



UNIVERSIDADE CATÓLICA PORTUGUESA

Travel Cost and Contingent Methods for Economic Valuation of Urban Forests: Parque da Cidade do Porto Case Study

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Dedication

I dedicate this proposal to those who helped me a lot along this survey. Firstly and foremost I would like to appreciate my supervisor, Professor Miguel Sottomayor. His academic advice and expertised knowledge were a big contribution towards this work. Many thanks to him for his guidance and supervision for performing the research. Then I would like to say special thanks to Eng. Rui Afonso the manager of Parque da Cidade do Porto, for his cooperation, providing a big amount of information and assisting me to gather the data. And my gratitude also to Professor Américo Mendes and other teachers in the Department of Economics and Management who gave me lectures and provided a great deal of support and knowledge in my studying years in Porto. Also I owe many thanks to the non-teaching staff in Catholica University, Padova University and to the group workers of MEDFOR program for their support and commitment.

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Resumo

A valorização económica de amenidades florestais urbanas é da maior importância devido ao alto custo de tais equipamentos e aos usos alternativos dos escassos recursos públicos. Os objetivos deste estudo são determinar o valor económico da maior floresta urbana Área Metropolitana do Porto - Parque da Cidade do Porto (PCP). O Método do Custo de Viagem (TCM) e Método de Valoração Contingente (CVM) foram utilizados e os resultados destes dois métodos comparados. Um total de 400 entrevistas face-a-face foram realizadas tendo por base um questionário comum preparado para o efeito. TCM e CVM foram aplicados na análise dos resultados das entrevistas, que incluíam informação sobre custos de viagem para o PCP e informação sobre a disponibilidade a pagar por entradas no parque para cada entrevistado, além de outra informação sobre as características do entrevistado e da sua percepção e forma de utilização do PCP.

Os resultados mostram que a maioria dos visitantes está satisfeita com os serviços prestados pelo PCP, e que o tempo de viagem, custos de viagem, idade, escolaridade e renda têm um impacto significativo sobre a frequência das visitas pelos indivíduos ao PCP. Além disso, também se demonstrou que as características socio-económicas dos indivíduos entrevistados também têm influência significativa sobre a sua disponibilidade total a pagar (WTP) pela utilização do PCP. No entanto, os resultados de valoração económica obtidos pela aplicação do TCM e CVM não foram totalmente consistentes; o excedente do consumidor para o uso recreativo de PCP com base no TCM ascendeu a 14.180.000 €, enquanto o WTP baseado na CV ascendeu apenas a € 7.640.000, cerca de metade. As possíveis razões para esta divergência são a existência de alguns fatores não convenientemente controlados que terão levado a uma subestimação da WTP pelo CVM, por exemplo, não detectado, apesar do

esforço feito nesse sentido, todas as respostas de protesto às questões da WTP. Por outro lado, a imprecisa, e possivelmente informação dada pelos entrevistados relativa ao tempo e despesas de viagem poderão ter sobreestimado o valor económico via TCM. No entanto, mesmo o valor monetarizado mais baixo estimado para o PCP, o valor obtido pelo CVM, é muito mais elevado do que os custos de investimento e manutenção anualizados reportados pela Gestão do PCP, o que significa ser o PCP um investimento com retorno largamente positivo do ponto de vista social. Desta forma a opção pela afetação de recursos ao PCP em detrimento de outras aplicações desses recursos passa a ter uma justificação económica mensurável.

Palavras-chave: Valoração Contingente, Método do Custo de Viagem, Floresta Urbana, Parque da Cidade do Porto, Valoração Económica

Abstract:

Valuing urban forest amenities is of utmost importance due to the high cost of such equipment and to the alternative uses of scarce public funds. The objectives of this study are to determine the monetary value of the largest Urban Forest in Porto metropolitan area—Parque da Cidade do Porto (PCP). Travel Cost Method (TCM) and Contingent Valuation Method (CVM) were used and the results from these two methods were compared. A total of 400 questionnaires were distributed and face-to-face interviews implemented with as much respondents. TCM and CVM were applied to the same respondents sample to estimate the economic value of PCP to its users.

The results show that most visitors are satisfied with the services provided by PCP, and the travel time, travel cost, age, education and income have a significant impact on the frequency of visits for individual. Besides, these social economic variables also have a significant influence on individual's WTP for using PCP. However, the results of TCM and CVM are not consistent; consumer surplus for recreational use of PCP based on TCM amounted to €14.18 million, while the WTP based on CV amounted only to €7.64 million. Possible reasons for this divergence are the existence of some practical factors affecting the behaviors of respondents. Non detected zero protest bids to the CV WTP question respondents would have caused the underestimation of WTP using this method- On the other hand the imprecise, and possible exaggerated information given on travel time and exaggerated bids of travel cost from respondents would have also generated inaccurate and over estimates of consumer surplus in TCM. However, the monetary values of PCP amenity benefits per year calculated from both methods are much higher than the total annualized investment and maintenance costs, so those net benefits can be

considered when planning the allocation of scarce budgets to the urban forest resources or other public competitive public equipments.

Keywords: Contingent Valuation, Travel Cost Method, Urban forest, Parque da Cidade do Porto, Economic valuation

Contents

DEDICATION	III
RESUMO	V
ABSTRACT:	VII
LIST OF TABLES	XI
INTRODUCTION	15
LITERATURE REVIEW	19
1. DEFINITION OF URBAN FOREST	19
2. ATTRIBUTES OF URBAN FORESTS	20
3. BENEFITS OF URBAN FORESTS	21
ESTIMATION METHODS FOR URBAN FORESTS	22
4.	22
4.1 <i>Contingent Valuation Method (CVM)</i>	22
4.2 <i>Travel Cost Method (TCM)</i>	23
4.3 <i>Some Empirical Studies</i>	25
CASE STUDY AREA	27
1. CASE STUDY CITY	27
2. CASE STUDY PARK	28
3. BENEFITS OF PARQUE DA CIDADE DO PORTO (PCP)	31
3.1 <i>Social Benefits</i>	31
3.1.1 Recreation and Exercise	31
3.1.2 Physical and Mental Health	31
3.1.3 Social Interaction and Community Cohesion	32
3.1.4 Educational Value	32
3.2 <i>Biological Benefit</i>	33
3.3 <i>Environmental benefits</i>	33
3.3.1 Landscape Enhancement	33
3.3.2 Air Quality	34
3.3.3 Hydrology	34

3.3.4 Energy	35
3.4 <i>Economic Benefits</i>	35
METHODOLOGY	36
1. PCP ECONOMIC VALUATION METHODS	36
2. SURVEY DESIGN	37
3. QUESTIONNAIRE DESIGN	38
4. WTP QUESTION.....	40
5. PILOT TESTING	42
RESULTS	44
1. ECOSYSTEM SERVICES OF PARQUE DA CIDADE DO PORTO.....	44
2. USE OF PARQUE DA CIDADE DO PORTO	45
3. SURVEY RESPONDENTS’ SOCIAL ECONOMIC CHARACTERISTICS	50
DATA ANALYSIS	53
1. DATA ANALYSIS USED TCM METHOD	53
1.1 <i>TCM Model Specification</i>	53
1.2 <i>TCM Model Result Presentation</i>	54
1.3 <i>Estimating Consumer Surplus</i>	57
1.4 <i>The Demand Curve for PCP Site</i>	61
2. DATA ANALYSIS USED CVM METHOD	62
2.1 <i>WTP Analysis</i>	62
2.2 <i>Protest bids analysis</i>	63
2.3 <i>Estimating WTP value</i>	65
DISCUSSION	67
CONCLUSIONS	69
REFERENCES	71
APPENDIX.....	77
1. MAP OF PORTO DISTRICTS	77
2. QUESTIONNAIRE.....	77

List of Tables

Table 1 A part of parks charge entrance fee in Portugal.....	41
Table 2 Benefits and important order of urban forest in Porto.....	44
Table 3 Correlation with visit alone age, house distance and visit frequency ...	47
Table 4 Socioeconomic profile of respondents (total 396)	51
Table 5 Regression result 1 (Visits/ year as dependent Variable).....	55
Table 6 Regression Result 2 (Visits/ year as dependent Variable).....	56
Table 7 Zone division and population.....	57
Table 8 Total Visits in last year	59
Table 9 Visits per 1000 population in each zone for the City Park in last year ..	59
Table 10 Travel cost from each zone to PCP.....	60
Table 11 Regression Result of visits/1000 and Travel Cost.....	60
Table 12 Total visits when assuming hypo entrance fee is 1 €.....	61
Table 13 Expected total visits with different assuming entrance fee	61
Table 14 Willingness to pay the entrance fee.....	63
Table 15 Frequency of protest zero bids and true zero bids.....	64
Table 16 WTP regression analysis	66

List of Figures

Figure 1 The city of Porto (Porto Metropolitan Area) (Madureira, 2011)	27
Figure 2 Green structure of Porto city in 2000 (H.Madureira, 2011).....	28
Figure 3 The boundary of Parque da Cidade do Porto in 1983 (Instituto Geográfico Português)	29
Figure 4 General layout of Parque da Cidade do Porto.....	30
Figure 6 Duration of a typical visit to PCP	48
Figure 5 Time preference to use the Park.....	48
Figure 8 Partners to the city park	48
Figure 7 Month use frequency of PCP.....	48
Figure 9 Motivations to use PCP	48
Figure 10 Satisfaction rates with some PCP environmental aspects.....	49
Figure 11 Demand Curve for Parque da Cidade do Porto	62
Figure 12 Frequency of various reasons for zero bids.....	64

Introduction

As the development of human society, urbanization is expanding rapidly and in a global scope. More than two thirds of Europe's population lives in urban areas (Forrest et al. 1999). Increasing population and urbanization is recognized as one of the most complex processes. The massive urbanization begun in the industrial revolution in the nineteenth century led to the increased public awareness to the need of introducing natural assets and components in urban contexts, what led to the creation and development of the urban park movement with the objective of increasing life quality in the modern city (Pregill et al. 1999). Urbanization can bring some benefits to human societies, such as concentrated populations and labor forces that facilitate production of goods and services, broader transportation systems that encourage trade and economic development, and even promote health care and public goods and services and so on, all resulting in higher overall living standards. However, urbanization has also resulted in a great deal of negative impacts on the environment, including encroachment on farmland and natural habitats, reduction in native biodiversity, enormous and concentrated consumption of energy and resources that result in equally large production of waste and pollution, and isolation of humans from nature (Carreiro et al. 2008). Thus, urban forests play an important role in constructing an ecological city, due to urban forests providing a number of valuable services to urban populations, like aesthetic enjoyment, recreational opportunities, environmental and agricultural functions. In addition, urban populations may hold values related to the preservation of gardens and parks for use by future generations. Thus, in many countries, the constructions and evolution of urban forests have been

considered as an important way to maintain urban ecosystem health, improve human living conditions and increase a relationship between human and nature. The same trend can be also observed in the Metropolitan area of Porto, Portugal.

In Portugal, with its progressive urbanization and important growth of urban areas and nature degradation throughout the 20th century, particularly the from 1960, the alienation between people and nature has increased. During this period, the urban park movement started (Madureira et al. 2011). Urban parks and other open green spaces are important for the quality of life in an increasingly urbanized society. Urban gardens and parks are designed to be a kind of space dominated by vegetation and established for public uses. These spaces are extremely relevant to the social human activities, such as the spatial planning and design, maintenance operations and even the increasing use for human recreation, also making a significant effect on the local fauna and flora.

Porto city itself underwent an enormous change in urban green space. At the beginning of the 20th century, green vegetated areas processed around 75% of the city. However, throughout the 20th century, more than half of the urban green structured area desapareared. With an increasing urban population, a higher demand for huge amount of construction consequently caused more and more land being occupied by buildings. Expanding urbanization resulted massively fragmented peripheral rural land converting to urban recreational land uses, such as some forest patches were integrated into the new public parks (e.g., Parque da Cidade, and Parque da Pasteleira), and some farming lands were transformed into public or semi-public parks or gardens (e.g., Parque de Serralves and Quinta da Bonjóia). Thus, yielding the larger urban parks mainly located in the peripheral parts of the city (Gullherme et al. 2014).

