements, but also abiotic aspects.

Thus, the meaning for environment has supplanted this purely ecological universe to achieve overall dimension of the man/nature relation, encompassing patrimonial, natural, artificial, and cultural aspects. In this sense, the interaction among these various elements provides a pluralistic and comprehensive environmental perception.

It is known that Brazil has extensive legislation focusing the preservation of public property, assigning to public managers the task of public policies development towards its preservation. The demand is great and public resources are scarce, so, investment in environmental preservation makes competition directly with investment in other areas as health, education, security, basic sanitation, infrastructure, etc. In this respect, it is important to have a tool that can help the preparation of budget planning.

The creation of public/policies towards environmental management is essential, since it will help the public manager in the resources allocation and consequently a significant improvement in the population life quality. Meanwhile, it is appropriate to add that valuing environmental goods has become increasingly important in the management context and in the creation of environmental policies.

For a quality environmental public management, the resources proper allocation for the preservation of public goods involves the need for defining their actual costs precisely. This setting can be made by economic valuation methods, whose main goal is to measure the costs and benefits related to the good.

Due to the absence of an environmental policy in Teófilo Otoni, it is deduced that the municipality has no resources for maintenance of Tiradentes Square. Facing this scenario, a public policy is needed focusing specially the environmental preservation in addition to high demand in several areas although the budgetary resources of the Municipality are limited. The economic valuation of this public property is a suitable alternative to offer a tool to the public manager able to guide his decisions, regarding resources allocation. Therefore, this study aimed to economically measure the Tiradentes Square in Teófilo Otoni, considering its tangible and intangible aspects.

THEORETICAL REFERENCES

Public Property And Its Preservation

According to Kohama (2010, p. 174), public property is "a set of goods, rights, and obligations of the entities that compose the Public Administration, evaluable in currency". This author states that public property is not only related to public entities, but to the entities comprising the public administration.

Andrade (2008) explains that the difference between public and private property consists only in the holder‘s characteristic that, in the first case, is the legal entity of public law. Based on the Articles 98 and 99 of the Brazilian New Civil Code (NCC), Law n. 10,406, 2002, it is possible to conceptualize the public goods in a clear and objective way:

Art. 98. Public goods are the goods of national domain belonging to legal entities of internal public right; all others are private, whatever the person to whom they belong.
Art. 99. Public goods are:
I - goods of common use, such as rivers, seas, roads, streets, and squares;
II - goods of special use, such as buildings, or land intended to service, or establishment of the federal, state, territorial, or municipal government, including the goods of their autarchies;
III - the dominical goods, which constitute the goods of legal entities of public law as object of personal or real right of each one of these entities.

The section V of Article 216 of the Brazilian Federal Constitution of 1988 provides that:

Goods of material and immaterial nature comprise the Brazilian cultural heritage, taken individually or together, bear reference to the identity, action, and memory of the different groups forming the Brazilian society, which include:
V - urban complexes and sites of historical, landscaped, artistic, archaeological, paleontological, ecological, and scientific values.

The third and fourth sections of Article 23 of this Constitution declare that the Union, States, Federal District, and Municipalities have the charge to care for the works and other goods of historical, artistic, and cultural values, as well as to prevent the escape, destruction, and mischaracterization of artworks and other goods of historical, artistic, or cultural values.

Based on this article, the legislator assigns to the municipalities the competence and responsibility for cultural heritage protection. However, the Brazilian Federal Constitution of 1988 explicitly states such responsibility of municipalities in section IX of Article 30, "to promote the protection of local, historical/cultural heritage, in accordance with the federal and state legislation and supervisory action", thus, seeking to eliminate doubts regarding municipal responsibility for preserving cultural heritage.

In this sense, Silva (1999, p. 13.) states that "the municipality has peculiar interest for taking care of the city things, and it is also of local interest, where the cultural goods, whether they are federal, state, or local, are concentrated".

ECONOMIC VALUATION OF PUBLIC ASSETS

Whatever the management approach being developed by the Government, the manager will have to solve the problem to allocating limited financial budget facing countless spending options that target different investments.

When the nature resources are generators of goods and services such as food production, inputs, among others result in some kind of link with the market that can be appreciated without presenting major difficulties. However, there are distinct assets characterized as public goods, which show no price signs by their conceptual and usage characteristics, to which it is difficult to assign monetary values.

In this sense and in general, it is possible to say that the value of a good or service is determined by its cost plus the desired profit established by its owner, primarily considering the value that the market is willing to pay. Moreover, there are certain categories of goods or services that do not have the free market characteristic, generating a certain difficulty in defining their market value.

Therefore, the public good should not be interpreted as without monetary value, because it does not have free market signs. Santana and Mota (2004, p. 54) state that:

> The environment, playing indispensable functions to human life displays as a result positive economic value, even if not directly reflected by the market operation. Therefore, zero value cannot be assigned to it, thus, taking the risk of overuse or even of its complete degradation. A basic principle to be observed is the interaction environment/economic system either by the impact that the economic system causes on the environment, either by the impact that the natural resources cause on economy.

