Economic valuation of Martins Dourado Square by contingent assessment method

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ABSTRACT

Objective of the study - To economically measure Martins Dourado Square, located in Fortaleza (CE), by the Contingent Valuation Method (MVC).

Methodology/Approach - This is an exploratory research, of a quantitative nature and carried out by means of a survey.

Originality / Relevance -The study disseminates the informational content of environmental valuation, given that this is one of the relevant aspects for the preservation of the environment.

Main results - The value of the monthly and individual DAP of the users of the square was R$25,08 and the total annual value attributed to the appeal was R$3.981.700,80. Most of the respondents were male, in the 21-35 age group, with a graduate degree, living in the Cocó neighborhood, with an average income above R$5.622,02, and who visited the square due to the benefits offered by their area . There was an association between DAP and income and schooling variables. In addition, it was found that variables such as gender, age, utility 1, utility 4 and income brackets influence the probability of the individual having PAD.

Theoretical/methodological contributions - The results of the study have implications for the understanding of obtaining a reference value for a public asset - environmental asset - and provide subsidies to public and private agents for a more efficient management of the species' resources.

Conclusion - Martins Dourado Square was considered a good that contributes significantly to increase the quality of life of the surrounding community, and that there is a concern to keep it conserved, due to the high proportion of users willing to contribute.

Keywords: Economic valuation, Contingent Valuation Method, willingness to pay.

Cite as:

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Valoração econômica da Praça Martins Dourado pelo método de valoração contingente

RESUMO

Objetivo do estudo - Mensurar economicamente a Praça Martins Dourado, localizada em Fortaleza (CE), pelo Método de Valoração Contingente (MVC).

Metodologia/Abordagem - Trata-se de uma pesquisa exploratória, de natureza quantitativa e realizada por meio de levantamento (*survey*).

Originalidade/Relevância – O estudo dissemina o conteúdo informacional de valoração ambiental, haja vista ser esse um dos aspectos relevantes para a preservação do meio ambiente.

Principais resultados – O valor da DAP mensal e individual dos usuários da praça foi de R$25,08 e o valor anual total atribuído ao recurso foi de R$3.981.700,80. A maioria dos respondentes foram do gênero masculino, na faixa etária de 21 a 35 anos, com pós-graduação, residentes no bairro Cocó, com renda média acima de R$5.622,02, e que visitavam a praça devido aos benefícios ofertados por sua área. Verificou-se associação entre a DAP e as variáveis renda e escolaridade. Além disto, constatou-se que variáveis como gênero, idade, utilidade 1, utilidade 4 e faixas de rendas influenciam a probabilidade de o indivíduo apresentar DAP.

Contribuições teóricas/metodológicas – Os resultados do estudo trazem implicações para a compreensão na obtenção de um valor de referência a um bem público – ativo ambiental – e fornecem subsídios aos agentes públicos e privados para uma gestão mais eficaz de recursos da espécie.

Conclusão - A Praça Martins Dourado foi considerada um bem que contribui de modo significativo para aumentar a qualidade de vida da comunidade de seu entorno, e que há uma preocupação em mantê-la conservada, devido à alta proporção de usuários dispostos a contribuir.

Palavras-chave: Valoração econômica. Método de Valoração Contingente. Disposição a pagar.

Valoración económica de la Plaza *Martins Dourado* por el método de valoración contingente

RESUMEN

Objetivo del estudio – Cuantificar económicamente la Plaza *Martins Dourado*, ubicada en *Fortaleza* (*CE*), por el Método de Valoración Contingente (MVC).

Metodología/Enfoque – Se trata de una investigación exploratoria, de naturaleza cuantitativa y realizada por medio de levantamiento (*survey*).

Originalidad/Relevancia – El estudio disemina el contenido informativo de valoración ambiental, teniendo en cuenta de que ese es un de los aspectos relevantes para la preservación del medioambiente.

Principales resultados – El valor de la DAP mensual e individual de los usuarios de la plaza fue de R$25,08 y el valor anual total asignado al recurso fue de R$3.981.700,80. La mayoría de los encuestados fueron del género masculino, en el grupo de edad de 21 a 35 años, con posgrado, residentes en el barrio *Cocó*, con una renta promedio por encima de R$5.622,02, y que visitaban

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la plaza debido a los beneficios ofrecidos por su área. Se verificó asociación entre la DAP y las variables renta y escolaridad. Además, se constató que variables como género, edad, utilidad 1, utilidad 4 y niveles de renta influencian la probabilidad del individuo presentar DAP.

Contribuciones teóricas/metodológicas – Los resultados del estudio traen implicaciones para la comprensión en la obtención de un valor de referencia a un bien público - activo ambiental - y ofrecen subsidios a los agentes públicos y privados para una gestión más eficaz de recursos de la especie.

Conclusión – La Plaza *Martins Dourado* fue considerada un bien que contribuye de modo significativo para aumentar la calidad de vida de la comunidad de su entorno, y que hay una preocupación en mantenerla conservada, debido a la alta proporción de usuarios dispuestos a contribuir.

Palabras clave: Valoración económica. Método de Valoración Contingente. Disposición a pagar.

1 Introduction

The accelerated growth of the population and industrial activities, resulting from the Industrial Revolution, contributed to intensify man's involvement in the environment. Changes in ecosystems have been observed, for example, in the reduction of available environmental assets, climate change and the growing generation of waste and environmental disasters. Due to the intense use of environmental resources, there is a concern about the correlation between economic development and ecological preservation (Silveira, Cirino, & Prado, 2013).

However, the society has been modifying its consumption patterns, to introduce environmental responsibility in its market decisions, which has generated the growth of the use of biodegradable products and recyclable packaging. Companies, in particular, have been inserting environmental issues into their priority lists, aiming not only to meet the legislation, but also to retain customers, seeking eco-friendly companies. Governments have reacted similarly, with the approval of laws and the establishment of pollution monitoring networks, to protect cities and their ecosystems (Thomas & Callan, 2010).

Art. 225 of the Constitution of the Federative Republic of Brazil (1988) is about the environment as follows:

> Art. 225. All are entitled to the environmentally balanced environment, well of common use of the people and essential to the sound quality of life, imposing on the Public Power and the collectivity the duty to defend it and preserve it for the present and future generations.

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According to Fiorillo (2013), any good can become an environmental good, since it is structured by the sum of two requirements, namely: being of common use of the people and essential to the sound quality of life, in order to guarantee the dignity of the human person.

Given its great importance, environmental goods and services can be translated into economic benefits, as their externalities influence the population's quality of life. The fact that these resources are not inserted in a real market hinders the establishment of monetary values to the benefits generated by them. Among the alternatives used to fulfill this difficulty, we highlight the application of methods of economic valuation, which capture and attribute value to the goods and services offered by the environment (Corbeti, Alvim, & Days, 2010).

Fonseca, Lima, Rezende, Santos and Nazareth (2013) affirm that the Contingent Valuation Method (MVC) has been the most widely used, because it is flexible and able to estimate the value of a good as a whole.

In View of the above, the public squares – type of environmental good – are leisure areas used for social welfare, goods of common use of the people and essential for the guarantee of more quality of life, functioning as living spaces since the ancient civilization Greek. According to Dorigo and Lamano-Ferreira (2015, p. 31), "Urban green areas play an important role in improving the environment and offering spaces for leisure and recreation, as well as contributing to urban sustainability." Thus, the conservation and maintenance of such assets becomes essential in order to contribute to the increase of the quality of life of its users.

In this sense, this article proposes to answer the following question: What is the economic value of Martins Dourado Square according to the Contingent Valuation Method (MVC)? The general objective of the study is to measure the economic value of Martins Dourado Square by means of MVC, and as specific objectives: i) to outline the profiles of the respondents of the research; (ii) Investigate the association between the study variables and the willingness to pay for the conservation and maintenance of the square; and III) Verify the willingness to pay of the participants.

Located in the neighborhood Poop, in Fortaleza (CE), Martins Dourado Square was chosen for study because it is a public street that offers various goods and services to the community of its surroundings. Nowadays It is considered one of the nicest squares in the city, and welcomes visitors also from several other neighborhoods.

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In this context, the study is justified by the need to disseminate the informational content of environmental valuation, since this is one of the relevant aspects for the preservation of the environment. The research brings contributions to society and public and private managers, since they will be aware of the economic value of a collective asset, which is part of the artificial environment, so that they can contribute to its maintenance and cbonservation. Thus, aligned with the recommendations of Sousa and Mota (2006), the results obtained will support the process of public and social management of the square object of study and other environmental assets destined for leisure and recreation.

2 Theoretical framework

2.1 Economic valuation of environmental resources

Some techniques were developed in an attempt to enable the estimation of values appropriate to the goods and services available in the environment, aiming to subsidize the adoption of measures and formulation of policies that seek the maintenance and conservation of environment coupled with human and economic needs.

Camphora and May (2006) affirm that valuation studies try to translate, in economic terms, the values associated with sustaining life, and the goods and services offered by environmental resources for recreational, cultural, aesthetic, spiritual and symbolic of human society.