In this transitional area, public parks and gardens have some important benefits: providing larger habitats for urban biodiversity, acting a significant role in social recreations and human health. However, the benefits and

valuation provided by urban forest are always tending to be under-estimated when used a monetary item as a standard measure in the government policy to determine whether it is worthwhile to continue its provision or shift the resources to some alternative uses. Porto has seven public parks governed by Câmara Municipal, but few parks have been valued by economic methods. So a survey of economic valuation of urban gardens and parks is worthwhile as it could be an important usable criterion to the support of policy decisions and investments for city green infrastructures.

A monetary valuation study was designed and conducted to measure the economic valuation of PCP in Porto. Given the complexity involved in the economic estimation of PCP, contingent valuation methodology and travel cost method are outlined below in this study. Different methodological techniques are compared, contingent valuation was chosen as one methodology because unlike some other valuing non-marketed environmental resources methods, it can measure both use and existence value of an environmental resource.

This dissertation is organized into seven sections. Section one is the introduction, followed by section two which is the literature review describing the urban forest definition, attribution and the benefits of urban forest. Section three explains the study area and section four indicates methodology, survey design and pretest of the survey. The data analyses are presented in section five with two different methods, and results are discussed in section six. Then the last section concludes comments regarding to the non-market economic valuation reports.

Chapter 1

Literature review

1. Definition of Urban Forest

Urban Forestry is a specialized branch of forestry that has as its objective the cultivation and management of trees for their present and potential contribution to the physiological, sociological and economic well-being of urban society. Urban forestry is one of the most used terms in relation to trees in or near the urban environment. But urban forestry has had difficulties in finding a final definition (Forrest et al. 1999). Europe is a continent characterized by diversity with a rich mixture of countries, regions, cities, cultures, traditions, languages, landscapes and economic development, which reflected the difficulties about defining a consensual concept of urban forest in different cultures and languages (Cecil et al. 2006). In Europe, there is a long history of urban forestry, regarding to the management and conservation of woodland owned by city authorities, and this adds to the difficulty of a unique definition of urban forestry due to the diversity of urban forests types, uses and management (Konijnendijk 2003).

Nevertheless, urban forest most generalised definition is to define it as the art, science and technology of managing trees and forest resources in and around urban community ecosystems for the physiological, sociological, economic, and aesthetic benefits trees provide society. So broadly defined, urban forestry and urban forest include all tree stands and individual trees in and around urban areas (Cecil et al. 2006).

2. Attributes of Urban Forests

To look into the economic and ecological characteristics and values of urban forests, attributed analyses can provide useful details. Urban forest attributes includes tree cover, such as amount or percent tree cover, specific locations and distribution of tree cover, amount or percent potential planting space, specific locations and distribution of plant able space. Also forest structure is a measure of diverse physical attributes of urban vegetations, like species composition, species diversity, tree density, tree health, distribution, leaf area and biomass (Nowak et al. 2007). Even, from forest functions sides, energy conservation for residential homes, carbon sequestration and storage by trees and air pollution reduction, all can be used to quantify the attributes of urban forest enables researchers to relate forest structure to specific forest values and uses.

Urban forests are diverse and interconnected ecosystems. The characteristics of diversity, connectedness and dynamics about urban forests have significant implications for urban forest sustainable management of forest structure, health, benefits and uses (Dwyer et al. 2003). Diversity is one of the most distinctive attributes of the urban forest. The multiple land uses and diverse species create complex landscape patterns, which include a wide range of wildlife, ground covers, soil types, microclimates, people and infrastructure. The mixture of natural and humanmade resources encompass such attributes as wildlife management; mitigating air pollution; enhancing aesthetic value; and providing recreation, flood control, and fire prevention. Connectedness is another important attribute of urban forest. Urban forests are connected to other elements of urban environments, including roads, homes, people, industrial parks, and downtown centers. Urban forests also connect landscape with architecture when progress urban planning and design. Besides, there always exist a critical link between human and urban forest resources. The appreciation

and education about natural resources present though urban forest preserves; the experiences, perceptions and uses are likely influenced by the associated resources in the urban environment. Even, urban forests and their management are always related to the issues about recreational opportunities, aesthetic enjoyment, flood control, energy conservation, air and water quality improvement (Dwyer et al. 1992). Like all forests, urban forests also grow, develop and success over the time. Dynamic is also a key attribute of urban forest when coupling the relatively biological processes with the expansion and development of urban areas. The combinations of land use transitions and urbanization alterations change the artificial surfaces and ground vegetation, tree growth, species introductions, environmental conditions and management objectives.

3. Benefits of Urban Forests

Urban forests can enhance the city environment by influencing temperature, wind, humidity, soil erosion, air quality, landscape quality, wildlife diversity. Each of these influences has significant implications for the well-being of urbanites.

Urban forests are also important to people especially through symbolizing personal, local, community and cultural meanings. They provide aesthetic enjoyment and create a pleasant environment for different outdoor activities. Urban forest can provide an experience of nature in the middle of urban life. In particular, urban forest with big trees may provide urban people with the opportunity to recover from daily stresses. There is also an important educational value of urban forests. Contact with trees, in particular for children, can help them learn about nature and natural processes in an otherwise artificial environment. Urban trees and woodland also contribute to an attractive green city landscape and thus communicate the image of a positive,

nature-oriented city. Indirectly, urban trees and forests can promote tourism and enhance economic development. At the local level trees contribute to the quality of housing and working environments and their benefits are reflected in property values. The same urban woodland areas and trees may have multiple benefits that reinforce each other. Recreational woodland, for example, also reduces wind speed and traffic noise as well as improves the landscape in a nearby residential area (Tyrvaainen et al., 2005).

4. Estimation Methods for Urban Forests

Measuring urban forest recreational benefits can be accomplished in several different ways. Non market goods require the construction of a hypothetical market to estimate their value (Kahn, 1995).

4.1 Contingent Valuation Method (CVM)

Contingent valuation is a method for placing a monetary value on a good or a service. It is a survey-based and a stated preference method, because it relies on people reporting how much they would be willing to pay for a good or a service by creating a hypothetical market. CVM questionnaires can be designed to elicit willingness to pay (WTP) or willingness to accept (WTA) to estimate a change in the level of provision of a public good. If money is used as the standard to measure welfare, the measure of benefit is WTP to secure that benefit, or WTA to forgo the benefits (Bateman et al. 2002). The decision to use WTP or WTA depends on the property rights of the good. However, WTA estimates are often biased upwards; therefore most of CV studies are designed to elicit WTP estimates (Mitchell and Carson, 1989).

The CVM is at present the most frequently applied method in the valuation of environmental assets. Mail surveys or interviews (in person or by telephone)

are normally used in data collection. In a CV survey the respondents are asked what they are willing to pay (WTP) towards the preservation or an improvement of an environmental asset. The researcher can then estimate the monetary value of the asset by calculating the average WTP of respondents and multiplying this by the total number of consumers. As the CV questionnaire is the principal tool for using the method, formulating a good questionnaire is crucial. Typically, CVM surveys have three types of components: a description of the good being valued and the situation in which the respondent has to imagine him/herself; willingness to pay questions for the environmental good; and questions concerning general attitudes towards the good in question and the socio-economic characteristics of the respondent (Ana Alberini).

The willingness to pay (WTP) is the maximum amount a person would be willing to pay to get a good or service, or to avoid some undesired things. WTP is a good way or an answer for public or market to well managed and conserved about urban forests and natural resources. It is typically used for non-market goods and services. And it is a method that measures whether an individual is willing to sacrifice their income in order to get more or better goods and services.

There are different ways to ask willingness to pay questions in contingent valuation surveys, which are known as elicitation methods. Recently four types of elicitation methods are commonly used in CVM studies, include: open-ended, payment card, closed-ended single-bound dichotomous-choice and double-bound dichotomous-choice, bidding game (Ahmed 2006). Open-ended question formats was used in this CV survey.

4.2 Travel Cost Method (TCM)

The basic notion of Travel Cost Method was originally proposed by Harold Hotelling in a letter to Park Services in 1974, later Jack Clawson and Marion

Knetsch refined the method in 1966, and since then, it has been wildly refined and adopted. TCM is one of the most popular methods for estimating recreational values. It aims to convert the physical and social benefits produced by outdoor recreation into monetary terms (Ward and Beal, 2000). The basic theory behind the travel cost method in valuing non-market goods, especially recreational sites and recreational activities, is that the travel cost is the implicit price visitors pay for their trip to access sites or to be able to take part in particular activities (Becker et al., 2005).

The basic idea of the TCM is that the travel cost and time expenses that people spend when visit a site, that is, representing the total price of access to the site. Thus, peoples' willingness to pay to visit a site can be concluded based on the number of trips and the different travel costs produced by a certain period, which is similar with estimating peoples' willingness to pay for a marketed good based on the quantity demanded at different prices. When apply the travel cost analysis of the demand for an environmental good, three major dimensions should be concerned: one is how demand depends on quality of the good (for example, roads quality or landscape quality in a forest); Second is related to the number and duration of trips during a period of time such as a year; Third concerns the treatment of substitute sites, for instance, when a visitor want to a public park faces choices of several parks.

There are three approaches for TCM: Zonal TCM, Individual TCM and Random Utility TCM. Zonal TCM is an original and simplest approach, and always uses most secondary data with some simple data collected from respondents. However, it is a certain restriction to estimate the value of recreational services of a site as a whole, like it is not easily value the changes in quality of a recreation site, or account the factors that may be important of determining the value. Individual TCM is similar to Zonal TCM, but uses survey data from individual respondents (rather than average data from each

zone) to estimate the value. While Random Utility TCM assumes individuals choose the site which they prefer. Among all sites, they may make tradeoffs between site quality and price of travel. But Random Utility TCM requires data about all possible sites that a respondent may select, their quality characteristics, also travel costs to each site.

4.3 Some Empirical Studies

There were plenty of studies used TCM or CVM or jointly both to estimate the value of the environmental goods and services. Emiriya (2013) used the Individual Travel Cost Method studied the monetary value attached on Nyanga National Park (NNP). They found that NPP was highly valued by a consumer surplus of US\$9426.0576 per year or US\$134.678 per average visitor and they also discovered that substitute sites, income and travel costs affected the visit to NPP in negative correlations.

Mohammadi Limaie et al. (2014) used TCM for evaluating the recreational and socioeconomic values of Masouleh forest park in Iran. Results in this study indicated that travel time and travel cost had negative correlations with the number of visitors, and age, education were effective influencing the use of park. Otherwise, willingness to pay decreased with increasing entrance fee.

Tyrvaainen (2001) also investigated a study on the valuation of urban forests in two different urban environments Joensuu and Salo in Finland. The results showed that urban forests in two towns both produced positive benefits with more than two thirds of the respondents were willingness to pay for the use of recreational areas. Moreover, it also indicated that around half of the respondents were willing to pay for preventing construction in urban forests. And good location and active management increased the average WTP. Besides,

the outcome also stressed that the monetary value of amenity benefits in both areas was much higher than the maintenance costs.

Utpal and Amrita (2011) estimated the recreational benefits by both TCM and CVM for Cherrapunjee. They examined that travel distance and travel cost had significantly negative impacts on the frequency of visit while education and income had positive impact on the individual visit. And the estimated recreational benefits obtained from the expressed WTP for improvement and preservation of the site had significant influence on the policy implications.

Mayor, S. et al (2007) used two valuation methods TCM and CVM based on one dataset to check the monetary value of the recreational use of Irish forests and to test convergent validity. They found that there were no convergence between the two results, since the WTP tended to cluster around 1R£1 per trip, while the TCM results of consumer surplus ranged between 1R£2.38 and 1R£5.95 per trip. Possibly, they thought this was due to the misinterpretation of the questions and the larger number of protest bids.

A case study on the recreational value of the Czech Paradise Geopark investigated by Jan Špaček and Michaela Antoušková (2013). Data gathered in the survey used to develop the single site travel cost model and determine the consumer surplus. The dependent variable in this model was the number of visits and the variables included travel costs, age, education, family status, economic activity and family income. The results in this research proved a positive correlation between the number of visits and age and the highest obtained education. Besides, economic activity and income had significant influence on the demand for the geopark. The consumer surplus in this study was determined as CZK 497.7.