Under this view, for valuing public goods economically, development of economic study is fundamental for analyzing the numerous factors that can affect directly or indirectly the price of the good. Therefore, it was necessary to develop valuation methods aiming to provide an efficient tool to guide the public managers in their decision making.

When there are no markets for goods and services or alternative markets to propose replacements, contingent valuation methods must be used. These methods can be employed to nature elements, such as biodiversity, landscape heritage, environmental protected areas, recreational areas, or any other condition for which there is no market values, and, in such cases, the willingness to pay is the most used alternative method (PUGAS, 2006).

Fritsch (2005, p. 35) shows that the market has difficulties to establish efficient prices for public goods because they are available to all people. Moreover, they are defined by the valuation that individuals attribute to them, differently of a private good that is traded in the market for certain price. "When the consumption of a good does not interfere in the consumption of other good, the economically efficient price is zero because there is no resource allocation among consumers by means of price". In this sense, the resources of common usage by people combined with the absence of prices for natural resources and the services provided by them often cause overuse by the population.

The importance of economic valuation of public assets lies in creating a reference that indicates a market sign, thus, providing the creation of policy that allows the resources rational use. Public and private agents will have indications for economic evaluation of political decision making regarding the efficient use of these assets. Therefore, to obtain a reference value for a good provides subsidies to the government, organized civil society, and Non-Governmental Organizations (NGOs) for more effective management of these resources (PUGAS, 2006).

CONTINGENT VALUATION METHOD

It is noticeable that most of the natural resources are of public nature and, consequently, they are freely accessible to people and without defined price in the market. These characteristics

lead the population to an abusive, unconscious, and uncontrolled use of these resources. Therefore, the priorities establishment, regarding the allocation of public resources and environmental policies establishment, among other things, will be most effective if the economic values of these assets become known.

The use of contingent valuation method to measure the willingness to pay for public goods has gradually grown over the past three decades (CORSI 2007). The Contingent Valuation Method (CVM) is a mechanism that allows determining the monetary value of natural resources starting from the users' preferences. In this sense, the CVM seeks to measure goods for which the figure of the free market does not exist.
The first study using direct interviews with the population to estimate the value of a natural resource was done by S. V. Ciriacy-Wantrup, who published an article in 1947 about measuring the generated benefits in favor of the conservation of soil erosion. However, CVM was used for the first time by Robert K. Davis as part of a study to obtain a doctoral degree by Harvard University (U.S.A.) in 1963. Davis sought to simulate the market behavior capturing the maximum willingness to pay to an environmental resource by respondents. To this end, all the benefits derived from a recreational area in Maine forest (U.S.A.) and alternative recreation sites in the region were presented to respondents. After the presentation, Davis offered successive values until the respondent could accept or reject the proposal to pay the good (BREEDLOVE, 1999).

Since then, the CVM is used to appraise the most diverse types of natural resources. Among the classic examples of the CVM application, it is relevant to mention: (1) the calculation of losses relating to existence values caused by the spill of nearly 260 thousand oil barrels from the Exxon Valdez in Prince William Sound, Alaska, in 1989, and (2) the estimation of the benefits generated by increasing visibility in the Grand Canyon, with the mist reduction caused by the emission of sulfur dioxide, in 1991. It is noteworthy that the results obtained by the two surveys were used for legal purposes (MAIA, 2002).

Maia (2002, p. 9) states that, although the CVM is criticized by many authors in many cases, "this is the only method able to capture existence values of environmental goods and services and it is adaptable to most environmental problems".

To achieve its purposes, the CVM bases on the premise of the hypothetical scenarios preparation from which the consumer preferences can be discovered applying forms to identify the individual and collective Willingness to Pay (WTP) or Willingness to Accept (WTA) for the use or preservation of a natural good. According to the research focus, the respondent would be asked about how much he would be willing to accept for giving up any environmental service.

Due to its hypothetical character, flexibility is one of CVM great virtues. Its implementation is feasible for a wide variety of environmental problems, being particularly useful and adaptable for intangible goods and services, and it is the only method that can be used in many situations. CVM enables to capture option values in the presence of uncertainty and to value goods not yet available (BORGER, 1995).

Pugas (2006, p. 37) comments that "the scenario is an essential part in the process of capturing the WTP of interviewee, but it must contain a very detailed description of the assessed good". The lack of a properly outlined scenario, which is not consistent with the effectively researched situation and the context to be effectively researched not specified, may cause answers not corresponding to reality.

Stampe, Tocchetto and Florissi (2008) explain that the contingent valuation method differs from other methods of economic valuation because it works with data from interviewees' responses about what they would do in hypothetical situations.

Motta (1997, p. 32) states that interest in the CVM has grown a lot over the last decade. "Among other reasons, the improvement of opinion polls stands out and especially the fact that it is the only technique with the potential to capture the existence value". In this respect, the CVM is able to determine the value of public goods market considering the tangible and intangible aspects, by constructing a hypothetical scenario and questions targeted to users of the good.