The economic valuation of a good considers all its attributes, related or not to its use. In the literature, it is common to dismember the economic value of the environmental resource in value of use and value of non-use (Martins, 2002; Motta, 1998).

Maia, Romeiro and Reydon (2004) teach that the flow of environmental goods and services generated by consumption defines the attributes related to their use value, while the attributes related to the existence of the resource itself, without any association with its use present or future, configure their non-use value or the existence value of the environmental resource.

The usage value can be fractioned in direct usage value, indirect usage value, and option value. The direct usage value occurs when there is direct appropriation of the resource; The indirect refers to the benefit generated by the ecosystem functions; And the option, when individuals intend to consume, directly or indirectly, the environmental

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good in the near future, and whose preservation can be threatened. The value of non-use, or existence, is dissociated from the use, and refers to a moral, cultural, ethical or altruistic position in relation to the rights of the existence of non-human species or preservation of other natural resources (Cunha, 2008; Maia et al., 2004; Motta, 1998; Sousa & Mota, 2006).

The methods used to valuate environmental goods and services can be divided into indirect (or preferably revealed) and direct (Benitez, 2005). Indirect methods use the available market information about resource usage, to derive its value, while direct methods use hypothetical market information. Among the commonly used indirect, the Hedonic Pricing Method (MPH) and the Travel Cost Method (MCV) stand out. Among the direct ones, MVC is considered the main analytical tool to estimate the economic value of environmental goods and services that do not have market value (Martins, 2002; Obara, 1999).

In an attempt to quantify, in monetary terms, the benefits of a well not inserted in the real market, the present study of Martins Dourado Square was performed using MVC.

2.2 Contingent Valuation Method (MVC): Previous empirical studies

The first study involving MVC was performed by Davis (1963), who sought to value the benefits generated by recreational use of a natural area, by applying questionnaires to 121 hunters and vacationers from a forest in the United States.

Maia et al. (2004) affirm that the use of MVC was recognized as new studies improved the technique and provided bases for validating the results, passing the method to be accepted by several national and foreign bodies and used for evaluating projects of great environmental impact.

MVC is characterized by distinct degrees of preference or taste for different goods or services that society can enjoy, and this manifests itself when people go to the market and pay specific sums for them; That is, when acquiring them, they express their Willingness to Pay (DAP) (Nogueira, Medeiros, & Arruda, 2000). To reveal such preferences, MVC uses direct interrogation to people, through questionnaires, seeking to capture DAP, in monetary terms, to guarantee a benefit, or the Willingness to Accept (DAC), to incur a curse (Pearce, 1993; Silva & Lima, 2004).

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Mitchell and Carson (1993) report that this process of gathering information should involve three stages: in the first of them, the applicator presents to the individuals, in a detailed way, the good and the hypothetical market; As a result, the questions which will serve as a basis for the determination of DAP or DAC are introduced; And, in a third moment, socioeconomic information is raised, as well as the ways of using the well analyzed. The authors also affirm that the information obtained is used in regression equations, so that the valuation function of the evaluated well is estimated.

The relevant differential of MVC, in comparison with the other methods, is that it can be applied in a broader analysis of environmental goods, being the only one able to estimate the value of non-use of environmental attributes (Benitez, 2005; Corbeti et al., 2010; Maia et al., 2004; Motta, 1998).

According to Carson, Flores and Meade (2001), the literature shows that the results obtained by studies using MVC can be valid and consistent with economic theory, provided that the questionnaires undergo a careful structuring.

According to Sousa and Mota (2006), MVC has been applied in Brazil in several studies, in areas aimed at biodiversity conservation and leisure, tourism and recreation activities. Its main purpose is to value the benefits that these assets provide to users, reveal input values and also estimate DAP to preserve natural elements or maintain their functions.

Majumdar, Deng, Zhang and Pierskalla, (2011) have estimated the DAP of tourists for the conservation of urban forests located in Savannah, Georgia (USA). The resources of the urban forests were represented by trees on the road, public squares, gardens and parks established in the city. 640 visitors participated in the research, and 478 of them presented DAP. The variables income, post-graduation level education and loyalty coefficient, which represented the fact that the respondent had already visited the space represented by urban forests, presented positive significance in relation to DAP; however, the group coefficient presented negative significance, that is, an additional member accompanying the respondent reduced the probability of willingness to pay. The mean DAP value was estimated at US$11.25 per person; considering 11 million visitors per year, the total annual value of Savannah's urban forests was estimated at approximately US$124 million.

Using MVC, Mamani, Damián, Alcalá, Lozano, Vázquez and Gonzalez (2011) estimated economically the benefits generated by the implementation of a recovery and

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conservation program for the attributes of the Molino de Flores National Park (PNMF), located 5 Km from Texcoco, in the State of Mexico (Mexico). The PNMF comprises an extension of 49.28 ha, and has beautiful places for recreation, such as camping and hiking. The study sample brought together 150 interviewees, aged over 18 years and heads of family. Among the variables analyzed-educational level, gender, in this case, the male, environmental perception regarding the degradation of the park and income-positively influence DAP, while the age, the size of the house of the interviewee and the value offered by the program of recovery of the park exert a negative influence. The proportion of willing to pay was 61%, and the mean DAP was estimated at US$24.00 per person. Considering the number of visitors per year, from about 208.000, the value of use equivalent to US$384,000.00 is obtained for the PNMF.

Dumenu (2013) used MVC to estimate the economic value of the non-commercial benefits generated by the environmental services of urban forests located in the city of Kumasi, Ghana. The study was conducted in Kwame Nkrumah campus of the University of Science and Technology (KNUST), gathering 200 interviewees, of which 178 (89%) proved to be willing to pay for the preservation and maintenance of the urban green space. Using a regression model, the existence of a positive relationship between DAP and the annual income of the interviewees was verified. Mean DAP was estimated at US $22.55/person/year. Taking into account a population of 30.810 people around the educational institution, the annual monetary value of the urban forest was estimated at US$694, 765.50.

Silveira et al. (2013) used the MVC to measure the economic value of the State Environmental Protection Area of Cachoeira das Andorinhas, in Ouro Preto (MG). The Andorinhas Waterfall is considered of great biological importance for the Atlantic Forest biome and for the conservation of the biodiversity of Minas Gerais. The socioeconomic characteristics of 723 respondents were analyzed, most of them being: male, 25 to 34 years of age, level of schooling, complete secondary education and income between one and two minimum wages. The monthly average DAP was estimated at R$ 15,43 / visitor, which, multiplied by 12, and the product obtained there also multiplied by 56.157 (number of inhabitants of the districts considered in the sample), resulted in the annual economic value of R$ 10.398,030,12.

Wakim, Magalhães, Silva and Pereira (2013) assessed the monetary value attributed to Tiradentes Square in Teófilo Otôni (MG), based on the DAP calculation of

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its visitors. 811 questionnaires were applied, with responses indicating that 53.9% were not willing to pay for their conservation. Among the justifications presented for the non-contribution, we highlight the understanding that the maintenance of the asset is the duty of the city. In the respondent population the male gender predominated, as well as an income between R$560,01 and R$1.000,00. The logit model was used to evaluate the correlation between the variables and the DAP. Only income showed a positive significance, while housing, transport, telephone and individual health expenses showed a negative effect. The monthly average DAP was estimated at R$13,81 per person, with the total annual economic value of R$9.974.537,22 being attributed to the street.

Araújo, Oliveira and Azevedo (2015) produced a study to determine the economic value of the Salitre Cave in Diamantina (MG), through MVC. Of The 126 respondents, 59 (46.8%) have expressed willingness to pay, 63 (50%) Rejected the payment hypothesis, while 4 (3.2%) Did not answer the question related to DAP. Of the 63 unwilling, 30 (47.6%) Justified understanding that the preservation of the grotto is government competence. To measure the value of DAP, the authors used a mathematical equation, estimating to the sample visitors, without taking into account the unwilling, the average monthly value of R$6,48 per person. It was attributed to the good the annual economic value equivalent to R$4.807.542,85. mathematical equation, estimating to the sample visitors, without taking into account the unwilling, the average monthly value of R$6,48 per person. It was attributed to the good he annual economic value equivalent to R$4.807.542,85.

Using MVC, Zavala, Castillo and Perez (2015) conducted a study aiming to determine the value of recreational use of three coral reefs located in the Bays of Huatulco (Bahías of Huatulco), in Oaxaca, Mexico. The 263 Tourists who responded to the questionnaire presented an average age of 31 years, educational level of 13 years and income between 13,000 and 19,000 Mexican pesos. It was verified that DAP correlated with income, educational level, previous experience of snorkeling and the level of satisfaction of the tourist in relation to coral reefs. DAP was estimated at US$48.40/tourist/month, so that, considering the number of 376,701 visitors/year, the reefs were assigned the total annual value of US$18,243,629.40. The authors concluded that the entry rate can be increased, and that the benefits of this income can be distributed equitably among the various stakeholders and involved in the tourism industry in Huatulco.