Chapter 3

Case Study Area

1. Case Study City

The platform of Porto is composed of successive terraces leading down to the Atlantic Ocean, and the geomorphology of the city is shaped by the watershed, with the Douro River running through the south part of the city and separating two cities--Porto and Gaia (which is located on the south bank of the Douro River, on the opposite side of Porto), and to the west part, the city is surrounded by the Atlantic Ocean. A map of the city is presented in figure 1 (Madureira 2011). The population in the urban area of Porto in 2011 was circa 1,4 million inhabitants (ITDS [2011]) in an area of 389 km² (Demograpia [2015]), making it the second-largest urban area in Portugal, after Lisbon the capital city.

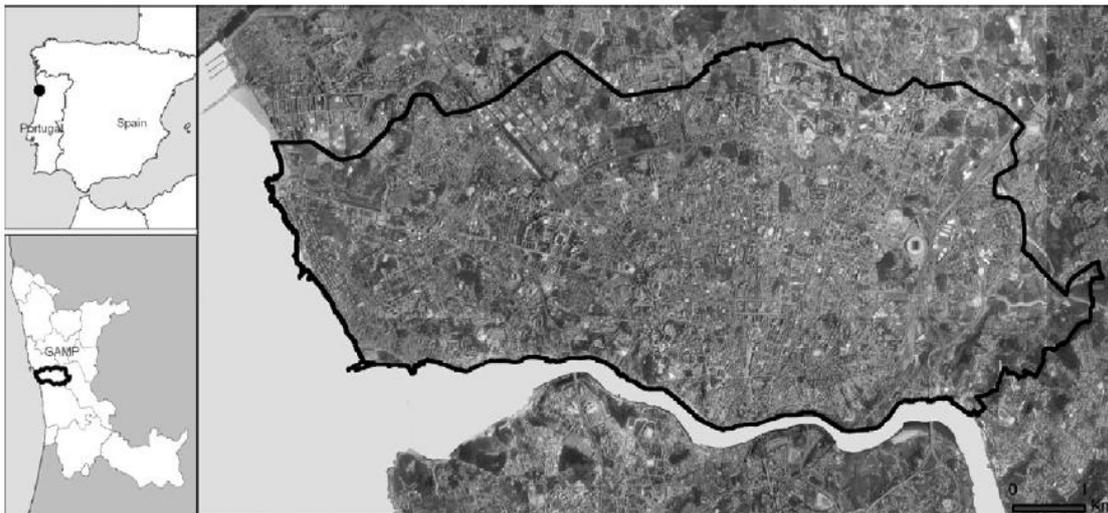


Figure 1 The city of Porto (Porto Metropolitan Area) (Madureira, 2011)



Figure 2 Green structure of Porto city in 2000 (H.Madureira, 2011)

Green spaces in Porto are rather fragmented and discontinuous (Figure 2). In the end of 19th century, despite the industrialization, Porto was still a very green city, with an enormous rural belt and agriculture land, and other tree-covered areas, which occupied more than 75% of the whole city. While after 20th century, the green area in the city dramatically decreased, taking up less than 30% of the city area. At present, public parks and gardens occupied around 4% out of the municipality total area, while representing around 70% of the green area of the city (Paulo et al. 2012).

2. Case Study Park

The construction of PCP was landmark in the urban park movement in Portugal, using as a main concept in the beginning of its designing the representation of rural landscapes and not only the establishment of ecological functions. While afterwards it developed into different styles taking more ecological criteria into consideration, as well as environmental education and

social integration functions (Luis et al. 2007). PCP is the largest urban park in Portugal, with a surface of 76.1 hectares and the park mainly consists of naturalized green spaces, extending towards the the Atlantic Ocean seaside, its boundary to the West, giving a it rare feature (Figure 3¹).



Figure 3 The boundary of Parque da Cidade do Porto in 1983 (Instituto Geográfico Português)

The park was designed by landscape architect Sidónio Pardo, and opened up to the public in 1993 (1st phase) and ended fully later, with all stage of construction completed, in 2002. The design strategy of this park was based upon several design strategies used in the construction of representative parks built from the seventeenth century till the twentieth century. In its species selection, slope creation and the development of environments were required not only for visual importance, but also for ecological and recreational purposes.

¹ Figures 3 and 4 were kindly supplied by Eng. Rui Afonso, from Parque da Cidade Administration.

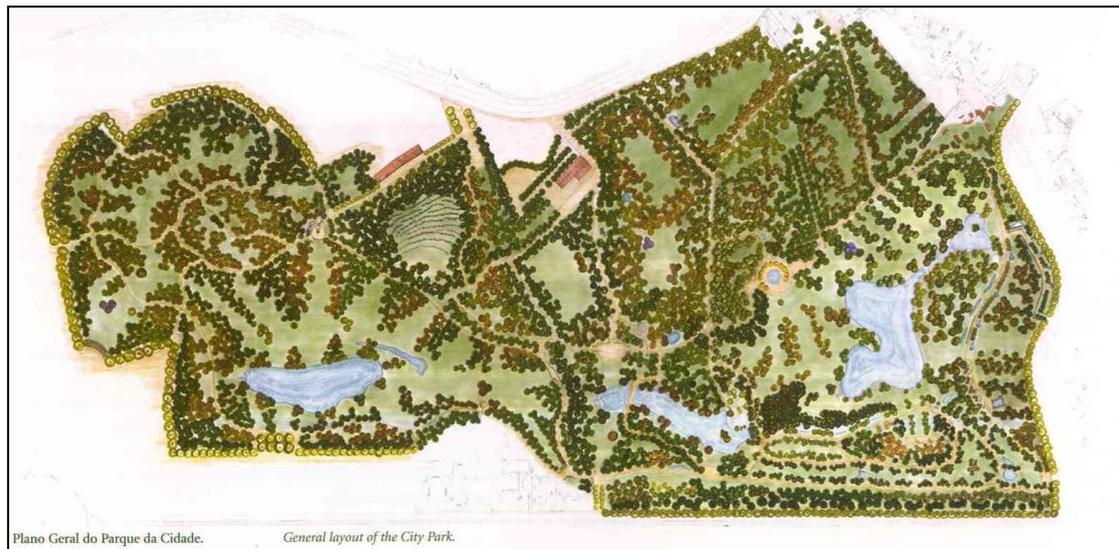


Figure 4 General layout of Parque da Cidade do Porto

In this park, a lot of traditional techniques of rural construction are used, such as the construction of retaining walls, dischargers surface of lakes, ponds, shelters, borders of paths and pavements, which give an impression of independent spaces, natural and a great powerful landscape structure.

The park is full of lakes, lawns, small groves of trees, water features, lush vegetation and natural stonework. The flora of the park is rich and diverse; as it is stated in Parque da Cidade website² there are 74 tree species, 42 shrub species, 15 species of fruit trees and 10 aquatic species, in total, tens of thousands of copies. The city park is an artery that effectively joins Porto with the Atlantic Ocean, becoming a main host area to many migratory birds, which positively conserve the biodiversity. According to the Parque da Cidade Administration, the overall cost of the park establishment was around 13.1 million euro (16.25€/m²), and 1 million euro (1.3€/m²) to maintain and manage it every year.

² Information available at the online address: http://www.cm-porto.pt/ambiente/parque-da-cidade_2

3. Benefits of Parque da Cidade do Porto (PCP)

PCP is planned at the regional, city and neighborhood levels, which takes into consideration both ecological principles and the needs of people about green space and recreation. PCP serves diverse interests of different users that include a place for physical activity to improve health, active and passive recreation, nature experience, increasing property values on surrounding areas and rising the number of businesses and jobs that contribute to the regional and local economies. Moreover, it also promotes the environmental values like clean air, lower temperature, improve watershed, protect habitat and improve local micro climate.

3.1 Social Benefits

3.1.1 Recreation and Exercise

One of the general functions of PCP is the provision of recreational opportunities. In PCP, walking seems to be the most common recreational activity. Other common activities are cycling, jogging, picnicking, and playing football. Since there are specific trails for jogging and cycling, Porto City Park is one of most popular places for citizens to do exercise. And, there are users who live nearby and who use the park for daily physical exercise. Besides, social recreation with family, neighbours and friends in the park is also a common group outdoor recreation.

3.1.2 Physical and Mental Health

Urban forest and trees contribute to a better quality of living environment in our cities. PCP has various natural species, which can improve air quality, thus improving health of urban residents. Besides, by offering an attractive

environment for recreational activities, the park also induces people to become more active during their leisure time, which has a positive effect in people's health. Moreover, the scenery of PCP can also affect the health by reducing stress.

3.1.3 Social Interaction and Community Cohesion

Green space and trees may help to facilitate positive social interaction amongst neighborhood members (William et al., 2004). Several studies have shown that urban forest can make important contributions to the economic vitality of an entire area as a kind of "common property" (Dwyer et al. 1992; Nowak et al. 2007). Active programs involved in urban parks enhance a community's sense of social identity, self-esteem, and territoriality. According to the data from administration, every year there were around 100 events involved and more than 150,000 persons participated. Also, among those people, some perceive PCP as a perfect place to have fun with friends, enjoy with families, and meet colleagues or neighbors. Besides, PCP as one of a largest greening land in the city, also provides a good space for people to reduce feelings of social isolation, which is a risk factor related to depression for young and older people (Townsend. 2006).

3.1.4 Educational Value

Urban parks and gardens, especially botanical gardens with rich collection of trees and plants, have a huge potential educational value. In PCP, there are always some school parties or students visiting the park to establish nature trails through the park as an education tool. Contact with the trees and animals, particularly for children, the park help them learn about nature and natural processes in a semi natural environment.

3.2 Biological Benefit

Biological benefits of PCP include providing habitat area and increased biodiversity, increased opportunities for wild species mobility. Especially for urban biodiversity, urban parks are the most investigated areas in Porto (Gullherme, 2014).

PCP is significant in ecological benefits by harboring a high number of species. For flora, there are 74 tree species, 42 shrub species (, 15 species of fruit trees and 10 aquatic species, in total, tens of thousands of plants. While there is also a wide diversity of fauna, wild ducks, swans, geese, moorhens, different kinds of fishes, toads, frogs, rabbits, various reptiles, all of these are growing in a natural way. Besides, since the park is closed to the sea, it is also a main area for hosting many migratory birds. As well as, the park also can function as corridors and improve habitat connectivity on a city scale (Gullherme, 2014).

3.3 Environmental benefits

3.3.1 Landscape Enhancement

There is a long history that building parks or gardens in urban area for the purpose of enhancing the visual character. Trees planted in PCP add variety and richness to the urban landscape with their different foliage and blossoms, colors, shapes and heights, and also enhance the living environment by reducing glare and reflection. PCP also adds the coherence of city landscape, complementing architectural features. Moreover, PCP helps to establish a sense of cultural identity. As well as considered as a source of civic pride on the concept of a “green city”.

3.3.2 Air Quality

With regard to air quality, the metropolitan area of Porto is considered to be one of the most polluted regions in Portugal. Normally, the road traffic exhaust emissions attribute to most pollution problems with some pollutants like CO, NOX, PM10 (Monteiro et al. 2007).

Nationally, urban trees and shrubs offer the ability to remove significant amount of air pollutants and consequently improve environmental quality and human health. There are various studies suggesting that urban forests on air pollution could be a viable strategy to improve air quality and help meet clean air standards, For example, United States demonstrates that urban trees help remove large amount of air pollution (O₃,PM₁₀,NO₂,SO₂,CO) which estimated at 711,000 metric tons, around \$3.8 billion value (Nowak et al. 2006). Though there are no relevant studies concerned PCP influences on air quality, it can be assumed reasonably that PCP plays a positive impact on air quality through deposition of pollutants to the vegetation canopy, sequestration of atmospheric CO₂ in woody biomass, and reduction of summertime air temperatures.

3.3.3 Hydrology

Plants in PCP can help remediate soils by absorbing, transforming, and containing a number of contaminants and reduce surface runoff, thus alleviating the strain from the urban sewage system and dampen peak flows of streams. Otherwise, trees in PCP could protect drinking water resources. Trees in urban area can divert captured rainwater into soil, where bacteria and other microorganisms filter out impurities. This reduces urban runoff and the amount of sediment, pollutants, and organic matter that reach streams (Pedroso et al. 2007).