RESEARCH THAT USED THE CONTINGENT VALUATION METHOD

Chang (2008) applied the contingent valuation method to measure the economic value of public libraries. Furthermore, he carried out a "cost-benefit analysis as a tool to determine if the benefit of public libraries overcomes the cost incurred in providing services" (CHANG, 2008, p. 71) This author sent five hundred questionnaires and obtained return of three hundred ninety-nine, representing 80% of the sample. He found that the total benefit of the public library had a cost of US$ 1,138,986,352.

Terashita et al. (2010) carried out a study aimed to measure the willingness of residents to pay for hospital services in the city of Hokkaido, Japan, using the contingent valuation method. From the selected sample, 83% of valid responses were obtained. The WTP of residents totaled up 129,586,000 yen, which is equal to US$ 1,439,844.

Leng and Lei (2011) applied the contingent valuation method for evaluating the *Zhangjiajie,* which is a natural property located in China. This heritage is protected by UNESCO, since 1992; it has an area of 9,516 km^2 and is very important for Chinese tourism. These authors found out an economic value of US$ 38,9 billion for *Zhangjiajie*.

In Brazil, Cirino and Lima (2008) used the CVM for getting an economic value for the Environmental Protection Area (APA) São José in Minas Gerais State. The survey obtained an average WTP R$ 13,72 (thirteen reais and seventy-two cents) excluding the votes of protest, i.e., the zeroed values concerning to the disposition to pay. The economic value of APA was R$ 8.555.838,72 (eight million, five hundred fifty-five thousand, eight hundred thirty-eight reais and seventy-two cents).

Mattos et al. (2007) applied the CVM to estimate the monetary value of the permanent preservation areas of the microbasin of the São Bartolomeu River, located in the municipality of Viçosa, Minas Gerais State. They identified a monthly WTP of R$ 27,98 (twenty-seven reais and ninety-eight cents) and a monetary value of R$ 3.863.926,08 (three million,

eight hundred sixty-three thousand, nine hundred twenty-six reais, eight cents) for the environmental good or R$ 3.616,52 (three thousand, six hundred and sixteen reais, fifty-two cents)/ha/year for the restoration and preservation of the permanent preservation area.

METHODOLOGY

This study was classified as exploratory; according to Gil (2007, p. 41), "exploratory research aims to provide greater familiarity with the problem for making it more explicit or for building hypothesis with the main objective to improve or discover insights". This study was also characterized as an explanation, because it had the primary interest to identify factors that determined and/or contributed to the occurrence of events, in addition to record, analyze, and interpret the studied phenomena. A survey in books, articles, magazines, and other periodicals, whether physical or electronic, was also performed to achieve an able theoretical tool to take considerations on the proposed theme.

Aiming to achieve the proposed objective, empirical research based on structured interviews driven by forms was carried out with the primary focus to determine the Willingness to Pay (WTP) of respondents and to identify the socioeconomic characteristics of the users of Tiradentes Square as sex, age, average income.

Marconi and Lakatos (2009, p. 199) highlight that a standardized or structured interview "is one in which the interviewer follows a predetermined script; the questions to individual are predetermined". Structured interviews were chosen because they ensure to the interviewer that the questions were made and they were clearly understood by respondents.

This study was based on an infinite population; the population of Teófilo Otoni for 2009 was 130,517 inhabitants (IBGE-Instituto Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics), 2010). Error of 3.5%, with p (0.50), q (0.50), and two standard deviations were adopted, representing 95% confidence level, totaling eight hundred and eleven forms applied from June to August, 2011.

The WTP was estimated by Ordinary Least method (OLS) and Logit Model. The equations defined for the OLS and Logit Model, respectively, are the following:

$$WTP = \beta_0 + \beta_1 A + \beta_2 SX + \beta_3 Edc + \beta_4 PI + \beta_5 FI + \beta_6 FE + \beta_7 HC + \beta_8 LE + \beta_9 TE + \beta_{10} EdE + \beta_{11} WE + \beta_{12} EnE + \beta_{13} HE + \varepsilon_i$$

in which:
WTP = Willingness to Pay
A = Age;
SX = Sex (dummy, 0 for man and 1 for woman);
Edc = education;
PI = Personal income;
FI = family income;
FE = Food expenditures;
HC = Housing costs;
LE = Leisure expenditures;

TE = Transportation expenditures;
EdE = Education expenditures;
WE = Water expenditures;
EnE = Energy expenditures; and
HE = Health expenditures.

$$WTP = \beta_0 + \beta_1 A + \beta_2 SX + \beta_3 Edc + \beta_4 PersI + \beta_5 FI + \beta_6 HE + \beta_7 LE + \beta_8 TE + \beta_9 EdE + \beta_{10} WE + \beta_{11} EnE + \beta_{12} TelE + \beta_{13} HE + \varepsilon_i$$

in which:
WTP = Willingness to Pay (dummy, 1 for those ones with WTP and 0, otherwise);
PersI = personal income;
FI = family income;
HE = Housing expenditures (dummy, 1 - individual spends on housing; 0, otherwise);
LE = Leisure expenditures (*dummy*, 1 - individual spends on leisure; 0, otherwise);
TE = Transportation expenditures (dummy, 1 - individual spends in transport; 0, otherwise);
EdE = Education expenditures (dummy, 1 - individual spends on education, 0, otherwise);
WE = Water expenditures;
EnE = Energy Expenditures (dummy, 1 - individual spends with energy, 0, otherwise);
TelE = Telephone expenditures (dummy, 1 - individual spends with telephone, 0, otherwise); and
HE = Health expenditures (dummy, 1 - individual spends on health; 0, otherwise).