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In the study by Sántiz and Rojas (2015), MVC was used to determine the total economic value of the Lerma River, located between the metropolitan areas of La Piedad de Cabadas, Michoacán and Santa Ana Pacueco, in Guanajuato, Mexico. The interviewed sample gathered 281 families. Using the logit model, it was possible to evaluate the influence of the variables on DAP, through the SPPS software, in version 17.0. The average monthly DAP was defined in 60.62 Mexican pesos per family. By Multiplying the monthly value by 12, the annual average/family equivalent to 727.44 Mexican pesos is obtained. Thus, when considering the 6,167 families living in the study area, the total annual DAP is estimated at 4.486.122 mexican pesos.

Latinopoulos, Mallios and Latinopoulos (2016) applied MVC to analyze public support and DAP for the construction of a metropolitan park in Thessaloniki, Greece. We interviewed 600 people residing within a 10 km radius of the site under study. The authors ' proposal consisted in the implementation of a ' green tax ' which would be charged each quarter by the municipal authority, whose collection would be exclusively destined to cover the operating costs and maintenance of the park. Using several regression models, the study revealed that the families were willing to pay a mean value between 4 and 4.5 euros per bimester. Considering the total of 332,800 families residing there, a total annual value between 8 million and 9 million of euros was estimated. Local authorities, planners and managers considered that these findings constitute a valuable argument for completing the project of creating a park.

Souza, Sampaio and Carioca (2016) estimated the economic value of the Rio Cocó Park, in Fortaleza (CE), through MVC. Of The 150 questionnaires applied, 125 (83.3%) were answered by people willing to pay for the preservation of the park. Regarding the socioeconomic characteristics of the sample, schooling was directly proportional to DAP. The age range from 41 to 50 years was the highest DAP. The study used a mathematical equation to estimate DAP, finding the mean value of R$19,37 per individual/month, which, multiplied by 12, being the result also multiplied by the average annual amount of users of the equipment, generated the annual value estimated of R$1.549.600,00.

Carvalho, Fonseca and Paixão (2016) used MVC to verify the possibility of drafting a proposal for Payments for Environmental Services (PSA) for the Cabo Branco Park in João Pessoa (PB). Of The 440 respondents, 237, i.e., more than half (53.9%) presented DAP. Among the socioeconomic characteristics, the male gender predominated, the mean age was 34.8 years, and the average income of R$3.123,17. The

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authors estimated the binary logit model, and observed that, among the significant results, the variables gender, age, bid value, place of residence (in João Pessoa) and knowledge of the barrier negatively influence DAP, while income affects it positively. The average individual DAP of R$15,14/month, multiplied by 12, being the result also multiplied by the number of 791,438 inhabitants of João Pessoa, generated the total annual value of R$143.788.455,84.

Chen and Qi (2017) evaluated the recreational use of the Fuzhou National Forest Park (FNFP), located in Fuzhou, capital of Fujian province, southeastern China. The objective was to calculate the monetary value of the services rendered using MVC, in order to understand the recreational quality of the green spaces and the behaviors and preferences of the visitors. 249 visitors from the Park were interviewed in October 2015 and January 2016. The results point out that park users were willing to pay between US$1.60 and US$1.69 per entry fee, generating an aggregated value between US$6,939,738.00 and US$7,344,978.00. And that the satisfaction of the interviewees about the facilities and services of the forest park significantly influenced the value, indicating that DAP would be related to the possibility of improvements in the equipment. In addition, the authors emphasize that the findings can help to develop effective management plans to improve the forest urban parks in China.

Table 1 summarizes the aforementioned studies that used MVC to estimate the DAP of visitors to the evaluated environmental assets.

Table 1 – Application of environmental assets in Brazil and abroad

Active	Local	Year of search	Average DAP per visitor/month	Estimated annual economic value
State Environmental Protection Area of Cachoeira das Andorinhas	Ouro Preto (MG)	2010	R$15,43	R$10.398.030,12
Forests in the city of Savannah	Georgia (EUA)	2011	US$11.25	US$123,750,000.00
Molino de Flores National Park	Texcoco (México)	2011	US$24.00	US$384,000.00
Tiradentes Square	Teófilo Otôni (MG)	2011	R$13,81	R$9.974.537,22
Kwame Nkrumah Campus of the University of Science and Technology	Kumasi (Gana)	2013	US$22.55	S$694,765.50
Salitre Grotto	Diamantina (MG)	2013	R$6,48	R$4.807.542,85
Cocó River Park	Fortaleza (CE)	2015	R$19,37	R$1.549.600,00
Huatulco Stalls Coral Reefs	Oaxaca (México)	2015	US$48.40	US$18,243,629.40
Lerma River	La Piedad de Cabadas/ Michoacán e Santa Ana Pacueco/ Guanajuato (México)	2015	MXN$60,62	MXN$4.486.122,00

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| Construction project of a metropolitan park	Tessalônica (Grécia)	2016	€ 4,00 e € 4,50	€ 7.800.000,00 a € 9.100.000,00
Cabo Branco Park	João Pessoa (PB	2016	R$15,14	R$143.788.455,84
Fuzhou National Forestry Park	Fujian (China)	2017	US$1.60 e US$1.69	US$6,939,738.00 a US$7,344,978.00

Source: Elaborated by the authors

Among the 12 studies on MVC presented in Table 1, being five in three states of the country and seven in five other countries, it is observed that only one of them estimated the economic value of a square, evidencing the originality of this research unpublished in Fortaleza (CE).

3 Methodological procedures
3.1 Characterization of Martins Dourado Square

Martins Dourado square is located in the Quad limited by the streets Doctor Zamenhof, Gilberto Studart, Almeida Prado and Bento Albuquerque, in the neighborhood Cocó in Fortaleza (CE), occupying an area of approximately 10.000 m^2 (Figure 1).

Figure 1 – Location of Martins Dourado Square

Source: Elaborated by the authors

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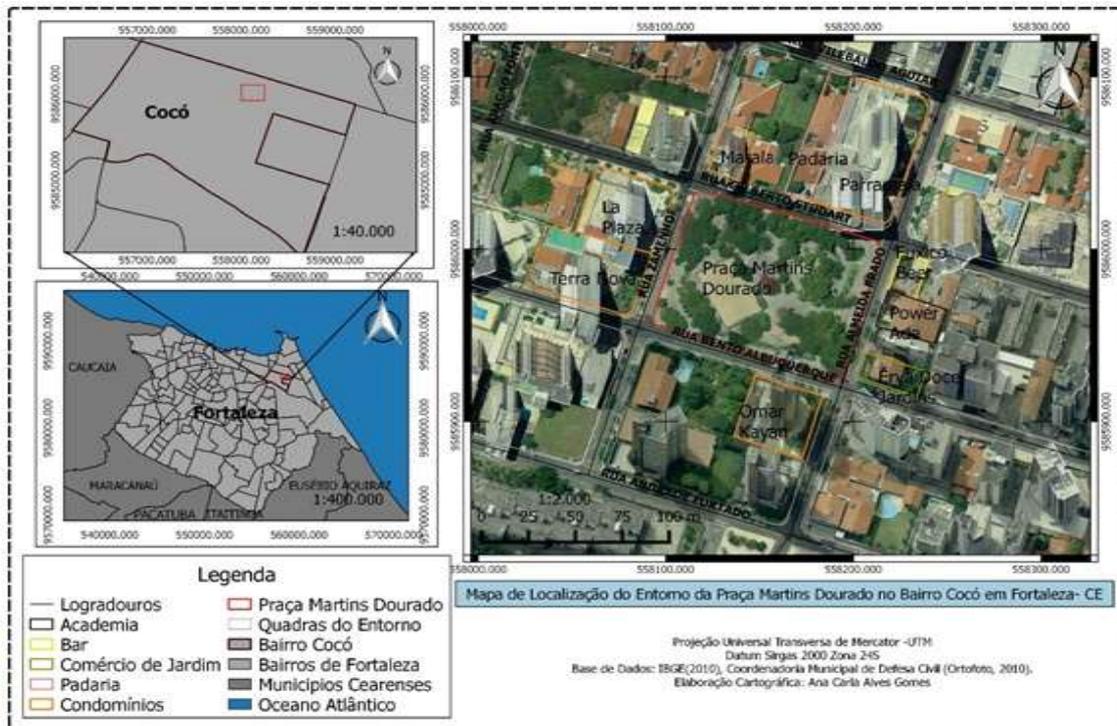
Martins Dourado Square offers several goods and services that contribute to improve well-being and increase the level of quality of life of the community residing in its surroundings. The area is quite wooded, and its physical structure includes benches and tables of wood and concrete, playground, arbor, apparatus for the practice of physical exercises, sports court and parking for automobiles, motorcycles and bicycles. In Addition to the contact with nature, it enables the realization of walks, races, tours with domestic animals and social and cultural events.