3.3.4 Energy

Trees can reduce building heating and cooling energy needs, as well as consequent emissions of air pollutants and CO₂ by power plants, by shading buildings and reducing air temperatures in the summer, and by blocking winds in winter (Nowak, 2007). PCP has direct effect on the surrounding buildings by providing shelters, cooling the temperature and altering the energy balance. Since various plants in the park help increase albedo, changing the micro climate around the park, thus, furthermore, modifying the energy balance of the whole city, producing city climate changes. While, indirectly affect the energy use in individual building. The City Park not only shades building, provides energy savings to the local people through the hot months of summer, but also reduces emissions related to temperature changes.

3.4 Economic Benefits

Many studies focused on positive influences of house prices produced by the presence of trees and urban green spaces and house prices (Kolbe et al. 2015). And from the study of Mansfield et al. (2005), it suggested that forests increased home sale prices. PCP with well-maintained trees and landscapes, may has positive effect on house price and the business located in the area have been shown to attract more residential, commercial and public investments. Furthermore, the park itself and its management needs also support some job opportunities which improve individual income, local and state taxes, promoting the economic value. Moreover, include all businesses and government units involved in installing, distributing and maintaining plants, trees, landscapes and related equipment, the park also outputs a certain economic values.

Chapter 4

Methodology

1. PCP Economic Valuation Methods

The Travel Cost Method (TCM) and Contingent Valuation Method (CVM) were used and compared to estimate the value of the public environmental services in this article because recreational sites about PCP are not traded in markets, and having no market prices. But since both methods are fundamental on the assumption of all the goods can be valued by monetary terms, and that values are based on the goods` utility to people, so we can dedicate three assumptions in this survey: the utility functions of the park exist; the non-market good can be valued by these utilities to human, and that value can be empirically estimated by TCM and CVM.

The contingent valuation method was selected in this case because PCP not only has important use values for users, also processes significant magnitude of non-use value. And since the park located in periphery of the city, not a great amount of people visit it, to avoid the underestimation of benefits by other method, in this case, CVM is necessary. While CVM is not a flawless approach to measuring the economic benefits, the method also has great flexibility, hypothetical bias. So the travel cost method was also selected to analyze in this case for four main reasons: PCP is primarily valuable to people as a recreational site; TCM method is based on actual behavior of what people actually do rather than what people say they would do in a hypothetical situation; travel cost method is a relatively inexpensive method which can also make sense about estimate the value of the Park; compared the outcome of estimated value from TCM and CVM can help avoid the bias caused by both methods.

2. Survey Design

A field study was designed and executed to estimate the economic value of PCP. Since each study area is different, and monetary valuation surveys are also complicated, intricate and hard to design, so this kind of surveys need to be carefully implement based on the social, political and environmental situations in different areas (Foster, 2010)

In terms of time necessary to collect data, cost, sample control, quality of data, quantity of data, response rate and the degree of complexity and versatility allowed, there are four different survey modes: internet surveys, mail surveys, telephone interviews and face-to-face interviews. In this survey, we chose face-to-face interviews to make sure a high response rate, greatest sample control and providing potential question aids for respondents.

The data analysed in this study came from our survey to PCP visitors conducted along July 2014, for a full month- the decision to do the survey in this month because it is the peak month for vistis to PCP. And thus allows a more comprehensive, larger and more diverse sampling of PCP visitors. The survey took place in various locations within the park and on the seaside beach which is also part of PCP. Also, care was taken to spread the interviews along different day times, from early in the morning to late in the afternoon, to reach. These sampling strategies aimed at recruiting PCP users as respondents showing all the different types of PCP use. The questionnaire used in the survey was designed to extract information about respondents' perceptions of performance and attribute importance, expenditures, destination, and willingness to pay for PCP, and also on respondents' characteristics and background information. Respondents were chosen randomly, but children under 15 years old were not chosen to ensure that all respondents were finatially independent and able to express WTP by their own making market choices, and also to ensure that every

respondent could fully understand all the questions posed. The questionnaires were completed by the respondents with one or two interviewers present nearby and prepared to instruct and answer individually any questions raised by respondents. For respondents who had difficulty to read the questions, interviewers helped them reading aloud avoiding with such procedure to reduce the rate of non valid answers. Moreover, the aim of interviewers staying nearby was to make sure that all the questions were answered, as for some questions respondents left alone would be less willing to answer and would be more likely to skip them.

The survey questionnaire final draft was modified by two native Portuguese native speakers, to ensure clarity, Professor Miguel Sottomayor and Eng. Rui Afonso, the technical staff manager who is responsible for this public park.

3. Questionnaire Design

In order to make the survey more effective and the questionnaire questions less ambiguous to respondents, the questionnaire was structured in four sequential groups of questions, or parts. Part I is about users' attitudes and preferences for the different seven public parks in Porto. Part II is about users' usage and experience with PCP; Part III includes the CV WTP questions and also questions on the reasons for "zero" answer, and Part IV is about respondents' personal characteristics and background. The full questionnaire used in the survey is given in Appendix 1.

The first part of the questionnaire is about introductory and attitudinal questions of all seven public parks in Porto, which can be thought as a kind of warm up questions. These questions are relatively general and easy for respondents to answer before moving forward to the next parts, which first give

them an initiation of public parks, and then move along to a certain single public park. There are seven public parks in Porto, in the brief introduction of this part, respondents can get the first sight of all the public parks, give their satisfaction with these parks, then think a while for its functions. Although the main purpose of the survey was to get information concerning PCP, these questions on the other public parks in Porto were considered also important, as they help to settle information on the level of knowledge about all the available urban parks, and to know the extent their use compete with each other in the users' mind.

Specific questions regarding the PCP value to users were asked in the second part of the questionnaires such as distance from the park, kind of vehicle to access the site, number of visits every year, travel time and cost to the Park, time preference and the amount of time spent in the park, motivations and accompany group to the park.

The third part includes is the key CV question on the WTP to pay to access the site. An open ended question was applied to ask the maximum willingness to pay for using the park. Next, and in order to identify likely protest answers, some possible reasons for zero answers were displayed, and zero answers respondents were asked to indicate the ones which apply to them. In the fourth part some general questions were asked such as: gender, age, education, family size, profession, environmental organization membership, family income per month, and residence area.

More explanation about the questionnaire composition is given below:

- Age classes in the questionnaire were 15–18, 19–24, 25–35, 35–45, 46-65, 66-80 and more than 80.
- Visiting time to access the park was before 8:00, 8:00-9:00, 9:00-12:00, 12:00-15:00, 15:00-18:00, 18:00-20:00, and later 20:00 in the evening.

- Time spent in the park was less than 0.5 h, 0.5–1 h, 1–1.5 h, 1.5–2 h, 2-5 h and more than 5 h.
- Kinds of recreation were bird watching, cycling, reading/studying, dog walking, jogging, café, meeting friends, children play, team sports socialize, walking and experience pure air and nature.
- Education classification was such as primary school, secondary school, college degree/bachelor, M.Sc. and PhD.
- Family income was independent in a page, classified into: A:<500, B:501-1000, C:1001-2000, D:2001-3000, E:3001-4000, F:4001-5000, G:5001-6000, H:6001-12000, I: >12000 (Euro)

In this survey, the questionnaires consist of two forms of structured questions: open format questions and closed format questions, in which there are dichotomous questions, rating scale questions and multi-choice questions.

4. WTP Question

Although according to the recommendation of NOAA Panel, which endorsed a dichotomous-choice question rather than an open-ended question, in this case, open-ended question makes more sense for the economic valuation based on the degrees of quality about the park and benefits that respondents could get. Since it opened up for the public, the entrance fee of PCP is for free. And around the city of Porto, there are few parks charging tickets, so it is very easy to make bias by giving a range of possible values for respondents to pick up.

We investigated some public parks in Portugal which request prices for the entrance, such as the Serralves Park in Porto requests 4--8.5€ for entrance fee,

Biological Park of Gaia take 0-6€ (depending on the age) to enter the park and Estufa Fria and Estufa Quente in Lisbon also charge 0–3.1€. (Table 1)

Table 1 A part of parks charge entrance fee in Portugal

Name of Park	Location(city)	ticket price €	
Estufa Fria and Estufa Quente	Lisboa	Adults	3,1
		Children and teenagers(6-18)	2,33
		Students	1,55
		Pensioners	1,55
		Children under 6 years old	free
		Lisboa card;Sundays and Bank Holidays until 14h00;School groups with previous scheduling	free
Parque e Jardim da Fundação Serralves	Porto	Museum and Park	8,5
		Park	4
		Youth card/Porto card/senior citizens over 65	50% discounts
Chalet and garden of the countess of edla	sintra	Youths 6-17	7,5
		adults18-64	9,5
		Seniors>65	8,5
Parque Biologico de Gaia	Gaia	children up to 6	free
		youth 7-17	3
		adults 18-64	6
		Seniors>65	3
		Family(up to 2 adults,2 jovem, 3 children)	15

Relying on these data, we provided the price range to the respondents which can be as a reference anchor when answering the WTP question. So people can easily get a similar value from those parks that would not produce much deviation. In CV studies, it is quiet important to give an appropriate WTP question since it based on a hypothesed market and can influence the responses of samples. In Portugal people who run public parks have different policies

concerning the conditions to allow its use by the general public. In most cases there is no charge, but in a few cases there is a small charge as we talked above. So we tried to make the WTP question as following:

*We want you to imagine that there is a fixed entrance charge anytime you want to use, as you currently use, Parque da Cidade do Porto, but you will not be really charged at present or in the future. Our question then is **how much would be the maximum amount you would be willing to pay for getting into the Parque da Cidade?***
_____Euro

5. Pilot Testing

Pre-testing for the survey questionnaire is essential before the survey was conducted. After the questionnaire design being completed, carrying out a field pilot by asking some respondents if the whole questionnaire can be understood well, and if they can understand the intended meaning of each question, and whether it is also necessary to explain their answers, to state any problems and difficulties they may have, so as to using the pre-testing results to refine the WTP question and to diminish response errors originating from the respondents' misunderstanding of the description of the questions.

More than one round of field pilot may be required if a number of problems are detected in the questionnaire design. In environmental survey applications, samples typically range from 25 to 100 respondents in each pilot (Bateman, 2002), depending on the complexity of the survey, the total sample size, and the questions model.

In order to obtain perceptions of survey and the reflection of the questions in the questionnaire, in this survey, a pilot testing was taken before the final survey experimented. We contacted 12 respondents and ask them to fill the

questionnaire. After this pilot sample was interviewed, we recorded the time each respondent took to complete the questionnaire (8 to 12 minutes), and asked if there were difficulties for them to understand each question, or if there were questions offending them, having in mind especially some sensitive questions like age, income.

Chapter 5

Results

1. Ecosystem Services of Parque da Cidade do Porto

The survey found that respondents perceived many different services provided by the urban forest in Porto (Table 2).

Table 2 Benefits and important order of urban forest in Porto

(1: most important, from 1 to 5, importance decreasing; 0: no importance)

Benefits of Urban forest	Benefits Importance Bids (%)						
	0	1	2	3	4	5	Total
Filtration of air	24.0	26.3	11.4	11.4	9.8	17.2	13.8
Reduce temperature	85.4	2.8	4.0	2.0	3.8	2.0	2.7
Habitats for wildlife	49.5	10.1	12.1	10.9	10.9	6.6	16.5
Provide space for recreation	56.1	7.3	12.4	9.3	8.8	6.1	8.0
Reduce noise	59.1	4.3	10.4	11.1	8.8	6.3	7.4
Physical and psychological health	19.4	25.3	17.9	14.9	8.8	13.6	14.6
Increase house price	91.4	1.8	1.8	1.0	0.8	3.3	1.6
Provision of shade	69.4	3.3	5.6	6.8	8.3	6.6	5.5
Aesthetics and Beautification	68.9	4.0	5.6	6.8	7.6	7.1	5.6
Biodiversity conservation	38.4	7.3	10.1	13.4	17.9	12.9	11.2
Watershed protection	71.5	2.3	5.1	6.3	7.3	7.6	5.2
Wood supply	92.4	1.0	1.3	2.5	0.8	2.0	1.4
Tourism attraction	63.9	7.6	4.5	5.6	6.1	12.4	6.6

The most frequently and importantly cited service were filtration of air (26.3%), indicating that most people believed the benefits related to nature valued most. Generally, for the most important, more people chose filtration of air as the first place, then second is physical and psychological health. While, if consider importance, the most frequently bid was habitat for wildlife (16.5%), following by physical and psychological health (14.6%) and filtration of air (13.8%), which are classified to biological benefits, social benefits and environmental benefits as we discussed in the beginning of this article. However, economic benefits may be not noteworthy in this city park, since just 1.6% bids for increasing house price benefit and 1.4% for wood supply. That means most users have obviously realized or consciously considered the park as a social, environmental and healthy recreational site, rather than a business or an economic area, even though the park brings economic benefits for a part of residents.