RESULTS AND DISCUSSION

Characterization of Respondents and Analysis of Willingness to Pay

Table 1 shows the sex of respondents: four hundred and two men, representing 49.6% of the sample; and four hundred and nine women, representing 50.4% of the sample. According to IBGE (2012), in Teófilo Otoni, in 2010, the population were 48% male and 52% were female. Results regarding to respondents' sex in the sample are similar to IBGE data, keeping almost the same proportion.

Three hundred and forty-eight people representing 43% of respondents have a monthly income from R$ 560,01 (five hundred and sixty reais and one cent) up to R$ 1.000,00 (thousand reais); from this total, one hundred ninety-five people are men (56%) and one hundred fifty-three are women (44%). It was also found that only 0.02% (sixteen people) have a monthly income exceeding R$ 4.000,00 (four thousand reais), and five hundred and one people (61.7%) have personal income of R$ 1.000,00 (thousand reais).

Sex	Income Personal Monthly						Total
	Up to R$ 560,00	From R$ 560,01 to R$ 1.000,00	From R$ 1.000,01 to R$ 2.000,00	From R$ 2.001,00 to R$ 3.000,00	From R$ 3.000,01 to R$ 4.000,00	Over R$ 4.000,01 R=Reais, Brazilian currency	
Male	78	195	85	32	8	4	402
Female	75	153	82	59	28	12	409
Total	153	348	167	91	36	16	811

Table 1 - Respondents' sex versus personal monthly income
Source: Survey data

The respondents' personal income was compared with education for trying to identify a possible explanation on the fact that 43% of interviewees had income between R$ 560,01 (five hundred reais and one cent) to R $ 1.000,00 (thousand reais). Table 2 shows that hundred and nineteen people (34.1%) have completed high school among the three hundred forty-eight respondents. In contrast, only twelve people (75%) receive over R$ 4.000,00 (four thousand reais) because they have a college degree.

Table 2 - Data crossing between education and respondents' personal income

Education	Income Personal Monthly						Total
	Up to R$ 560,00	From R$ 560,01 to R$ 1.000,00	From R$ 1.000,01 to R$ 2.000,00	From R$ 2.001,00 to R$ 3.000,00	From R$ 3.000,01 to R$ 4.000,00	Over R$ 4.000,01 (R=Reais, Brazilian currency)	
Elementary and Middle School	2	4	0	0	0	0	6
Hight School	23	119	51	24	2	0	219
Incomplete Hight School	48	52	9	8	0	0	117
College	7	76	71	30	8	12	204
Incomplete College	72	97	36	25	12	4	246
Specialization Course (post-graduation)	0	0	1	4	6	0	11
Master's Degree	0	0	0	0	8	0	8
Total	152	348	168	91	36	16	811

Source: Survey data

Table 3 shows the comparison between the monthly personal income variable and the number of people living in the respondents' house. It is noted that 69% (two hundred and forty people) of respondents have four to five people living in their homes, while the monthly personal income ranged from R$ 560,01 to $ 1.000,00 (five hundred reais and one cent to thousand reais).

Table 3 - Monthly Personal Income versus number of residents

Monthly Personal Income	Number of people living in the respondents' house							Total
	1	2	3	4	5	6	7	
Up to R$ 560,00	1	19	21	63	19	23	6	152
From R$ 560,01 to R$ 1.000,00	0	41	54	103	137	13	0	348
From R$ 1.000,01 to R$ 2.000,00	6	18	54	46	35	9	0	168
From R$ 2.001,00 to R$ 3.000,00	0	5	19	58	7	2	0	91
From R$ 3.000,01 to R$ 4.000,00	0	0	19	7	6	4	0	36
Over R$ 4.000,01 (R=Reais, Brazilian currency)	0	0	8	0	8	0	0	16
Total	7	83	175	277	212	51	6	811

Source: Survey data

Table 4 shows the comparison between the monthly family income with the number of people residing in the respondents' houses, in which six hundred and fifteen people (75.8%) stated that the average family income ranges from R$ 1.000,01 to R$ 3.000,00 (from thousand reais and one cent to three thousand reais). Among the six hundred and fifteen interviewed people, who are in the mentioned income, four hundred two people have four to five people living in their homes. By analyzing the family income, it is possible to identify a *per capita* income around R$ 250,00 (two hundred and fifty reais) for families with four people, considering a family income of R$ 1.000,01 (thousand reais and one cent) and around R$ 600,00 (six hundred reais) for families with five people, considering an family income of R$ 3.000,00 (three thousand reais).