3.2 Sample Selection and application of the form

As for the objectives, the research isclassified as exploratory, since it allows greater familiarity with the problem. Regarding the approach, it is a quantitative study, since statistical procedures were used to estimate the value of monthly DAP, to analyze the relationship between the probability of willingness to pay and the socioeconomic variables of the respondents and to measure the economic value of the street (Marconi and Lakatos, 2017). Regarding the research procedures, the survey was used, with direct interrogation of the people, through the application of a form (Appendix) (Gil, 2010), in a simple random sample, calculated by the following formula:

$$n = \frac{N\left(z\frac{\alpha}{2}s\right)^2}{\left(z\frac{\alpha}{2}s\right)^2 + N\varepsilon^2} \qquad \text{(Equation 1)}$$

Where:

N = population size
z = critical value to (1-α)% confidence
s = Standard deviation
Ɛ = Pet Error

The size of the population (N) was represented by the average monthly number of people attending Martins Dourado Square. According to the Square Friends Association (2016), responsible for its maintenance, 441 people attend the Daily Street (Table 2). By multiplying this number by 30, a total monthly population of 13.230 people is obtained. The critical value used was 1.96, the standard deviation was 0.5 and the estimation error was 8%, as recommended by Tafuri (2008). When replacing the values in Equation 1, the ideal sample size was calculated in 148 people.

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Table 2 – Daily frequency of Martins Dourado Square – 24 a 30/10/201

SCHEDULE	WEEKDAY / QUANTITY						
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
5 to 8 am	90	90	90	90	80	40	30
8 to 10 am	70	70	70	70	60	80	120
10 to 12 am	30	30	30	30	30	60	100
12 to 4 pm	40	40	40	40	30	29	50
4 to 7 pm	200	200	200	150	120	80	50
7 to 10 pm	70	70	80	50	40	39	30
10 to 00 pm	15	15	10	10	10	10	10
TOTAL	515	515	520	440	370	338	390

Source: Square Friends Association (2016).

The field research was performed in two steps: The first occurred on day 17/06/2017, consisting of a pilot research, aiming to test the clarity of the instrument, the comprehension of the respondents, the time of application and the definition of the values of the cards of payment that would be addressed in the final form; The second consisted of applying the final form, in the period from 19 to 23/06/2017 (Monday to Friday), not extending to the weekend due to the coincidence of extraordinary events in the square. The forms were applied at the time the users were in the square. The chosen form of eliciting was opened by means of payment cards, being presented 10 DAP values for the respondent to choose, of which six were present in the pilot research (R\$10,00, R\$20,00, R\$25,00, R\$30,00, R\$50,00 and R\$60,00), three were added as intermediate values (R\$35,00, R\$40,00 and R\$55,00) and one was the value above the maximum DAP obtained in the pilot research (R\$70,00), according to Mota (1998).

The initial part of the form evaluated the socioeconomic characteristics of the respondent, regarding gender, age, schooling, monthly income and neighborhood of residence (1st to 5th Item). The second part presented options on the characteristics and services offered by Martins Dourado square motivators of the visit (6th item). In the final part of the form the respondent was consulted if he/she would be willing to contribute financially to the maintenance and conservation of the square through a voluntary program (7th item). In the hypothetical scenario used, the user willing to pay would receive in his residence a billet with the contribution value. The one who was not willing to pay should mark the reason, among the following: not having interest, financial condition, not seeing necessity and finding that this is government competence. The form was elaborated based on the studies conducted by Araújo et al. (2015), Carneiro, Sátiro, Melo e Mendonça (2017), Carvalho et al. (2016), Coberti et al. (2010), Nascimento,

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Mattos, Ribeiro e Sousa (2013), Resende, Fernandes, Andrade and Neder (2014), Silveira et al. (2013), Souza et al. (2016), Tafuri (2008) and Wakim et al. (2013).

3.3 Statistical Tests

To Investigate the association between the variables age, income, gender, schooling and DAP, the Multiple Correspondence Analysis (ANACOR) was applied, which, according to Fávero, Lima and Martins (2007), presents associations between nominal categorical variables on a map, enabling a visual examination of a structure in the database. It is important to emphasize that, before the execution of Anacor, it was necessary to apply the Chi-square test, to analyze the hypothesis test between the variables DAP versus age, gender, education level and income (Fávero et al., 2007).

To identify the probability of the individual being willing to contribute financially to the maintenance and conservation of the square, a non-linear regression was used, based on the cumulative logistic probability function, known as the logit model (Fávero, Belfiore, Silva and Chan, 2009). This model is often used in binary choice situations, that is, in which the dependent variable can take two single values. In this research, it is associated with DAP, and can assume the value 1 for the individual willing to pay and the null value for the one not disposed, and the explanatory variable DAP was defined by the following formula:

$$DAP = \alpha + \beta_{1-4}REND_{n-1} + \beta_{5-10} UTILj + \beta_{11}GEN + \beta_{12} L_nIDAD + \beta_{13}ESCOL + \varepsilon$$
(Equation 2)

Figure 2 - Describes the detailing and variables used in the econometric estimation by the logit model

Variable	Description
α	Constant of the equation
β	Coefficient
N	Number of income range (1 to 5)
J	Quantity of utilities involved in the evaluated well (1 to 6)
DAP	1, If you are willing to pay; O, If you are not willing to pay
$REND_1$	Up to R$937,00. *Dummy* variable: 1, If the income falls within the range; 0, if not fit.
$REND_2$	R$937,01 to R$1.874,00 .*Dummy variable:* 1, If the income falls within the range; 0, if not fit.
$REND_3$	R$1.874,01 to R$3.748,00. *Dummy variable*: 1, If the income falls within the range; 0, if not fit.
$REND_4$	R$ 3.748,01 to R$5.622,00. D*ummy* variable: 1, If the income falls within the range; 0, if not fit.

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REND$_5$	Above R\$5.622,00. D*ummy* variable: 1, If the income falls within the range; 0, if not fit.
UTIL$_1$	It provides the traditional walk, the contact with nature, and it is space for social and cultural events. *Dummy* variable: 1, If it is relevant; 0, If it is irrelevant.
UTIL$_2$	Area of the square reserved to the fun of children. It has slide and seesaw. Dummy variable 1, if it is relevant, 0, if it is irrelevant.
UTIL$_3$	Enables the practice of outdoor physical exercises. *Dummy variable:* 1, if it is relevant; 0, if it is irrelevant.
UTIL$_4$	Provides the practice of sports. *Dummy* Variable: 1, if it is relevant; 0, if it is irrelevant.
UTIL$_5$	Enables moments of rest, individual reflexion, meetings for chat or meals. D*ummy* Variable 1, if it is relevant; 0, if it is irrelevant.
UTIL$_6$	It has arbor, with wooden benches inside it, and can be used for rest, conversations and group events, such as soiree of poetry. D*ummy* Variable: 1, if it is relevant; 0, if it is irrelevant.
ESCOL	*Dummy Variable:* 1, if incomplete elementary school; 2, if complete elementary school; 3, if incomplete secondary school; 4, if complete secondary school; 5, if incomplete higher education; 6, if complete higher education; 7, if Postgraduate.
GEN	D*ummy* variable: 1, if Female; 0, if Male
IDAD	Ages of the sample components

Figura 2 – Detailing of *logit model*
Source: Elaborated by the authors

It is worth noting that for the variable income dummy, we considered n-1 categories, to avoid problems of perfect multicollinearity. Gujarati (2006) recommends that one of the categories (the base category) be omitted, and that it be interpreted by the behavior of the constant.

For the performance of Anacor, the Statistical Package for the Social Sciences 22.0 (SPSS) application was used, while for the logit test, Stata v. 14 was used. The calculation of DAP considered the study of Morgado, Abreu, Réquia and Aravéchia (2011), in which the number of individuals of the population was multiplied by the mean of the DAP values of the sample, as can be visualized in the following formula:

DAPT = DAPmxN   (Equation 3)

Where:

DAPm = willingness to pay average
DAPT = Total Payment Disposition
N = number of respondents

The average willingness to pay (DAPm) is calculated by the average of the values reported by the respondents, which, multiplied by the number of respondents (N), generates the total willingness to pay (DAPT).

4 Analysis of results

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4.1. Respondents Profile

To achieve the first specific objective, information was collected from respondents in order to trace their profiles in relation to DAP and gender (Table 3).

Table 3 – Relationship between gender and DAP

Gender	Quantity	Willing		Unwilling	
		Quantity	Proportion (%)	Quantity	Proportion (%)
Female	63	51	81,0	12	19,0
Male	85	68	80,0	17	20,0
Total	**148**	**119**	**80,4**	**29**	**19,6**

Source: Elaborated by the authors.

The research revealed a proportion of 57.4% for males, limiting the female, consequently, to 42.6%. In the studies by Carneiro et al. (2017), Carvalho et al. (2016), Nascimento et al. (2013), Silveira et al. (2013) and Wakim et al. (2013), the majority of the sample also fit the male gender. When analyzing the relationship between DAP and each genus in isolation, it is perceived that the proportion of users willing to pay was similar to those not willing to pay, in the comparison between the two genders. The age variable was presented in ages with 15-year intervals (except for the two extremes).