2. Use of Parque da Cidade do Porto

In general, the respondents had positive attitudes towards urban parks in Porto, and particularly towards PCP. The rate of use for urban parks in Porto was very high, with 99% of all respondents reporting having used urban parks of Porto at least once in the past. Also PCP are actively used, with 5.1% of the respondents stating use of it more than twice a week, 25.5% of the respondents visiting the city park at least once a week, and 6.6% of users visiting the park daily. More than 54% respondents live more than 5km way from the park, and 12.3% live within 1km radius of the park area, which suggests that people living close to the park may have been less likely in answering the questionnaire, a possible bias of the survey. The most frequently transport method to PCP is a

private car (65.3%), then public transportation (17.5%), and 11.8% by walking for those living very close.

Most people prefer to use the park from 9:00 to 12:00 and 15:00-18:00, these two time periods, are visiting peaks (Figure 5). Although 19.5% rates indicated users stayed in the park from 12:00-15:00 which was between the two peak time period, it was still much lower than the nearby peaks (31.3%, 31.9%), the reason could be that some people need to go away to have lunch. Short visits to the city park were not typical since 90.6% of the duration on a visit was usually more than 1 hour , among which 36.1% users stay in the park for 2 to 5 hours, even 7.3% reported that stayed in the park more than 5 hours (Figure 6). It could be drawn that forest use was relatively much active in the city park. Especially from May to September, there were more users choosing to entertain in this park, with a peak in July, 15.3%, and 9.8%, 14.4%, 14.1% and 9.0%, respectively for May, June, August and September (Figure 7).

Activities in this park include bird watching, cycling, jogging, team sports, picnic, study or pure air experience. Most of visitors who visited the park come from cities around Porto, such as Maia, Gaia, Bonfim Ramalde and Campanhã. Usually, they come in the weekend to relax, and enjoy the gorgeous view and fresh air in the park. The result showed that approximately 66.7% of respondents use the park for walking, 55.8% for pure air and natural experience and 58.1% for enjoyment with family and children (Figure 9). This result indicated that most people are interested in using the park as a natural and social environment site to experience nature and recreate. Also, most respondents expressed that they preferred to go together with family (41.8%) and friends (33.5%), just 10.1% of the users always go alone (Figure 8). Applying SPSS statistical package software to calculate the correlation about the lonely visiting group of users had a significant correlation with distance and

age, and visit frequency (Table 3). For house distance, correlation -0.243, that means with the distance decreasing, visitors going to the park alone increased, and the visits frequency also increased. Also this group of visitors trend to be older people with the positive correlation Sig 0.367.

Table 3 Correlation with visit alone age, house distance and visit frequency

	Distance	Age	Visit Frequency
Lonely Visiting	-,243**	,367**	,406**
Distance		-,248**	-,402**
Age			,278**

** . Correlation is significant at the 0.01 level (2-tailed).

There is a relatively high rate of satisfaction (98.7%) with public parks in Porto, which 43.4% respondents expressed very satisfied and 55.3% satisfied, while there were also 0.5% respondents thinking very unsatisfied with the public parks in Porto because some environmental aspects. Regarding to the city park, around 3.5% users reflected that the security, public toilets, and shower place are very bad. 28.5% respondents expressed that they never heard of shower facilities after exercise, and 14.9% users did not know the accessibility equipments for disabled users, such as ramps, WC. However, more than half of the visitors positively commend security, playground, vegetation, roads accessibility for disabled people, and water drinking sources in the park (Figure 10).

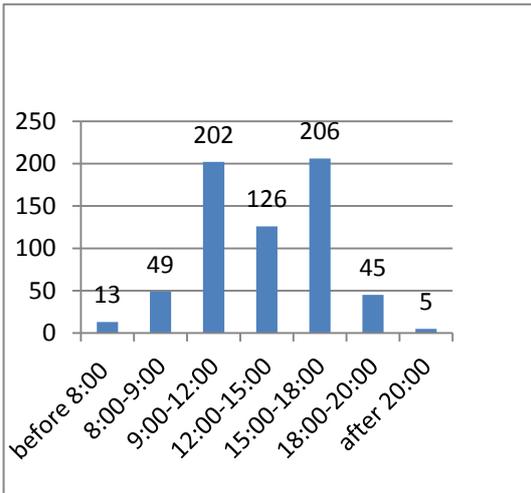


Figure 6 Time preference to use the Park

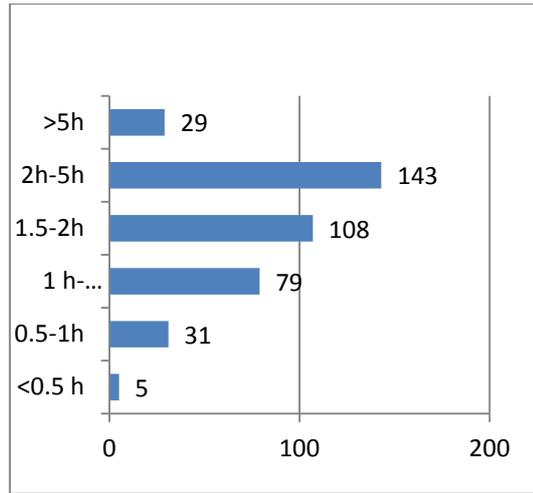


Figure 5 Duration of a typical visit to PCP

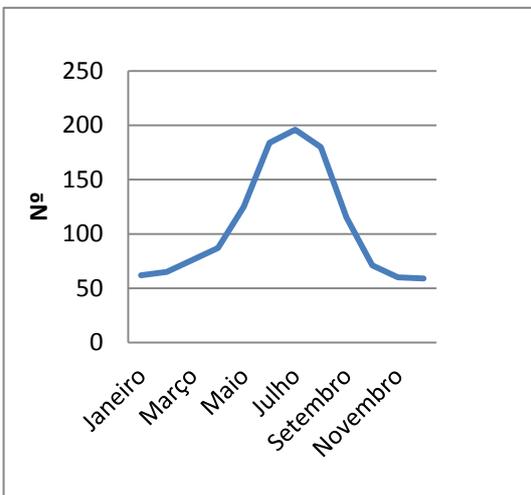


Figure 8 Month use frequency of PCP

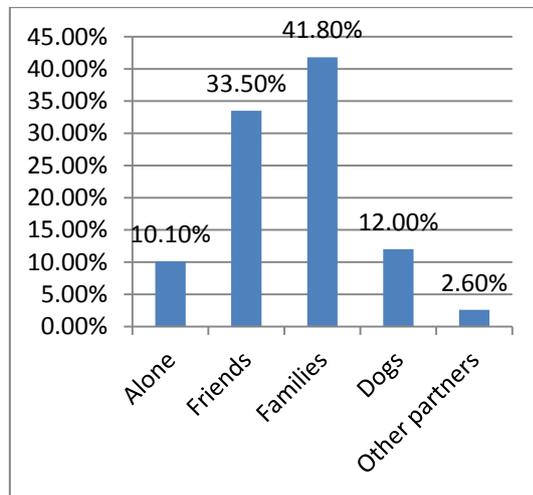


Figure 7 Partners to the city park

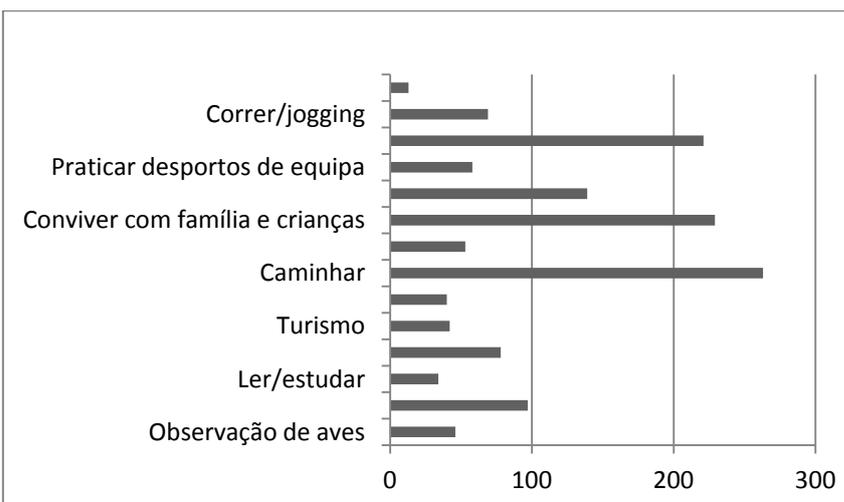


Figure 9 Motivations to use PCP

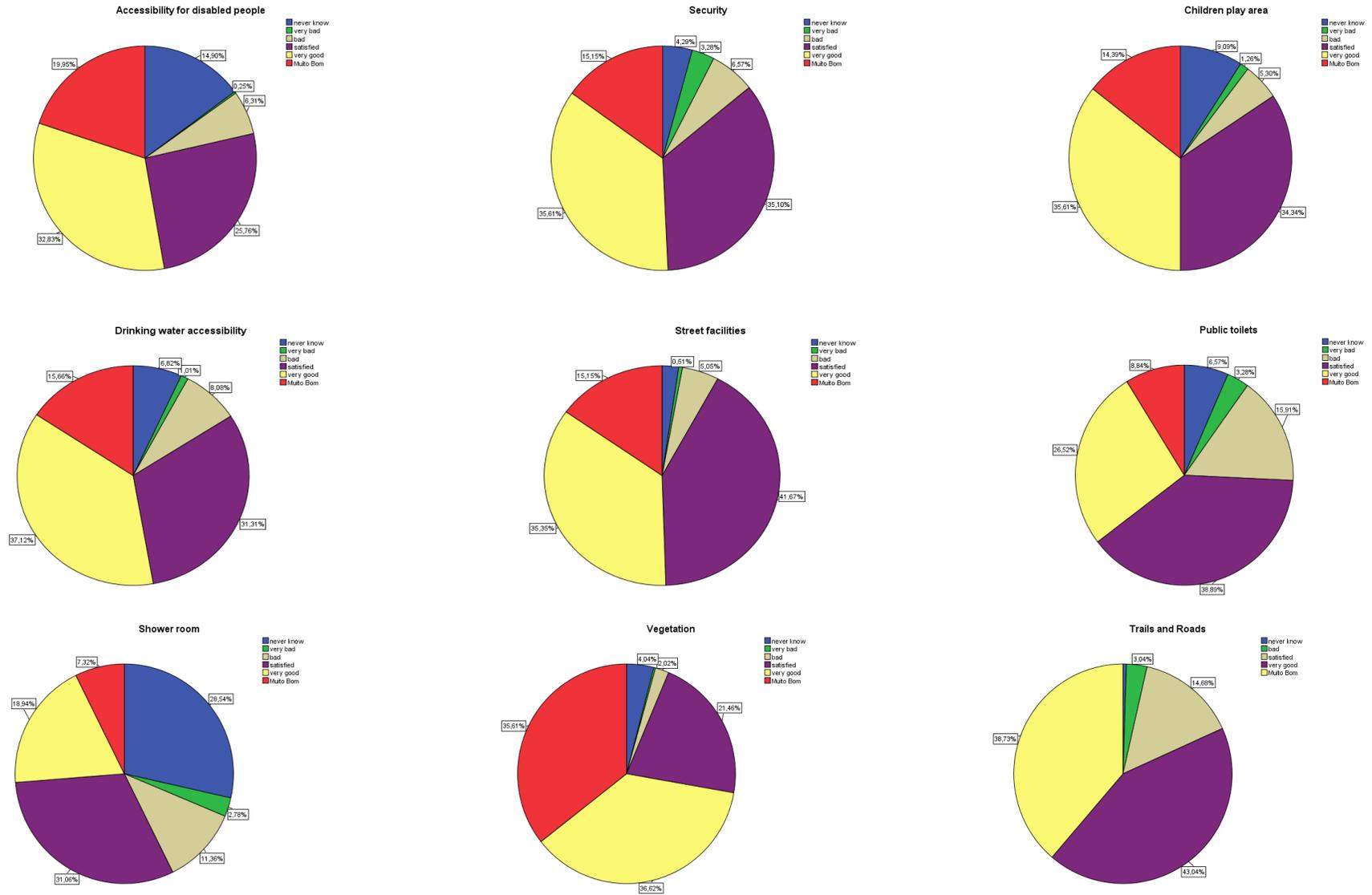


Figure 10 Satisfaction rates with some PCP environmental aspects

3. Survey Respondents' Social Economic Characteristics

The basic background information about visitors who completed the questionnaires included their gender, age, level of education, occupation, family members, average family monthly income, and residence area and so on. Results of the descriptive statistics about the data are shown in Table 4.