Table 4 - Data crossing between family income and number of resident people

Monthly Personal Income	Number of resident people in the respondents' house							Total
	1	2	3	4	5	6	7	
Up to R$ 560,00	4	0	0	0	0	0	0	4
From R$ 560,01 to R$ 1.000,00	0	17	15	8	5	6	3	54
From R$ 1.000,01 to R$ 2.000,00	3	7	88	101	96	33	0	328
From R$ 2.001,00 to R$ 3.000,00	0	37	37	121	84	5	3	287
From R$ 3.000,01 to R$ 4.000,00	0	22	17	32	18	3	0	92
Over R$ 4.000,01 (R=Reais, Brazilian currency)	0	0	18	15	9	4	0	46
Total	7	83	175	277	212	51	6	811

Source: Survey data

It is noted that Tiradentes Square has a visitation frequency by 49.5% (four hundred and two people) men and 50.5% (four hundred and nine people) women. Among the respondents, 46.5% (three hundred seventy-seven people) visit the square at least once a day. This visitation does not necessarily mean that people are going to the square to enjoy the atmosphere; the square is located in the geographical and commercial center of Teófilo Otoni; people must necessarily pass through the square, thus, it justifies the large number of visitation per day.

Table 5 - Sex versus visitation frequency to Tiradentes Square

Sex	Visitation frequency to the Square									Total
	1x/ day	+ 1x/ day	1x/ week	+ 1x/ week	1x every 15 days	+1x every 15 days	1x/ quarter	1x +/quarter	1x/ year	
Masculino	185	44	63	33	36	25	4	9	3	402
Feminino	192	24	72	48	40	19	1	5	8	409
Total	377	68	135	81	76	44	5	14	11	811

Source: Survey data

This study aimed to identify by the sample which action could be considered for improvement and that could bring major benefits to the population. Based on these considerations, 72% of respondents (five hundred eighty-seven people) said that there is a

great need for the square's maintenance, 18% (one hundred forty-seven people) said it is necessary to perform more cultural events, and, approximately, 10% (seventy-seven people) stated the public agency should promote more disclosure of the square.

Table 6 shows that women have more perception about the need for the square's maintenance, approximately, 53% (three hundred ten people) versus 47% (two hundred seventy-seven people) men, who also said there is a need to maintain the Tiradentes Square. The maintenance and improvement of Tiradentes Square is a general consensus.

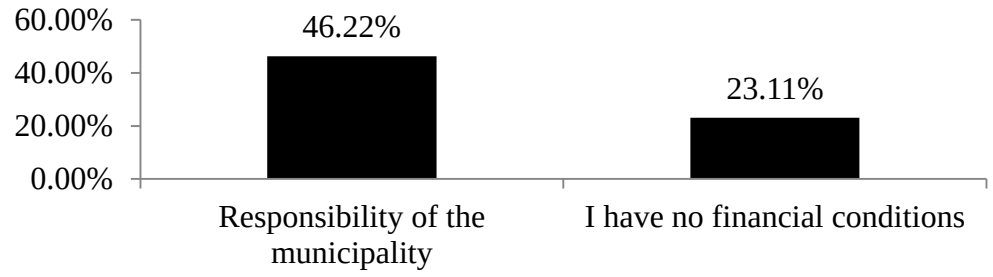
Table 6 – Data crossing between what can be improved in the Square and respondents' sex

What can be improved in the square	Sex		Total
	Male	Female	
Maintenance	277	310	587
Greater disclosure of the square	49	28	77
Cultural events promotion	76	71	147
Total	402	409	811

Source: Survey data

By the selected sample, this study aims to identify which willingness to pay for preserving Tiradentes Square and improving its maintenance to provide the population higher life quality and well-being. The WTP of respondents was obtained using form in this study with spontaneous responses. Figure 1 shows that 53.9% of respondents are not willing to contribute to Tiradentes Square preservation and for its maintenance. Only 46.10% of the respondents have some WTP that is ranging from R$ 0,01 to R$ 200,00 (one cent to two hundred reais)

Figure 1. Respondents with and without willingness to pay for maintenance of Tiradentes Square



Source: Survey data

Some respondents had a few reasons for expressing unwillingness to pay. Figure 2 shows that 46.22% assigned responsibility to City Hall, 23.11% reported not having a financial position to contribute, 4.58% said they have no interest in the preservation of Tiradentes Square, and 26.09% stated that they already pay many taxes.