Table 4 – Relation between age and DAP

Age range (years)	Quantity	Willing to pay		Not willing to pay	
		Quantity	Proportion (%)	Quantity	Proportion (%)
$x \leq 20$	10	6	60,0	4	40,0
$21 \leq x \leq 35$	53	45	84,9	8	15,1
$36 \leq x \leq 50$	52	39	75,0	13	25,0
$51 \leq x \leq 65$	22	20	90,9	2	9,1
$x \geq 66$	11	9	81,8	2	18,2
Total	**148**	**119**	**80,4**	**29**	**19,6**

Source: Elaborated by the authors

In Table 4, it is observed that the square receives the visit of users of different ages, varying between 18 and 84 years, which results in an average of 40 years. It is Important to note that the four users not willing to pay with ages up to 20 years earn income not exceeding R$937,00.

Schooling was distributed in seven levels, with a range ranging from elementary to graduate education, observing the participation of users of the square in all of them (Table 5).

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Table 5 – Relation between schooling and DAP

Schooling	Quantity	Willing to pay		Not willing to pay	
		Quantity	Proportion (%)	Quantity	Proportion (%)
Incomplete Elementary School	4	2	50,0	2	50,0
Complete Elementary School	1	1	100,0	-	0,0
Incomplete Secondary Education	3	2	66,7	1	33,3
Complete Secondary Education	19	11	57,9	8	42,1
Incomplete Higher Education	30	24	80,0	6	20,0
Complete Higher Education	45	38	84,4	7	15,6
Post-graduation	46	41	89,1	5	10,9
Total	**148**	**119**	**80,4**	**29**	**19,6**

Source: Elaborated by the authors

The level of schooling of the population that frequents Martins Dourado Square can be considered high, since higher education (incomplete and complete) and postgraduate, together, concentrate 81.8% of the sample, with 50.7% and 31.1%, respectively.

According to Table 5, in the seven levels of schooling, the group of users willing to pay concentrates the expressive participation of 80.4% of the sample, with increasing proportions per level of schooling in the same order of importance of the levels, thus distributed : Elementary school, 60%; High school, 59.1%; Higher education,82, 7%; and postgraduate studies, 89.1%. The Square receives visits from residents of 22 districts of Fortaleza, with a concentration of 82.4% of the Poop itself and three other surrounding areas (Table 6).

Table 6 – Relationship between neighborhoods and DAP

Neighborhoods	Quantity	Willing to pay		Unwilling to pay	
		Quantity	Proporção (%)	Quantity	Proportion (%)
Cocó	72	66	91,7	6	8,3
Papicu	25	17	68,0	8	32,0
Cidade 2000	18	11	61,1	7	38,9
Vicente Pinzon	7	4	57,1	3	42,9
Others	26	21	80,8	5	19,2
Total	**148**	**119**	**80,4**	**29**	**19,6**

Source: Elaborated by the authors

The Neighborhood Cocó presented the largest number of visitors and also the largest proportion of users willing to pay, which was already expected due to the greater proximity of the residences and, consequently, the greater frequency of use of the square by its residents.

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The income was presented in five bands (Table 7), and the values were defined based on the minimum wage then prevailing (R$937.00 in 2017).
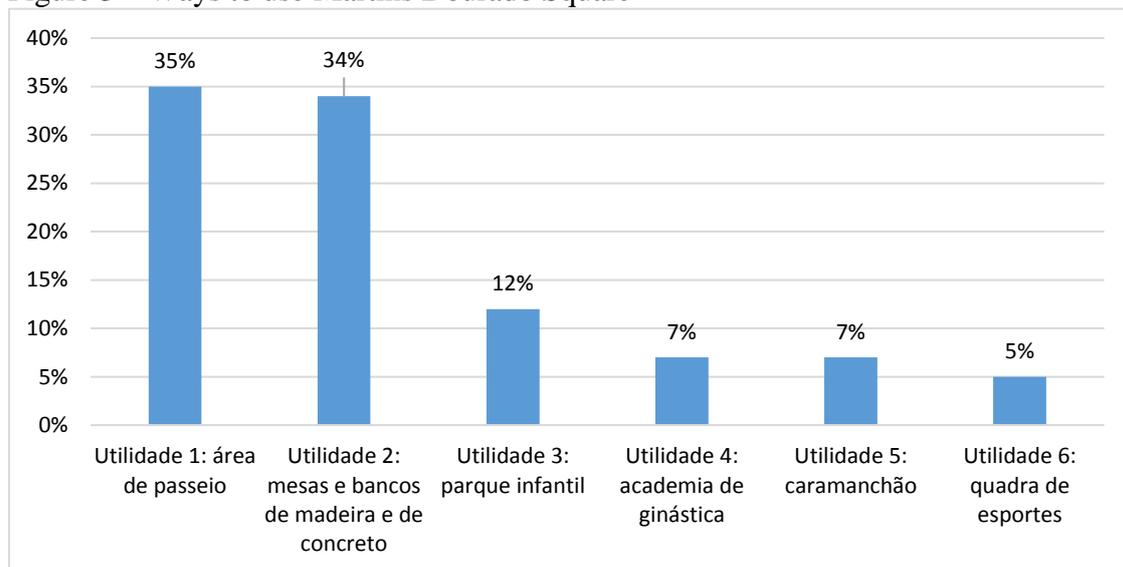
Table 7 – Relationship between income and DAP

Monthly individual income (R$)	Quantity	Willing to pay		Unwilling to pay	
		Quantity	Proportion (%)	Quantity	Proportion (%)
$x \leq 937,00$	18	8	44,4	10	55,6
$937,00 < x \leq 1.874,00$	20	15	75,0	5	25,0
$1.874,00 < x \leq 3.748,00$	37	30	81,1	7	18,9
$3.748,00 < x \leq 5.622,00$	25	22	88,0	3	12,0
$x > 5.622,00$	48	44	91,7	4	8,3
Total	**148**	**119**	**80,4**	**29**	**19,6**

Source: Elaborated by the authors

With regard to the respondents' income, it was possible to observe that in the group of users who received up to R$937,00, the lowest amount and the smallest proportion of people willing to pay (44.4%) were recorded, while the group with the highest income range indicated the highest Quantity and the highest proportion (91.7%). These data corroborate the understanding of Pearce and Turner (1990), according to which the people of the most wealthy classes demand more environmental assets, due to the fact that their basic needs and materials have already been met, so that they aspire to a Higher level of well-being, through environmental improvements that result in increased quality of life.

With regard to the form of use of the square, we sought to identify elements that provide the welfare of the population (Figure 3).

Figure 3 – Ways to use Martins Dourado Square

Source: Elaborated by the authors.

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The walking area obtained the highest proportion of utilization, with 35% (preference of 52 of the 148 respondents), because it is very demanding for walks, races, rides with animals and social and cultural events. In the second preference, the banks and tables, where people sit to rest, Converse, read, pray and meditate, were appointed by 34% (preference of 50 of the 148 respondents). The Playground obtained the third position, with 12% (preference of 18 of the 148 respondents) of the indications, since several respondents take their children to have fun in the area destined for children. The Arbor and the gym indicated, each, 7% (preference of 10 of the 148 respondents, each) of the indications, while the sports court registered 5% (preference of 7 of the 148 respondents). These results are in tune with those found by Dorigo and Lamano-Ferreira (2015), who, when raising the contributions of environmental perception studies in public green areas, such as squares and urban parks, identified the following aspects Of the green areas in the vision of the regulators: practice of physical activities, leisure, promotion of education and environmental awareness. It is Important to warn that the research of these two authors pointed to a negative aspect, in this case a concern about the insecurity of urban green areas, which may be related to the decrease in the frequency of use of these public spaces (Dorigo and Lamano-Ferreira, 2015).

To investigate the association between the variables of the study and the willingness to pay for the conservation and maintenance of the square, we used Anacor, which allows to generate a perceptual map with the visual identification of associations between categories. However, this is an essentially descriptive analysis, not inferring about cause and effect (Fávero et al., 2009). Before the execution of Anacor, it was necessary to apply the Chi-square test, in order to verify the existence of an association, as can be seen in Table 8.

Table 8 – Chi square test summary

| Relationship	Cases Summary		Tests χ^2	
	Valid Cases	Proportion (%)	Value	Sig.
DAP *versus* age	148	100	5,84	0,21
DAP *versus* gender	148	100	0,21	0,88
DAP *versus* schooling	148	100	11,7	0,068
DAP *versus* income	148	100	14,79	0,005

Source: Elaborated by the authors

The test proved to be significant in the relationships that involve the variables income and schooling, with probability values lower than 1% and 10%, respectively (Table 8). Thus, Anacor could only be applied to significant associations (Figure 4).