Regarding to the gender of all the respondents, there were more female respondents (59.8%) than male (40.2%). With respect to the age, the visitors who come to PCP come from various age brackets. The results indicated that the respondents' ages ranged from 15 to 80 year old. Most of respondents interviewed are in the range of 25-45 years old (total 40.6%). This was followed by those in 46-65 years old (19.4%), below 19 years old (15.7 %), almost the similar percentage with 19-25 years old (16.2%), 66-80 years old (7.8 %), and the fewest of respondents interviewed was those above 80 years old (0.3%). This information showed that most of visitors who visit PCP come from the middle age group.

The level of education shows that most of the respondents (40.4%) had finished the secondary high school level. This was followed by bachelor level (23.7%), elementary level (15.4%), primary school level (9.8%), and master and doctor degree together 10.6%. This implies that visitors to the City Park tend to be monopolized by the middle highly educated people. The occupation of respondents in the questionnaire was divided into 6 groups. 114 (28.8%) respondents were students, 35.4% of respondents were self-employed while just 9.3% were salary employed. The reason for self-employed respondents were much more than salary-employed could be the high unemployment rate in Portugal or because the sampling bias. And there were also 10.6% respondents were retired.

Table 4 Socioeconomic profile of respondents (total 396)

Variables	Definition	Frequency (n=396)	Percentage %
Gender	Male	159	40.2
	Female	237	59.8
Age	15-18	62	15.7
	19-24	64	16.2
	25-35	82	20.7
	36-45	79	19.9
	46-65	77	19.4
	66-80	31	7.8
	>80	1	0.3
Education Level	Primary	39	9.8
	Elementary	61	15.4
	High school	160	40.4
	Bachelor	94	23.7
	Master	40	10.1
	Doctor	2	0.5
Occupation	Student	114	28.8
	Self-employed	140	35.4
	Salary-employed	37	9.3
	Unemployed	54	13.6
	Retired	42	10.6
	other	9	2.3
Family income per month	-500	35	8.8
	500-1000	105	26.5
	1001-2000	122	30.8
	2001-3000	66	16.7
	3001-4000	34	8.6
	4001-5000	14	3.5
	5001-6000	3	0.8
	6001-12000	12	3.0
+12000	5	1.3	
Environmental organization membership	Yes	11	2.8
	No	385	97.2

Usually, the income level of respondents is a critical factor affecting their WTP for PCP visits. Generally, average WTP for ecosystem services increases with mean household income (Baumgartner et al. 2012). In this study, most respondents (30.8%) had average household income between €1001-2000 per month. This is followed by respondents with income ranging from €501 to In this study, most respondents (30.8%) had ave€2001 and €3000. The respondents' household income mostly concentrated between €500-3000, and there were still 8.8% users' family income below €500 per month, even lower than the average household net-adjusted disposable income per capita (OECD. 2014). There were also 1.3% respondents had family income more than €12000 per month, which was almost six times as much as the bottom families, even the family size made a significant effect on the family income with a Sigificant level of correlation (Sig. 0.134) in this research, the richest and poorest still show a considerable income gap.

Chapter 6

Data Analysis

There were 400 respondents interviewed, among which only four respondents answered they never visited public parks in Porto, so there were 396 questionnaire answers to Part II, with respondents giving their willingness to pay the city park and completing Part IV on their personal information, in order to make sure the TCM and CVM analysis have the same data base, we ended up with 396 valid questionnaires and usable for further data analysis.

1. Data analysis used TCM method

1.1 TCM Model Specification

In this research, we collected respondents' information on the number of visits in last year and the travel cost and travel time they spent to the park site at different distances, using this information to construct the demand function and consumer surplus for the recreational services of PCP.

It is not necessary to take into account accommodation since visits to the City Park tend to be daily trips and foreigners who visit this park are not intend to spend more days even if they have several nights in Porto. Data on additional expenses such as food and drink consumed on site were not available and were left out of the analysis.

A single site model is a demand model for trips to a recreational site by a person over a period (Parsons, 2003) adopted for the individual TCM in this study:

$$V_{ij} = \beta_0 + \beta_1 TC_{ij} + \beta_2 Y_i + \beta_3 S_i + \beta_4 Z_i \quad (1)$$

Where:

i = individual

j = Parque da Cidade do Porto

V_{ij} = Visits of the individual (i) to the park (j) per year

TC_{ij} = Total travel costs incurred by individual (i) to the park (j)

S_i = Substitute sites to individual (i)

Z_i = A vector of socioeconomic characteristics.

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ are regression coefficients which can be used to measure the changes in number of visits when a unit change in the variables. And for Substitute sites to individual, we value "1" The model in this case plots the travel cost against the number of visits occurred last year to PCP.

1.2 TCM Model Result Presentation

The data gathered from the survey about travel time, transport cost, visit frequency last year were adjusted. The travel cost variable as determined in the model needed consisted of distance cost and travel time cost. Average distance cost will be calculated by the transport costs depending on different means of transport, data that can be got from questionnaire answers. Multiplying individual travel time by the cost of time, then get the travel time cost. In Portugal, average hourly rate is 12.12€/hour or 0.202€/minute (Eurostat. 2014).

A linear regression of the dependent variable V_{ij} with other independent variables was applied. The regression results are summarized in table 5

Table 5 Regression result 1 (Visits/ year as dependent Variable)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant	80.526	8.450		9.529	.000
Travel Cost	-2.470	.470	-.256	-5.256	.000
Income	-.004	.002	-.097	-1.991	.047
Substitutes	-6.592	7.469	-.043	-.883	.378

a. Dependent Variable: Visits/year

But from the table 5, the Sig. result of substitutes is 0.378, greater than 0.05, which means the variable substitutes cannot explain the number of visits of individuals per year. So we concluded that the regression do not show this variable as a good predictor of the number of visits demanded. For this lack of fit, the main reason is likely to be the questionnaire positioning of the relevant question in our survey, since we put it in another part of our questionnaire, expecting the respondents will give us as well information on use and experience as PCP (See Appendix 2). While practically, because of the long time response required, many respondents skiped this part or gave unreliably the answer “did not visit other parks except PCP”. So, we decide to leave out this variable and run a new regression ith the other independent variables income, travel cost, age and education (Table 6).

The results of Sig. of these four independent variables are all below 0.05. So they are well explained the number of visits. The travel cost has a negative coefficient of 1.983. This indicated the negative relationship between number of visits and travel cost. People living closer to the park face a lower cost of reaching the site, and may take more visits to the park. This is consistent to the demand function theory. And also this result is corresponded with most empirical works of some researchers discussed in section 3.

According to the theoretical model of recreational demand, we would expected a positive relationship between the income and the demand quantity

for a good, with increasing income, the number of visits tend to go up. But, we got a negative relationship between the individual' family income and the number of visits of individual to PCP. One percent income increase will reduce 0.4 percent of visitation rate, this possibly because visitors prefer other better quality parks or choose other recreational activities. This negative relationship was also discovered by other works of Emiriya and Robson (2013).

Table 6 Regression Result 2 (Visits/ year as dependent Variable)

Model	Unstandardized Coefficients		Standardized Coefficients	Mean	t	Sig.
	B	Std. Error	Beta			
Constant	50.982	15.378			3.315	.001
Travel Cost	-1.983	.458	-.206	8.9979	-4.333	.000
Income	-.002	.002	-.058	2113.64	-1.184	.043
Age	12.071	2.395	.242	3.36	5.040	.000
Education	-7.327	3.424	-.105	3.10	-2.140	.033

a. Dependent Variable: Visits/year

And also, we found individual's age and educations have impact on the number of visits. Respectively, age has a positive influence on the visits, which means older people visit the park more frequently than the younger. This could be found in some empirical researches, like Jan Špacek and Antoušková (2013), also gained a positive impact of age on the number of visits. Probably because young people have more other recreational choices, while old people prefer public parks. While in this survey, education has a negative correlation with the number of visits, which is different from most researches. But we found education has a significant positive correlation with income at 0.272 (correlation is significant at the 0.01 level). The higher education could get the more income, but the number of visits decline, which is in accordance with the negative relationship between income and the number of visits we discussed above.

The estimated equation of the linear functional form the table should supposed to be:

$$V_{ij} = 50.982 - 1.983 TC_{ij} - 0.002Y_i - 7.327E_i + 12.071A_i \quad (3)$$

1.3 Estimating Consumer Surplus

In addition to quantifying factors describing demand and determining price reponse, the most significant reason for construct the travel cost model is to calculate consumer surplus, a measure commonly used in benefit cost analysis. To produce the demand curve, we followed the steps by Shammin (1999).

Table 7 Zone division and population

Zone	Freguesia	Population (2011)	Zonal total Population
Zone 1	Matosinhos	175,478	413,062
	Porto	237,584	
Zone 2	Vila do Conde	79,533	818,018
	Trofa	38,999	
	Maia	135,306	
	Valongo	93,858	
	Gondomar	168,027	
Vila Nova de Gaia	302,295		
Zone 3	Póvoa de Varzim	63,408	397,784
	Santo Tirso	71,530	
	Paços de Ferreira	56,340	
	Lousada	47,387	
	Paredes	86,854	
Penafiel	72,265		
Zone 4	Felgueiras	58,065	188,301
	Amarante	56,264	
	Baião	20,522	
	Marco de Canaveses	53,450	

*Population data of each Municipalities was from Instituto Nacional de Estatística (2011).

Firstly we defined a set of zones surrounding the park, which is assuming the distribution of people is fixed in geographic divisions (Appendix figure 1).

According to the distance and municipalities, we defined Matosinhos and Porto city as zone 1; Vila do Conde, Trofa, Maia, Valongo, Gondomar, Vila Nova de Gaia as zone 2; Póvoa de Varzim, Santo Tirso, Pacos de Ferreira, Lousasa, Paredes, Penafiel as Zone 3; Felgueiras, Amarante, Baião and Marco de Canaveses, Braga, and Aveiro as zone 4; other origins of Portugal as Zone beyond 4 (Table 7).

Based on 396 questionnaire, there are 137 respondents from Zone 1, we added up all these 137 questionnaire about the visit frequency in a year, getting 13378 times per year. While there are 196 interviewees from zone 2, which had 6848 visit times in a year. Normally, with the distance increasing, time cost and travel cost go up and visitors and visits will decrease. In this case, since defined zone 1 is much smaller than zone 2, so the visitors could be less, thus, the random respondents from zone 1 (137) are less than zone 2 (197), while the total visit frequency still more than zone 2, which are conformed to the regular behavior. And zone 3, gradually decreasing, had 27 respondents out of 400, and 689 visit times; zone 4 has 24 respondents while 310 visit times, and beyond zone 4, there are 12 interviewees in those some were from other countries, and the other from other part of Portugal, which are far away from Porto province.