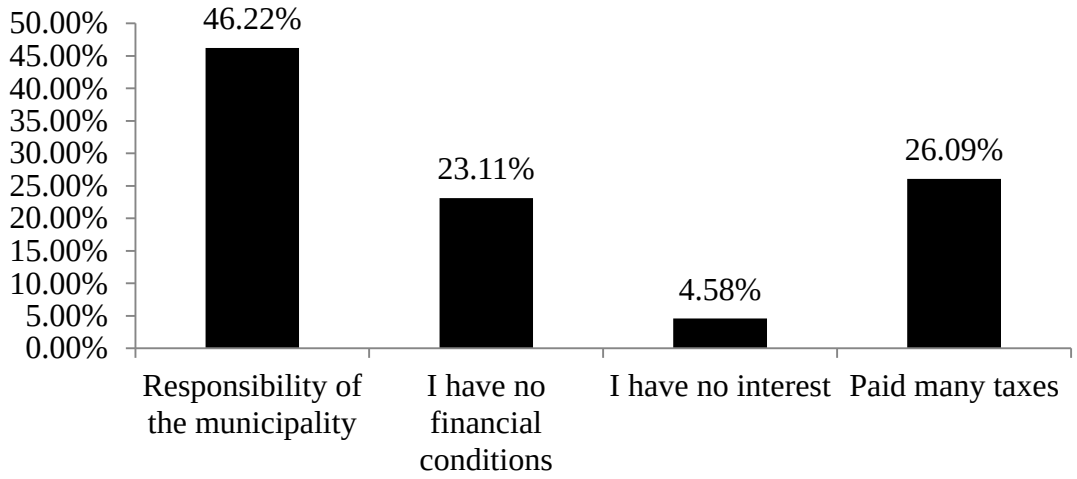


Figure 2. Reasons for unwillingness to pay
Source: Survey data

Based on the sample data, the mean WTP value of respondents is obtained by the Contingent Valuation Method, not considering the protest votes (WTP equal to 0) equivalent to R$ 13,81 (thirteen reais and eighty-one cents).

Calculation of Annual Total Willingness to Pay was performed using the formula:

$$TWTP = \left(\sum AWTP\ x\ \left(\frac{ni}{n}\right) x\ pop.city\right) x\ 12$$

in which:

- TWTP: Total Willingness to Pay;
- AWTP: Average Willingness to Pay;
- ni: Number of respondents willing to pay; and
- N: Total number of respondents.

Taking into consideration the average WTP value and based on the IBGE demographic sense (2010), which shows the population of Teófilo Otoni corresponding to 130,517 inhabitants, this formula is presented:

$$TWTP = \left(R\$\ 13{,}81\ x\ \left(\frac{374}{811}\right)\ x\ 130.517\right)\ x\ 12 = R\$\ 9.974.537{,}22$$

Therefore, the annual population WTP is equal to R$ 9.974.537,22 (nine million, nine hundred seventy-four thousand, five hundred thirty-seven reais and twenty-two cents). Thus, it is possible to state that 46.10% of the sample who are willing to contribute intend to offer high values. So, it is noticed that the value that the population is willing to contribute assigns significant value to Tiradentes Square.

To estimate the willingness to pay, the Ordinary Least Squares method (OLS) was used. For confirming the multicollinearity existence, it is important to emphasize that the Variance Inflation Factor (VIF) test was applied on the estimated model according to Gujarati (2006); and the result shows that there is no evidence of multicollinearity. Among the tested models,

the linear model showed the best fit; and the most significant variables were: *Age, Family Income, Leisure Expenditures, Education Expenditures, Water Expenditures, and Energy Expenditures* (Table 7). By the White test, the model is homoscedastic at 5% significance level.

Regression analysis (Table 7) indicates that the *Age* variable showed a reduction of R$ 0,09 (nine cents of real) in the individual WTP, at each more year in the respondent's age. The sign of the *Family Income* variable was the opposite of the expected one: an increase of R$ 1.000,00 (thousand reais) in family income brings reduction in R$ 1,87 (a real eighty-seven cents) on the individual WTP. It was expected that the willingness to pay would increase due to existence of more resources. The sign of the *Leisure expenditures* variable was also opposed to the expected one: it was expected that the WTP for the preservation of the square would be larger in relation to the same spent on leisure; however, there was an increase of R$ 1.000,00 (thousand reais) on leisure expenditures and decrease in WTP of R$ 27,42 (twenty-seven reais and forty-two cents. The sign of the *Education* variable was as expected: the higher respondents' education, the greater the awareness of the preservation importance. The increase in education expenditures in R$ 1.000,00 (thousand reais) increases the WTP in R$ 34,79 (thirty-four reais and seventy-nine cents). The sign of the *Water Expenditures* variable was as expected: WTP reduces with the water bill increasing, i.e., if the water bills increase by R$ 100,00 (hundred reais), the willingness to pay tends to decrease in R$ 6,15 (six reais and fifteen cents). Increasing in the electricity bill around R$ 100,00 (hundred reais) increases the WTP in R$ 3,80 (three reais and eighty cents).

Table 7 - Results of the estimated regression model

Variables	Coefficient		p-value
Age	-0,0961757		0.024**
Sex	0.7292733		0.599
Education	0.0674867		0.898
Personal Income	0.0009756		0.343
Family Income	-0.0018746		0.019**
Food Expenditures	-0.0029772		0.531
Housing Expenditures	0.0001169		0.967
Leisure Expenditures	-0.0274286		0.003*
Transportation Expenditures	0.0094264		0.162
Education Expenditures	0.0347912		0.000*
Water Expenditures	-0.0615714		0.000*
Energy Expenditures	0.0388292		0.004*
Telephone Expenditures	-0.0122906		0.198
Health Expenditures	-0.0120188		0.105
Constant	15.25103		0.000
N = 811	R^2 = 9,07%	α = 5%	P-value = 0.0000

Note: * significant at 1%; ** significant at 5%; All other variables showed no significant statistical impact.
Source: Survey data

Table 8 shows the estimation by Logit model aimed to identify the odds ratio of the respondents to contribute to the improvement of Tiradentes Square.