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Figure 4 – Perceptual Map
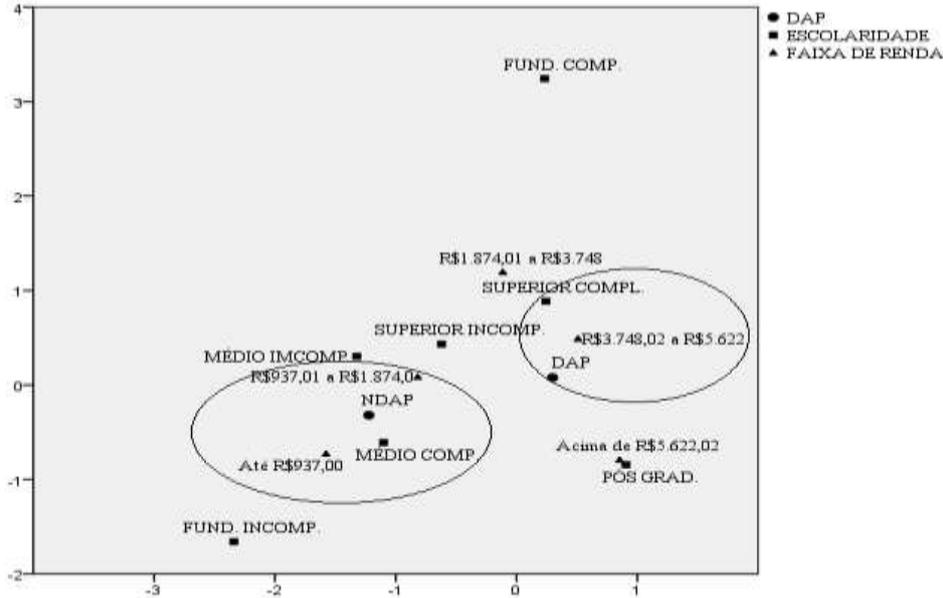
Source: Elaborated by the authors

According to the perceptual map of Figure 4, there is an association between DAP, complete higher education and income range between R$3.748,01 and R$5.622,00, suggesting that the respondents of this level of schooling and with income in this range are more willing to pay for Preservation and maintenance of the square.

The perceptual Map also evidences that the non-willingness to pay is associated with respondents with full secondary education and with income range between R$937,01 and R$1.874,00. It is Highlighted that the non-willingness to pay is close to the lower wage range (up to R$937,00), which reinforces the argument that the respondents of the lower wage ranges have lower payment capacity, which is why they are less willing to Give up a portion of his income.

4.2 Econometric Model

After tracing the profile of the research sample and investigating the existing associations, we analyzed the model estimated to verify the DAP (Table 9).

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Table 9 – Result of the estimation of the logit model

Explanatory Variable	Regression Coefficient	*p*-value	Marginal Effect	*p*-value
Const	2,879	0,130	-	-
FR_1	-3,508$^{(*)}$	0,001	-0,677$^{(*)}$	0,000
FR_2	-1,735$^{(***)}$	0,070	-0,297$^{(**)}$	0,014
FR_3	-0,833	0,304	-0,111	0,368
FR_5	0,995$^{(**)}$	0,0273	0,100$^{(**)}$	0,0210
$UTIL_1$	1,545$^{(*)}$	0,010	0,184$^{(*)}$	0,009
$UTIL_2$	0,545	0,484	0,055	0,420
$UTIL_3$	-0,192	0,809	-0,023	0,819
$UTIL_4$	2,101$^{(***)}$	0,055	0,131$^{(*)}$	0,001
$UTIL_5$	0,829	0,158	0,097	0,162
$UTIL_6$	-0,778	0,336	-0,110	0,421
Gen	0,958$^{(***)}$	0,095	0,105$^{(***)}$	0,078
Idade	-0,034$^{(***}$	0,090	-0,003$^{(***)}$	0,087
Escol	-0,154	0,472	-0,017	0,466
N° observations			148	
LR chi2(14)			32,48	
Prob> chi2			0,0020	
Pseudo R2			0,2218	
Values correctly classified			85,8%	
Y=Pred(y)			86,9%	

(*) significant to 1%; (**) significant to 5%; (***) significant to 10%.
Source: Elaborated by the authors

By analyzing the estimation results of the logit model, it is possible to observe that it is well adjusted. This can be verified through the Chi-square test of the likelihood ratio (LR test), which presented a significant value of 32.48%. Still on the logit model, it was found that he managed to correctly classify 85.8% of the observations analyzed, and that the probability of willingness to pay for this specific sample is 86.9%. It should be emphasized that the statistical software automatically eliminated the variable Income Range 4, with the purpose of avoiding multicollinearity, being therefore the base category of the variable income dummy.

Considering the whole sample, it is perceived that only the variables gender (10%), age (10%), utility 1 (1%), utility 4 (10%), Income range 1 (1%), Income range 2 (10%) and income range 5 (5%) were significant. The genre, Utility 1, utility 4 and income range 5 increase the probability that the individual is willing to pay for the maintenance and conservation of the square. With regard to the significance of the phantom gender coefficient, it is indicated that there are differences between men and women in the willingness to pay for the enjoyment of the square, and the female gender presented a higher probability of DAP.

In relation to the utilities, it was found a positive and significant effect of the variables Utility 1 and utility 4 in the probability of the individual presenting DAP; In the

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case of utility 1, the marginal effect shows that the fact that the Plaza provides activities such as hiking, contact with nature and space for social and cultural events increases by 18.4% the probability of individuals accepting to pay; Likewise, utility 4, which points to the square as a place conducive to the practice of sports, increases the probability of DAP by 13.1%.

In relation to income, it was verified that the income range 5 showed significance, positively influencing the willingness to pay the respondent. The Marginal effect on income above R$5.622,00 points out that for an increase of R$1,00, the probability of individuals accepting to pay is increased by 10%, suggesting that individuals with higher income have higher payment capacity and are more willing to give up A portion of their income to ensure the preservation and conservation of the square.

The income ranges 1 and 2 were statistically significant, but with negative effect, that is, participants who earned income in these bands are not willing to pay for the preservation and maintenance of the square. These findings corroborate the results already obtained by Carvalho et al. (2016), Coberti et al. (2010), Majumdar et al. (2011), Resende et al. (2014), Wakim et al. (2013) and Zavala et al. (2015), which argue that the higher the income, the greater the probability of DAP, and the lower the income, the lower the DAP.

The age variable had a negative effect, so that the higher the age, the lower the probability of the individual being willing to pay. Such perception can be evidenced in the marginal effect in which the increase in age reduces by 0.3% the probability of accepting to pay. The result obtained for the variable age was analogous to that found by Carvalho et al. (2016), Coberti et al. (2010) and Mamani et al. (2011). Mitchell and Carson (1993) stated that this behavior is due to the fact that people with ages in the higher ranges believe they have less time to live to enjoy the good.

In the case of schooling, the fact that it did not show significance was compatible with the positive effect on DAP, i.e., the higher the level of schooling, the greater the probability of the individual being willing to pay, which could be explained, in the case of this study, by the importance that the user attributes to the good to increase his/her quality of life, so that he would be willing to contribute, regardless of his/her schooling level.

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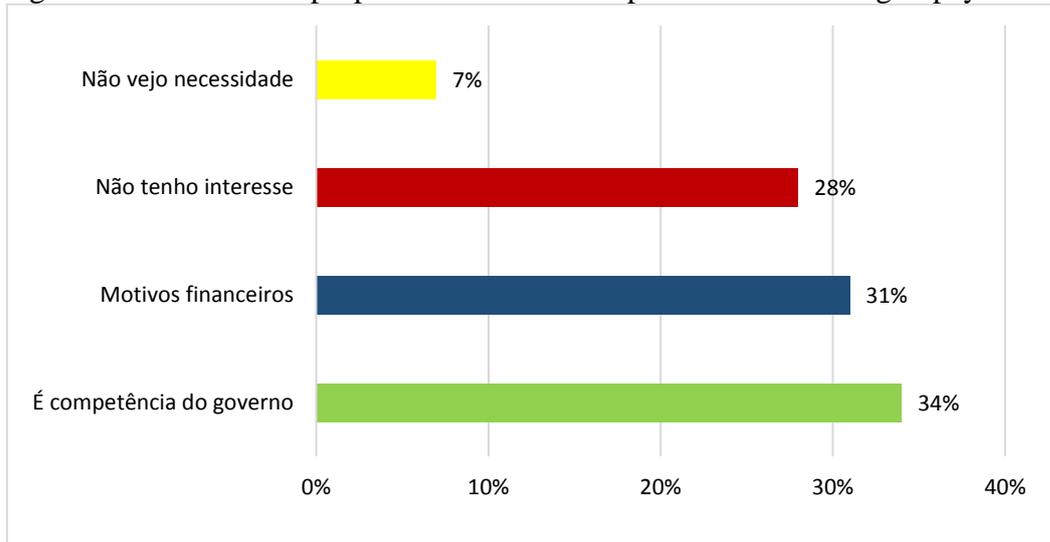**8(2), p. 283-312, May/Aug. 2019**

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4.3 Estimation of the provision payable

Of the 148 respondents, only 119 (80.4%) are willing to pay for the maintenance and preservation of the square. Figure 4 shows the distribution of the alleged reasons for the non-willingness to contribute.