Number of visitors from each zone in last year:

$$V_i = \frac{r_i}{10R} * N_i \quad (i= 1, 2, 3 \dots i) \quad (4)$$

V_i : Number of visitors from each zone

r_i : Number of respondents from each zone

R : Total valid respondents

N_i : Total population from each zone

Supposing every 1 out of 10 people of the total population of each zone visited the City Park last year, we can get the number of visitors from each zone

and total visitor to the park last year (Table 8). Based on the average frequency and the number of visitors of each zone, we can get the number of visits to the park from each zone, then getting the total number of visits 2,918,261 to the park last year (2013).

Table 8 Total Visits in last year

Zone	Respondents number	Number of visits /year	Average visits /respondent / year	Number of visitors /year	Total visits from each zone/year
Zone 1	137	13378	98	14,148	1,386,504
Zone 2	196	6848	35	40,286	1,410,045
Zone 3	27	689	25	2,784	69,600
Zone 4	24	310	20	2,586	51,720
Beyond 4	12	25	2	196	392
Total	396	21250		60,000	2,918,261

To calculate the visitation rates per 1000 population in each zone, that is visits/1000, just simply apply the total visits per year from each zone to divide by the population in each zone in thousand.

Table 9 Visits per 1000 population in each zone for the City Park in last year

Zone	Total Visits/ year	Zone Population	Visits/1000
1	1,386,504	413,062	3357
2	1,410,045	818,018	1724
3	69,600	397,784	175
4	51,720	188,301	275
Total	2,917,869		

Add average transport cost and travel time cost together from each zone, we can get total travel cost from each zone to the City Park. In table 10, from zone 1 to zone 4, each zone has an increasing average travel time and total travel cost with the increasing distance.

Table 10 Travel cost from each zone to PCP

Zone	Total transport cost (€)	Average Transport Cost (€)	Total travel time (minute)	Average Travel Time (minute)	Average Travel time cost/minute (€0.2)	Total Travel Cost/trip (€)
Zone 1	411.2	3.0	2249	16	3.2	6.2
Zone 2	840.53	4.3	5180	26	5.2	9.5
Zone 3	223.2	8.0	950	34	6.8	14.8
Zone 4	233.9	9.0	1020	39	7.8	16.8
Beyond 4	169.45	14.1	842	--	--	---
Total	1878.28	28.4				

Table 11 Regression Result of visits/1000 and Travel Cost

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant Travel Cost	4919.631	721.485	-0.965	6.819	0.021
	-298.721	57.491		-5.196	0.035

a. Dependent Variable: Visits/1000

The regression was carried out on the zonal model with the visits per 1000 population as the dependent variable. The regression results are shown in table 11, then an equation of the curve can be calculated:

$$\text{Visits/1000} = 4919.63 - 298.72 * \text{travel cost}$$

From this function a demand curve could be estimated by increasing travel costs with the decreasing in number of visits that would be occurred. The demand curve should be derived from the data on visits, increases of travel cost are applied to simulate rising price for the park, assuming different hypothetical entrance fees to estimate the number of visits. For example, by assuming hypo entrance fee = 1€ (table 12), thus the total cost for each zone recreationists will all go up by 1€ , together with the travel cost from each zone,

a total cost for each zone can be generated, then the total visits from each zone also can be concluded with the increasing cost.

Table 12 Total visits when assuming hypo entrance fee is 1 €

Zone	Basic Travel Cost	Travel cost plus 1€	Visits/1000	Population	Total Visits
1	6.2	7.2	2769	413,062	1,143,769
2	9.5	10.5	1783	818,018	1,458,526
3	14.8	15.8	200	397,784	79557
4	16.8	17.8	0	188,301	0
					2681852

With these increasing in travel cost, a demand schedule of table 8 and a figure 5 of demand curve are generated

Table 13 Expected total visits with different assuming entrance fee

Assuming entrance fee €	Expected total visits
1	2681852
2	2307823
3	1939731
5	1131155
8	280056
9	156550
10	33045
10.2	20

Supposing entry is free (0€ fee), the number of visits would be 2917 869 visitors per year (current situation).

1.4 The Demand Curve for PCP Site

The demand curve for Parque da Cidade do Porto could be developed by using the demand function (Equation3) and shown in Figure 11. According to the figure, there is a negative relationship between the number of visits made by individual every year and the travel cost to the site. Consequently, the demand curve estimated for PCP was consistent with the theoretical applications in TCM.

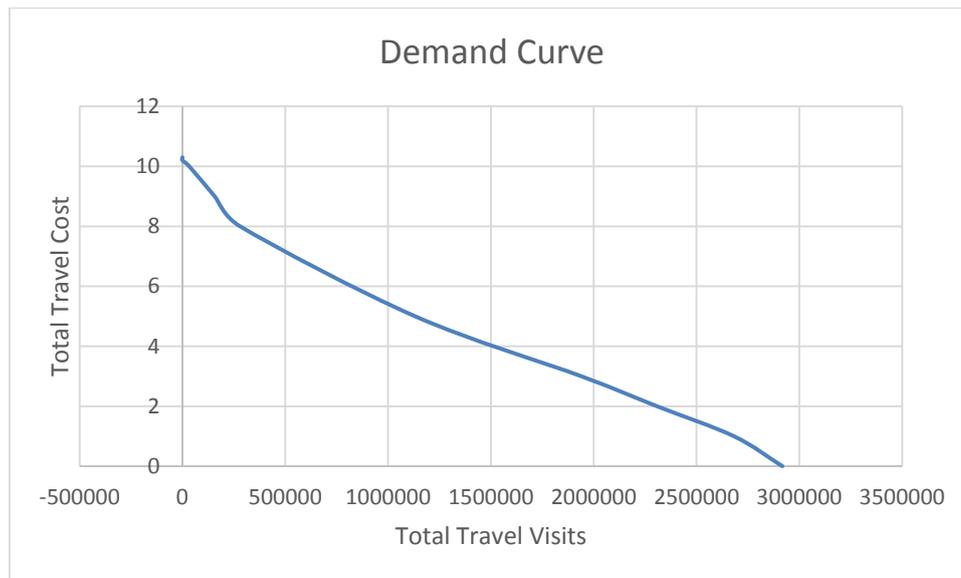


Figure 11 Demand Curve for Parque da Cidade do Porto

By calculating the consumer surplus, or the area under the demand curve, we can estimate the total economic benefit of PCP to visitors is around 14.18 million Euro.

2. Data analysis used CVM method

2.1 WTP Analysis

In this study visitors were asked how much they would be willing to pay as entrance fee (the site is free access currently). The frequency distribution and percentage of respondents' willingness to pay at each bid amount are shown in Table 14. The maximum WTP is 50€, but this value too much surpass the actual behavior since the family income of this respondent was just around 500 € per month, it should be dropped as a protest unpractical payment.

Table 14 Willingness to pay the entrance fee

WTP (€)	Frequency	Percent %	WTP (€)	Frequency	Percent %
0.00	90	22.7	5.00	42	10.6
0.20	1	0.3	6.00	3	0.8
0.50	10	2.5	7.00	5	1.3
0.75	1	0.3	7.50	1	0.3
1.00	68	17.2	8.00	2	0.5
1.50	7	1.8	9.00	2	0.5
2.00	93	23.5	10.00	7	1.8
2.50	7	1.8	11.00	1	0.3
3.00	43	10.9	20.00	1	0.3
3.50	1	0.3	50.00	1	0.3
4.00	10	2.5	Total	396	100.0

2.2 Protest bids analysis

Around 22.7% interviewees expressed zero bids, respondents who offer a zero bid may be using their response as a form of protest to the proposed schemes or changes, they are “protest bids”. All zero bids should be carefully examined and classified as either protest bids or legitimate zero bids (Halstead et al. 1992). In this survey, protest zero bids could be identified through a dedicated interview question. Respondents who gave a zero bid tick afterwards a multi-choice answer set to clarify the reason behind their zero bid: a) I am indifferent to Parque da Cidade do Porto; b) I do not trust the administration would use the money in an efficient way; c) I’m already paying enough taxes for public goods; d) This additional cost would be too much for me; e) I prefer to apply the money on other interesting things; f) Other reasons.

Respondents choosing reasons a), d), e) were considered as given a valid (“true”) zero bid. On the other hand, respondents ticking choices b) and c), were treated as protest bidders. Out of the total 90 respondents giving zero bids, 13 justify their answer with choice f) (other reasons). Probing those reasons further 2 were considered true zero bids, and the remaining 11 as protest bids.

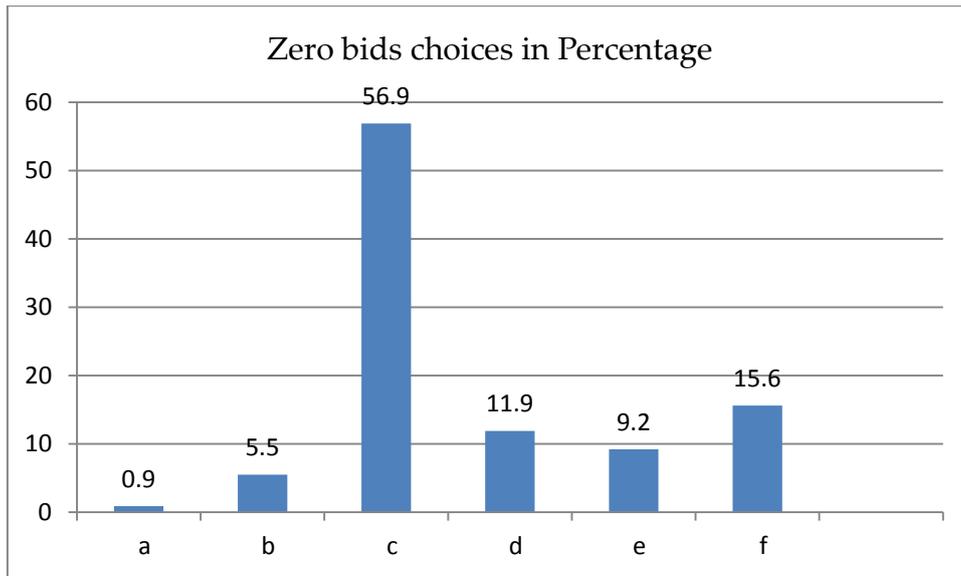


Figure 12 Frequency of various reasons for zero bids

From figure 12, it indicated that around 56.9% responses for zero values thought that they have already paid enough taxes for public goods and services, and just one interviewee show indifference to the park. The most likely reason for this answer is probably linked to the perceiving of public garden as a public amenity which should be for free to tax payers.

And 12 respondents chose either a, d or e as true zero bids and 59 chose either b or c as protest zero bids. There were 19 respondents giving both protest zero bids and true zero bids in which we defined 13 as true zero bids and 6 were protest zero bids.

Table 15 Frequency of protest zero bids and true zero bids

Zero bids reason choices	Frequency	Protest zero bids	True Zero bids
a	1		1
b	6	6	
c	62	62	
d	13		13
e	10		10
f	17	15	2
Total	109	83	26

While from the survey, there are 25 respondents gave true zero bids and 65 showed protest zero value, consisting 72.2% of the zero bids respondents and 16.4% of all the samples. The main reasons for protest zero bids were either the question was not better described or respondents considered the question were not meaningful or it was difficult to express valuation in monetary terms. The factors that cause zero bids have been discussed in details in the study of Halstead et al.(1992).

In order to avoid downward bias caused by protest zero bids when analysis WTP data, 65 respondents' data eliminated from the data set. So, there are just 330 data valid for WTP analysis.

2.3 Estimating WTP value

Bateman and Turner (1993) noted that the CVM requires individuals express their preferences for some environmental resources or change in resource status by answering questions on hypothetical choices. For individual i :

$$\text{WTP}_i = F(Q_i, Y_i, T_i, S_i) \quad (5)$$

where

Q_i : the quantity or quality of environmental good,

Y_i : income,

T_i : preferences,

S_i : other socio-economic variables thought relevant

In this study, the WTP value only relates to access to a site, amelioration or degradation of the park quality is not considered. The WTP in our study is the dependent variable and the socio-economic characteristics of the individual are

the independent variables. The results for the regression are shown in Table 16. Therefore the function is concluded as following:

$$\text{WTP} = 4.007 + 0.082 \text{ FMI} - 0.107 \text{ EDU} - 0.273 \text{ AGE} - 0.087 \text{ DIS} \quad (6)$$

Where,

WTP is the willingness to pay; FMI is the family income of the individual; EDU is the education level of the individual; AGE is the age of individual and DIS is the distance from the individual's house to the park.