Table 8 - Marginal effect of estimated LOGIT regression model

Variables	Coefficient	p-value
Age	-0.0023914	0.647
Sex	0.0780414	0.624
Education	0.0009343	0.988
Personal Income	-0.1921129	0.406
Family Income	0.0532225	0.767
Food Expenditures	-0.4489180	0.005*
Housing Expenditures	-0.1341433	0.493
Leisure Expenditures	-0.4045142	0.036**
Transportation Expenditures	0.1337658	0.514
Education Expenditures	0.0034275	0.087
Water Expenditures	0.0003257	0.842
Energy Expenditures	0.0003257	0.000*
Telephone Expenditures	-1.1935000	0.000*
Health Expenditures	0.9889353	0.252
N = 811	*Pseud-R2* = 6,84% α = 5%	Prob > Chi^2= 0,0000

Note: ***significant at 1%; **significant at 5%; *significant at 10%; ^{NS}not significant. ^{1}/Dummies variables
Source: Search data.

Table 8 shows that only the variables: *Housing Expenditures, Transportation Expenditures, Water Expenditures, Family Income, Telephone Expenditures, and Health Expenditures* were significant in explaining the Willingness to Pay. Thus, it was deduced that the probability of the respondent who has *Housing Expenditures* tends to decline in 13.14 percentage points, and all other variables were maintained constant. Likewise, because respondent has *Transportation Expenditures*, the likelihood of contributing to improving the Tiradentes Square decreases in 10.61 percentage points. Regarding the *Telephone Expenditures*, the probability tends to decrease in 8.39 percentage points, and all other variables were maintained constant. The individual *Health Expenditures* reduces the likelihood of contributing to improving the Tiradentes Square in 31.71 percentage points. By increasing the *Family Income*, the likelihood of respondents to contribute to improving the Tiradentes Square increases in 0.01 percentage points.

Analyzing the marginal effect of all respondents, the odds ratio for contributing to the improvement and preservation of Tiradentes Square at the midpoint is 54.2%. In addition, the estimated model had a low number of successes on the estimation of the event occurrence, i.e., it hit about 65.5%.

MAINTENANCE COSTS FOR TIRADENTES SQUARE

When analyzing the trial balance of public expenditures of Teófilo Otoni, it is verified that there is no detailed discrimination of maintenance costs for the Tiradentes Square. The expenditures for maintaining all the city squares are allocated in a single account, which affects the identification of the maintenance costs for each square (Table 9).

By failure to disclose clear information on how the budgeted public funds are being effectively used, the municipal government violates Article 1 of the Supplementary Law n. 131, stating that transparency will be ensured through the "release to the full knowledge and

monitoring by society, in real time, detailed information on the budgetary and financial execution in electronic devices of public access".

Table 9 - Trial Balance of Expenditures by Budget Allocation - Maintenance of Squares, Parks, and Gardens

December	Budgeted	Voided	Credits	Committed
Hiring by Fixed Term	R$ 30.000,00	R$ 0,00	R$ 0,00	R$ 0,00
Remuneration and Fixed Benefits - Civilian Personnel	R$ 135.000,00	R$ 60.000,00	R$ 0,00	R$ 58.660,68
Consumption material	R$ 60.000,00	R$ 20.000,00	R$ 0,00	R$ 10.078,18
Other Third Party Services - Individual	R$2.000,00	R$ 0,00	R$ 0,00	R$ 0,00
Other Third Party Services - Legal Entity	R$5.000,00	R$ 0,00	R$ 8.000,00	R$ 7.567,00
Permanent Materials Equipment	R$5.000,00	R$ 0,00	R$ 0,00	R$ 0,00
Total	R$ 237.000,00	R$ 80.000,00	R$ 8.000,00	R$ 88.694,14

Source: Trial Balance of Expenditures of the City Hall of Teófilo Otoni

Checking the Municipal Public Budget for squares, parks, and gardens maintenance, it is realized that there was a significant budget provision, equivalent to R$ 237.000,00 (two hundred and thirty-seven thousand reais); however, this annual budget was reworked and the City Hall canceled R$ 80.000,00 (eighty thousand reais) planned to be spent: (a) on salaries and fixed benefits, (R$ 60.000,00 - sixty thousand reais) and (b) consumption material, (R$ 20,000.00 - twenty thousand reais). This practice is perfectly allowed if expressly authorized in the Annual Budget Law.

The reality is that the total expenditure during 2010 with the maintenance of all squares in the town is small, requiring more explanation of what is paid for each square and especially to explain why only 56.49% was spent from the planned amount to be used during the year, since there is an expenditure planning that comprises initially R$ 237.000,00 (two hundred and thirty-seven thousand reais) in such costs; and that the maintenance lack is notorious not only in Tiradentes Square as in many other squares in the town.