Figure 5 – Motives and proportions of the 29 respondents not willing to pay

Source: Elaborated by the authors

Among the 29 respondents who were not willing to pay, 10 (34.4%) alleged to understand that the maintenance and conservation of the square constitutes the responsibility of the Public Power, corroborating the findings of Carneiro et al. (2017), Sousa and Mota (2006), Souza et al. (2016), Tafuri (2008) and Wakim et al. (2013). In Most cases, respondents complemented that they are already penalized by a very high tax burden.

In order to measure the value that respondents would be willing to pay for the preservation and maintenance of the square, we used Equation 3, through which the average monthly DAP of R$25,08 per visitor was obtained, very close to that found by Carneiro et al. (2017) for the State Marine Park of Pedra da Risca do Meio (R$21,50), in Fortaleza (CE). Table 10 presents a descriptive analysis of DAP.

Table 10 – Descrptive Analysis of DAP

	N	Mínimum	Máximum	Media	Standard- deviation	Coefficient of variation
DAP$_m$	119	10,00	60,00	25,08	14,74	0,59

Source: Elaborated by the authors.

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In Table 10, it can be observed that the maximum value to be paid reached R$60,00, and that the lowest value was R$10,00, verifying a homogeneity of the values, since the coefficient of variation did not present such a high value (0.59).

To achieve the main objective of this study, we considered the average monthly frequency (441 x 30) and the annual (441 x 30 x 12) Visitors of the square, obtaining the values R$331.808,40 (441 x 30 x R$25,08) Monthly and R$3.981.700,80 (441 x 30 x 12 x R$25,08) annually ATR Ibuprofen to Praça Martins Dourado, meaning to say that these amounts could be invested in the maintenance and conservation of the square, for better enjoyment by the community of its surroundings and other neighborhoods.

Besides the evidence of using DAP for collection purposes, the estimated annual value (R$3.981.700,80) was confronted with the annual expenses of the association with maintenance and conservation of the square, about R$48.600,00/year. However, the collection obtained by the association through voluntary contributions corresponds to the annual average of R$46.000,00; that is, there is a deficit of 5.65%, demonstrating that this need for collection is supported by the willingness to pay by the users of the square.

5 Final considerations

This research was aimed at economically valuing Martins Dourado Square, by the Contingent Valuation Method. With the tool of Disposition to Pay, the monthly and annual values attributed to the quoted public street were measured.

For this purpose, the following specific objectives were outlined: i) to outline the profiles of the respondents of the research; (ii) Investigate the association between the study variables and the willingness to pay for the conservation and maintenance of the square; and III) Verify the willingness to pay of the participants.

The first objective was achieved by applying 148 forms with users of the square, of which only 119 (the equivalent of 80.4%) were willing to contribute to the maintenance and conservation of that equipment. The profile with the highest frequency of respondents concentrated men, in the age group from 21 to 35 years, with postgraduate degree, residents in the neighborhood Cocó, with income above R$5.622,00, and who visited the square due to the benefits offered by its structure. Regarding the second specific objective, there was an association between the willingness to pay and the variables income and

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schooling. Moreover, it was found that variables such as gender, age, utility 1, utility 4 and income range influence the probability of the individual willing to pay. With regard to the third specific objective, the average monthly DAP value was estimated at R$25,08 per person.

It is worth noting that the analysis of the data obtained – with open application of payment cards and presentation of hypothetical scenario to the 148 square-bearers of Martins Dourado Square – made several contributions emerge for the formulation of answers to the question that guided the research: **What is the economic value of Martins Dourado Square according to the Contingent Valuation Method (MVC)?** The answer to the research question and the general objective of the study was achieved by identifying the DAP (R$25,08) and the average annual frequency of 158.760 users of the square, obtaining for the street the total annual economic value of R$3.981.700,80.

The results of the study bring implications for understanding in obtaining a reference value to a public good – environmental asset – and provide subsidies to public and private agents for more efficient management of resources of the species, as they enable the valuation mechanisms to be improved, assisting managers in formulating public policies. It is considered essential that public organizations are technically supported with a view to attending the public interest through the use of environmental resources in a conscious and participatory manner.

As for the results obtained, it is observed that Martins Dourado Square was considered a good that contributes significantly to increase the quality of life of the community and its surroundings, and that there is a concern to keep it preserved, due to the high proportion of users willing to contribute. The contribution to maintenance and conservation of the square proved to be viable for a large part of the respondents, and can be used as a way to improve the financial management and services offered by the street, through the expansion of the partnership between society and government. In Addition, the present study may be replicated to other squares of Fortaleza and other municipalities, with the objective of evaluating the possibility of implementing such contribution from society.

Among the limitations of the present study, it is noteworthy that the sample gathered so-only users of the square, making it difficult to obtain the values of existence and option of people who do not usually attend it, but who could be willing to pay, due to Importance of maintaining a conserved environmental good for future generations. It

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was also identified that the forms were applied to the users of the week, but could also be applied on weekends, when the square was available for the daily activities to which it is proposed. It is recommended that subsequent research samples encompass the population of non-users of the square, in order to capture the values of existence and option, as well as involving the users of the square on weekends.

A suggestion that is proposed for the evolution of the present study is the allocation of maintenance and conservation costs of the square, for its uses (preferences of users), in order to identify whether the amounts that could be collected – which the users propose to pay – , faced with the specific expenses of the utilities of the square, generate marginal contribution of resources in public (government) and private (association) management.

References

Araújo, H. R., Oliveira, A. F., Júnior, & Azevedo, A. A. (2015). Valoração de serviços ambientais: subsídio para a sustentabilidade do atrativo natural Gruta do Salitre, Diamantina, Minas Gerais. *Pesquisas em Turismo e Paisagens Cársticas*, *8*(1), 17-26.

Associação Amigos da Praça. (2016). *Frequência média diária de visitantes à Praça Martins Dourado. Fortaleza*. Fortaleza: Associamigos.

Benitez, R. M. (2005). *Impactos das preferências ambientais sobre os resultados dos métodos de análise conjunta de valoração ambiental: rating e ranking contingent*. Tese de doutorado, Faculdade de Ciências Econômicas, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brasil.

Camphora, A. L., & May, P. (2006). A valoração ambiental como ferramenta de gestão em unidades de conservação: há convergência de valores para o bioma Mata Atlântica? *Megadiversidade*, *2*(1-2), 23-38.

Carneiro. P. B. de M., Sátiro, I., Melo, C. C. de, & Mendonça, K. V. de. (2017). Valoração ambiental do Parque Estadual Marinho da Pedra da Risca do Meio, Ceará, Brasil. *Arquivos de Ciências do Mar*, *50*(1), 25-41.

Carson, R. T., Flores, N. E., & Meade, N. F. (2001). Contingent valuation: controversies and evidence. *Environmental and Resource Economics*, *19*(2), 173-210.

Carvalho, P. S. A., Fonseca, M. B., & Paixão, A. N. (2016). Pagamento por serviços ambientais: um exercício de valoração do Parque Cabo Branco. *Anais do Seminários em Administração*, São Paulo, SP, Brasil, 19.

Chen, B., & Qi, X. (2017). Protest response and contingent valuation of an urban forest park in Fuzhou City, China. *Urban Forestry & Urban Greening*, *29*, 68-76.

Constituição da República Federativa do Brasil. (1988). Brasília. Recuperado em 1 jun. 2017, de http://www.planalto.gov.br/ccivil_03/constituicao/constituicaocompilado.htm

Corbeti, C. M. C., Alvim, A. M., & Dias, D. V. (2010). Valoração econômica dos recursos hídricos da região de Pelotas. *Análise – Revista de Administração da PUCRS*, *21*(1), 85-96.

_____

Rev. Gest. Ambient. Sustentabilidade - GeAS
8(2), p. 283-312, May/Aug. 2019

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Cunha, F. L. S. (2008). *Valoração dos serviços ecossistêmicos em bacias hidrográficas*. Tese de doutorado, Instituto de Economia de Universidade Estadual de Campinas, Campinas, SP, Brasil.

Davis, R. K. (1963). *The value of outdoor recreation: an economic study of the Maine woods*. Unpublished Ph.D. dissertation, Harvard University, Maine, USA.

Dorigo, T. A., & Lamano-Ferreira, A. P. N. (2015). Contribuições da percepção ambiental de frequentadores sobre praças e parques no Brasil (2009-2013): revisão bibliográfica. *Revista de Gestão Ambiental e Sustentabilidade – GeAS*, *4*(3), 31-45.

Dumenu, W. K. (2013). What are we missing? Economic value of an urban forest in Ghana. *Ecosystem Services*, *5*, 137-142.

Fávero, L. P., Belfiore, P., Silva, F. L., & Chan, B. L. (2009). *Análise de dados: modelagem multivariada para tomada de decisões*. Rio de Janeiro: Campus.

Fávero, L. P. L., Lima, G. A. S. F., & Martins, G. A. (2007). Associação entre níveis de governança, indicadores contábeis e setor: uma análise sob as perspectivas da Anacor e da

Homals. *Revista de Informação Contábil*, *1*(2), 1-17.

Fiorillo, C. A. P. (2013). *Curso de direito ambiental brasileiro*. 14. ed. São Paulo: Saraiva.

Fonseca, R. A., Lima, A. B., Rezende, J. L. P., Santos, A. A., & Nazareth, L. G. C. A. (2013). Validade do método de contingência como valoração de bens e serviços ambientais. *Anais do Simpósio de Excelência em Gestão e Tecnologia*, Rio de Janeiro, RJ, Brasil, 10.

Gil, A. C. (2010). *Como elaborar projetos de pesquisa*. 5. ed. São Paulo: Atlas.

Gujarati, D. N. (2006). *Econometria básica*. 3. ed. São Paulo: Makron Books.

Latinopoulos, D., Mallios, Z., & Latinopoulos, P. (2016). Valuing the benefits of an urban park project: a contingent valuation study in Thessaloniki, Greece. *Land Use Policy*, *55*, 130-141.

Maia, A. G., Romeiro, A. R., & Reydon, B. P. (2004). Valoração de recursos ambientais –metodologias e recomendações. *Texto para Discussão, Instituto de Economia/Unicamp*, n. 116.

Majumdar, S., Deng, J., Zhang, Y., & Pierskalla, C. (2011). Using contingent valuation to estimate the willingness of tourists to pay for urban forests: a study in Savannah, Georgia. *Urban Forestry & Urban Greening*, *10*(4), 275-280.

Mamani, J. W. T., Damián, M. A. M., Alcalá, R. V., Lozano, J. L. R., Vázquez, M. P., & Gonzalez, R. V. R. (2011). Valoración económica de los beneficios de un programa de recuperación y conservación en el Parque Nacional Molino de Flores, México. *Revista Chapingo. Serie ciencias forestales y del ambiente*, *17*(2), 231-244.

Marconi, M. D., & Lakatos, E. M. A. (2017). *Fundamentos da metodologia científica*. 8. ed. São Paulo: Atlas.

Martins, E. C. (2002). *O turismo como alternativa de desenvolvimento sustentável: o caso de Jericoacoara no Ceará*. Tese de doutorado, Escola Superior de Agricultura Luiz de Queiroz, Universidade de São Paulo, Piracicaba, SP, Brasil.

Mitchell, R. C., & Carson, R. T. (1993). *Using surveys to value public goods: the contingent valuation method*. 3. ed. Washington: Resources for the Future.

Morgado, R. C., Abreu, L. M., Réquia, W. J., & Aravéchia, J. C. (jul-dez. 2011). Valoração ambiental do Parque Ecológico de Usos Múltiplos Águas Claras – DF: analisando a disposição a pagar dos usuários. *Revista de Estudos Ambientais*, *13*(2), 6-17.

_____
Rev. Gest. Ambiental. Sustentabilidade - GeAS
8(2), p. 283-312, May/Aug. 2019

310

Motta, R. S. da. (1998). *Manual para valoração econômica dos recursos ambientais*. Brasília: Ministério do Meio Ambiente.

Nascimento, S. T., Mattos, F., Ribeiro, E. S., & Sousa, R. A. T. de M. (2013). Economic valuation of a unit conservation urban, Cuiabá, Mato Grosso. *Interações (Campo Grande)*, *14*(1), 79-88.

Nogueira, J. M., Medeiros, M. A. A. de, & Arruda, F. S. T. de. (2000). Valoração econômica do meio ambiente: ciência ou empiricismo. *Cadernos de Ciência & Tecnologia*, *17*(2), 81-115.

Obara, A. T. (1999). *Valoração econômica de unidades de conservação – método de valoração contingente – caso de estudo: Estação Ecológica de Jataí (Luiz Antônio – São Paulo)*. Tese de doutorado, Universidade Federal de São Carlos, São Carlos, SP, Brasil.

Pearce, D. W. (1993). *Economic values and the natural world*. Londres: Earthscan Publications.

Pearce, D. W., & Turner, R. K. (1990). *Economics of natural resources and environment*. Londres: Harvester Wheashealf.

Resende, F. D. M., Fernandes, G. W. A., Andrade, D. C., & Neder, H. D. (2014). *Valoração econômica do Parque Nacional da Serra do Cipó (Minas Gerais): uma aplicação do método contingente*. Anais do Encontro Nacional de Economia, Foz do Iguaçu, PR, Brasil, 41.

Sántiz, F. G., & Rojas, H. R. G. G. (2015). Valoración económica de bienes públicos: estudio de caso del río Lerma, La Piedad, Michoacán. *Región y sociedad*, *27*(63), 97-126.

Silva, R. G., & Lima, J. E. de. (2004). Valoração contingente do Parque Chico Mendes: uma aplicação probabilística do método Referendum com bidding games. *Revista de Economia e Sociologia Rural*, *42*(4), 685-708.

Silveira, V. C., Cirino, J. F., & Prado, J. F. do, Filho. (2013). Valoração econômica da Área de Proteção Ambiental Estadual da Cachoeira das Andorinhas-MG. *Revista Árvore*, *37*(2), 257-266.

Sousa, G. B., & Mota, J. A. (jan.-jun. 2006). Valoração econômica de áreas de recreação: o caso do Parque Metropolitano de Pituaçu, Salvador, BA. *Revista de Economia*, *32*(1), 37-55.

Souza, J. L., Sampaio, G. V., & Carioca, M. C., Neto. (2016). Valoração econômica do Parque Ecológico do Cocó no Município de Fortaleza-CE. *Anais do Encontro Internacional sobre Gestão Empresarial e Meio Ambiente*, São Paulo, SP, Brasil, 18.

Tafuri, A. C. (2008). *Valoração ambiental do parque estadual do Itacolomi, Ouro Preto, Minas Gerais*. Dissertação de mestrado, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brasil.

Thomas, J. M., & Callan, S. J. (2010). *Economia ambiental: fundamentos, políticas e aplicações*. Trad. Antônio Cláudio Lot e Marta Reyes Gil Passos. São Paulo: Cengage Learning.

Wakim, V. R., Magalhães, E. A., Silva, S. P., & Pereira, D. N. (2013, Sept.). 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. *International Journal of Environment and Pollution Research*, *1*(2), 20-39.

Zavala, E. R., Castillo, D. Y., & Perez, B. E. E. (2015). Economic valuation of use of coral reefs in the bays of Huatulco, Oaxaca, Mexico. *Ecosistemas y Recursos Agropecuarios*, *3*(7), 135-142.

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APPENDIX

ECONOMIC VALUATION OF MARTINS DOURADO SQUARE

1. Gender: Male ( )   Female ( )
2. Age: _____
3. Schooling:

Incomplete Elementary School	
Complete Elementary School	
Incomplete High School	
Complet High School	
Incomplete Higher Education	
Complete Higher Education	
Postgraduation	

4. Monthly individual income (R$):

Till 937,00	
937,01 to 1.874,00	
1.874,01 to 3.748,00	
3.748,01 a 5.622,00	
Above 5.622,00	

5. Neighborhood where you live: _____
6. Martins Dourado Square is located in the quad formed by the streets Doctor Zamenhof, Gilberto Studart, Almeida Prado and Bento Albuquerque, in the neighborhood Cocó, in Fortaleza (CE). The Street contributes to the welfare of its users. Tick the option (s) that represent (s) the shape (s) as you enjoy the square:

Sector	Utility function of wellfare	X
Walking area	Provides the traditional walking, the contact with nature and space for cultural and social events.	
Playground	Area reserved to children entertainment, owing toys as slide and seesaw	
Gym	Enables the practice of physical exercises outdoor	
Sports court	Enables the practice of sports	
Tables and benches made of wood and concrete	Enables moments of rest, individual reflection and meetings for chats or group meals	
Arbor	Place covered by vines, has wooden benches inside, is used for rest, conversations and group events such as soiree of poetry	

Facing this context, would you like to pay, monthly a value for contribution for maintenance and conservation of the square, through a volunteer program (Program of Maintenance and Conservation of Martins Dourado Square - PMCPMD)? The collection would be done by bank billet sent to users residences who want to pay. In positive case, what value would it be (R$)?
( ) 10,00 ( ) 20,00 ( ) 25,00 ( ) 30,00 ( ) 35,00 ( ) 40,00 ( ) 50, 00 ( ) 55,00
( ) 60,00 ( ) 70,00 Other: _____

7. If your answer to the previous question is "no", what would be the reason?

I do not have interest		I do not see necessity	
Financial Condition		It is the government competence	

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