Regarding the proposed municipal budget, the only expenses that can easily be evidenced are the wage expenditures, but other resources allocation lack of additional information. Analyzing this budget allocation, it is possible to realize the great lack of planning, which begins in the Annual Budget Law (ABL) when providing a budget of R$ 135.000,00 (one hundred and thirty-five thousand reais) to be used in salaries and fixed benefits - civilian personnel - and other R$ 30.000,00 (thirty thousand reais) on hiring personnel for a fixed term, which represent 70% of total for this budget allocation.

It is true that at the end of the year, the City Hall disbursed 36% for personnel expenditures; however, this study intended to show the total lack of technical support for budget planning, because it does not respect the precepts of Article 19, section III of the Fiscal Responsibility Law (FRL), by which, States Member of the Federation shall not exceed 60% of Current Net Revenue on active and inactive personnel expenditures in each year of assessment. Therefore, proper planning should endorse the Municipality to fulfill this provision and for not allocating resources higher than the budget, consequently becoming impossible the resources allocation in other areas in which they could actually be used.

Another point to be remembered is the transparency of public accounts. The FRL in its Article 1, paragraph 1 assigns that the responsibility for fiscal management assumes the planned and transparent action. This is consistent with the principles of Administrative Law, the Disclosure, that states all administrative acts and facts must be public.

DISCLOSURE OF ECONOMIC VALUE OF TIRADENTES SQUARE IN THE BALANCE SHEETS

Regarding the Balance Sheet, the City Hall of Teófilo Otoni has not released data on what actually makes up the heritage of the Municipality. According to FRL, the transparency instruments in fiscal management are the plans, budgets, and laws of budgetary directives, Accountability Reports and its prior opinion, the Summary Budget Execution Report and Fiscal Management Report, and the simplified versions of these documents. Thus, the non-disclosure of data sheet does not imply the law violation, since the City Hall is not required to do it. Thus, the disclosure of the economic value of Tiradentes Square in the Balance Sheet of the **City Hall of Teófilo Otoni will be demonstrated in an exemplified manner**. Supposing that the Municipality has not registered the economic value of Tiradentes Square in its Balance Sheet, the release should be made with a debit to the account of Tiradentes Square which appear in the Balance Sheet and a credit to Valuation and Gains on Assets that will be shown in the Statement of Changes in Net Assets (Table 10).

Table 10 - Accounting release of the value of Tiradentes Square

Balance Sheet - Permanent Assets Tiradentes Square		Statement of Changes in Net Assets - Valuation and Gains on assets	
R$ 9.974.537,22			R$ 9.974.537,22

Source: Search Data

Note that if there is an asset value for the Tiradentes Square that is already registered on the Balance Sheet of the City Hall of Teófilo Otoni, the release should be done according to the same systematic of debit and credit presented above; however, the market value found for this square should be deducted from the pre-existing value shown in Table 11 as "X".

Table 11 - Accounting release of the value of Tiradentes Square assuming a pre-existing value

Balance Sheet - Permanent Assets Tiradentes Square		Statement of Changes in Net Assets - Valuation and Gains on assets	
R$ 9.974.537,22 - X			R$ 9.974.537,22 - X

Source: Search Data

FINAL THOUGHTS

The main objective of this study was to economically measure the Tiradentes Square of Teófilo Otoni, considering its tangible and intangible aspects. Based on resulting data after

tabulating the forms, the willingness to pay of the square's users was estimated. These data enable offering to the public manager a mechanism to support the decision making related to resources allocation for preserving the public property.

So, a WTP of R$ 13.81 (thirteen reais and eighty-one cents) was reached employing the Contingent Valuation Method. The annual value assigned to the square was equivalent to R$ 9.974.537,22 (nine million, nine hundred seventy-four thousand, five hundred thirty-seven reais and twenty-two cents) excluding the protest votes.

The economic analysis is an important tool to assist public management in the decision making process and, thus, should be incorporated into the management process. As the costs and benefits are identified and, then, can be transformed into monetary values, they result in estimated information in the management context. Therefore, tangible and intangible values of natural resources must be taking into account.

Public policies for the management of natural resources should ensure the sustainable environmental use. Thus, it is essential that public organizations are technically supported to meet these purposes with a view toward the public interest for using public resources properly and conscientiously.

The plan will provide technical support to fiscal management; however, the act of planning especially on environmental management needs to be based on scientific parameters to identify the economic value of natural resources. However, it is known that the City Hall of Teófilo Otoni is devoid of these parameters. Thus, further studies on the subject will be of great relevance.

Finally, it was noted that, at the sample midpoint, the odds ratio of respondents to contribute to some kind of action to preserve and/or for maintenance of Tiradentes Square was approximately 54% and the model hit 65.5% of projections. Therefore, in an attempt to reconcile the proposed study with the environmental problems, the achieved results intended to contribute to the expansion of the debate, not only about environmental issues, but mainly for attracting the attention on new methodologies for environmental public management.

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