Table 16 WTP regression analysis

Model Variables	Coefficients	SD	t.	Sig.
Constant	4.007	.708	5.656	.000
Family Income	.082	.087	.940	.034
Education	-.107	.128	-.834	.040
Age	-.273	.088	-3.114	.002
Distance	-.087	.086	-1.007	.031

a. Dependent Variable: WTP

According to the statistics from the regression results, the willingness to pay was found to have a correlation with some socio-economic variables of respondents. It indicated that the family income had a positive relationship with the willingness to pay, that means, visitors with high income were willing to pay more to use the park. While the education, age and distance variables negatively related to WTP. By applying variables in the Equation 6 to their mean value, we could obtain the mean WTP €2.62. Then multiply the total number of visitors each year (2 917 869), we get the total benefit for PCP of contingent valuation is 7.64 million Euro.

Chapter 7

Discussion

The objective of this survey was using two methods TCM and CVM to estimate the economic valuation of PCP. The results of travel cost method and contingent valuation method have generally been inconsistent due to some operational problems. In this study, the result of economic valuation from TCM (€14.18 million) was almost twice times greater than the outcome from CVM (€7.64 million). A few points should be considered in an attempt to partially explain the divergence in benefit estimation from the two methods.

The reason for the results of TCM and CVM are not consistent are mainly because the WTP questions are not easily expressed in a monetary hypothesis way, as well as the WTP value surmised by the contingent valuation analysis related just to access the site without considering the quality and other factors, thus producing responses being zero or protest zero bids.

The most probably reason for the high number of true zero or zero protest bids is mainly related to the way of urban forests being perceived in Portugal. Always a large number of people consider urban forests or parks as a kind of public amenities or public goods. Traditionally, there was no charge for those recreational sites, thus charging for access these sites would be encountered with protest. Moreover, those zero or very low responses could be a political statement from the respondents to against the plan for charging tickets to the Parque da Cidade, even this survey was just based on a hypothesis situation .

And also for our question format, as can be seen in Table 15, more than half of the respondents clustered a WTP result between €0 and €2, usually an open-ended question would expect a large variability in response as there are not

constrain of a set range of answers for respondents. This may make the respondents not seriously considering the question and then produce underestimated bids.

The result difference between WTP and CS is also likely due to respondents not realizing their true travel cost. There were some respondents showing an exaggerated response for the travel cost and giving a lower bid for WTP value. It was clear that respondents did not accurately consider their travel cost to the park, producing a low WTP answer and a high travel cost giving an overestimated CS.

Since both of these two methods are imperfect, no one can really say one method is better than another. Because the data applied in TCM is more close to the real figures and in this case it can be seen as a sound method. CVM could be considered a less accurate prediction of values than TCM.

Chapter 8

Conclusions

In this study, Values derived from the two methods were vastly different. The total consumer surplus was found to be around 14.18 million euro; the individual consumer surplus was 4.86 euro. While the willingness to pay for the recreational use of the park was 2.62 euro per person, totally 7.64 million euro.

The total investment of PCP construction was about 13 million euro and around 1 million euro for maintenance and management. While from the annual benefits estimations from CVM and TCM, the park will generate the total benefits beyond the investment in less than 2 years. This figure has economic significance for Parque da Cidade do Porto.

The monetary values of the recreations in Parque da Cidade do Porto can be taken into consideration for the deliberate policies, financing of urban forest practice or public parks and even strategic planning. Results of total economic valuation from both methods are overpass the total cost produced every year in maintaining and managing the city park. So, it could be a positive guiding for decision makers to make effective investments in urban green areas.

Recently, both the TCM and CVM have been popularly used in the non-market monetary valuation. While for the travel cost method, survey data are always collected from a specified site which benefits are being estimated. If a site is considered to be planned, a similar area's data can be well guided. The less similarities between sites, the greater unreliable results are produced (Smith, 1980). So, difficulties can be always encountered when trying to find a similar site. Moreover, in the future travel cost method application should also focus on the socioeconomic variables and inclusion of variables accounted for the existence of substitutes since those factors are also significant for the demand of any good.

The contingent valuation method is much flexible, however, in order to avoid biased responses, future application of contingent valuation method should concentrate on survey design.

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Appendix

1. Map of Porto Districts



(Figure from Portuguese Genealogist Master List)

2. Questionnaire



Date:

CATÓLICA PORTO

FACULDADE DE ECONOMIA E GESTÃO

Inquérito: “Quanto vale o Parque da Cidade para a População?”

Somos da **Universidade Católica Portuguesa**, e estamos a realizar um estudo sobre o valor para a população do Parque da Cidade do Porto.

A sua colaboração seria muito importante para o sucesso do nosso estudo, e ficar-lhe-íamos muito agradecidos se pudesse ajudar-nos respondendo a este curto questionário.

Muito obrigado desde já!

As suas respostas a este inquérito serão tratadas com total confidencialidade, e o seu nome nunca será mencionado nos relatórios, apresentações ou artigos dele resultantes. A sua participação no estudo é totalmente voluntária, e não lhe ocuparia mais do que 10 a 12' do seu tempo. Não há perguntas certas ou erradas, pedíamos-lhe só que respondesse, e isso é muito importante para nós e para a fiabilidade do estudo, unicamente com base no que realmente sente e na sua própria experiência.

No Porto atualmente existem sete parques públicos, a seguir identificados, mantidos e geridos pelos Serviços Municipais de Parques Urbanos:

- Parque da Cidade
- Parque Oriental
- Palácio de Cristal
- Parque das Virtudes
- Parque da Pasteleira
- Parque da Quinta do Covelo
- Parque da Quinta de São Roque da Lameira

1. Qual o seu grau de satisfação, em geral, com os parques públicos do Porto?

- Muito satisfeito
- Satisfeito
- Medianamente satisfeito
- Insatisfeito
- Muito Insatisfeito

2. Assinale na lista seguinte até 5 benefícios dos parques urbanos para a população que considera serem os mais importantes? (assinale-os sff com os números de 1 a 5, por ordem decrescente de importância; não assinale mais do que 5 dos benefícios listados em baixo)

Purificação do ar atmosférico		Fornecimento de zonas de sombra	
Redução da temperatura		Melhoria estética espaços urbanos	
Habitats para a fauna		Conservação da biodiversidade	
Provisão de espaços recreativos		Proteção das reservas de água	
Redução da poluição sonora		Fornecimento de madeira	
Bem-estar físico e psicológico		Atração turística	
Aumento do valor das casas/apartamentos		Outro: (especifique sff): _____	

3. Alguma vez visitou parques públicos no Porto?

- Sim **(se “Sim”, sff continue na questão 5/pág.3)**
- Não **(se “Não”, sff continue na questão 4/pág.3)**

4. Pode dizer-nos qual, ou quais, as razões porque nunca visitou parques públicos do Porto?

- Os parques públicos não me interessam
- Prefiro usar o meu próprio jardim
- Não tenho tempo para o fazer
- Não há nenhum parque público no Porto suficientemente próximo de mim
- Outra razão (sff especifique qual) _____ **(continue sff na Parte V/pág.11)**

5. Alguma vez visitou o Parque da Cidade?

- Sim **(se “Sim”, continue sff na Parte II do inquérito/pág.4)**
- Não **(se “Não”, continue sff na Parte III do inquérito/pág.7)**

Parte II: Experiencia e tipo de utilização do Parque da Cidade

1. Qual a distância do Parque da Cidade a sua casa?

- <500m
- 500-1000m
- 1000-1500m
- 1500-2000m
- 2000-5000m
- >5000m

2. Qual o meio de transporte que utiliza mais vezes para se deslocar ao Parque da Cidade? (Sff escolha um só)

- Automóvel particular
- Mota ou motorizada particular
- Transportes públicos (autocarro, metro...)
- Bicicleta
- Táxi
- A pé
- Outro meio de transporte (sff especifique): _____

3. Quando utilize o meio de transporte que indicou acima, quanto tempo normalmente demora a chegar ao Parque da Cidade? _____ (minutos)

4. Pode dar-nos uma indicação da despesa que, em média, tem com essa deslocação?

_____ € (por exemplo, o preço do bilhete de autocarro, a despesa em combustível.)

5. Aproximadamente com que frequência visita o Parque da Cidade?

_____ (dias por ano)

6. Normalmente em que altura do dia frequenta o Parque da Cidade? (sff assinale todas os períodos que se aplicam no seu caso)

- Antes das 8:00 (manhã)
- Das 8:00-9:00 (manhã)
- Das 9:00-12:00 (manhã)
- Das 12:00-15:00 (tarde)
- Das 15:00-18:00 (tarde)
- Das 18:00-20:00 (tarde)
- Depois das 20:00 (tarde)

7. Em média quanto tempo permanece no Parque da Cidade em cada visita que faz?

- Menos de meia hora
- Meia hora a 1 hora
- 1 hora - 1 hora e meia
- 1 hora e meia a 2 horas
- 2 a 5 horas
- Mais de 5 horas

8. Quais os meses do ano em que normalmente utiliza o Parque da Cidade? (escolher sff todos os horários que se aplicam ao seu caso)

- | | |
|------------------------------------|-----------------------------------|
| <input type="checkbox"/> Janeiro | <input type="checkbox"/> Julho |
| <input type="checkbox"/> Fevereiro | <input type="checkbox"/> Agosto |
| <input type="checkbox"/> Março | <input type="checkbox"/> Setembro |
| <input type="checkbox"/> Abril | <input type="checkbox"/> Outubro |
| <input type="checkbox"/> Maio | <input type="checkbox"/> Novembro |
| <input type="checkbox"/> Junho | <input type="checkbox"/> Dezembro |
- ou Todos os meses do ano

9. Quais são os principais motivos das suas visitas ao Parque da Cidade (sff assinale todas as que se aplicam ao seu caso):

- | | |
|---|--|
| <input type="checkbox"/> Observação de aves | <input type="checkbox"/> Tomar café/utilizar esplanadas |
| <input type="checkbox"/> Andar de bicicleta | <input type="checkbox"/> Conviver com família e crianças |
| <input type="checkbox"/> Ler/estudar | <input type="checkbox"/> Encontrar-se com amigos |
| <input type="checkbox"/> Passear cães | <input type="checkbox"/> Praticar desportos de equipa |
| <input type="checkbox"/> Turismo | <input type="checkbox"/> Usufruir ar puro e natureza |
| <input type="checkbox"/> Passagem | <input type="checkbox"/> Correr/jogging |
| <input type="checkbox"/> Caminhar | <input type="checkbox"/> Outra (sff especificar) _____ |

10. Quem normalmente o acompanha nas suas visitas ao Parque da Cidade? (sff assinale todas as que se aplicam ao seu caso)

- Ninguém
- Amigos
- Familiares
- Cão
- Outro (sff especifique) _____

11. Qual o seu grau de satisfação com os seguintes aspetos referentes do Parque da Cidade?

Aspetos referentes ao Parque da Cidade	Muito Bom	Bom	Satisfatório	Mau	Muito Mau	Não sei
Acessibilidade para pessoas com mobilidade reduzida (rampas, WC)						
Segurança						
Zona infantil						
Bebedouros e fontes de água potável						
Mobiliário urbano (bancos, papeleiras, pontos de iluminação)						
Sanitários públicos						
Balneários						
Coberto vegetal						
Caminhos						

Parte III: Utilização e experiência com outros parques públicos

1. Além do Parque da Cidade, já visitou outros Parques públicos do Porto?

- Sim (se “ Sim”, continue sff na questão 2, a seguir)
- Não (se “Não”, continue sff na **Parte IV** do inquérito/pág.10)

2. Pode dizer-nos quais dos seguintes parques públicos do Porto já visitou?

- A**, Parque Oriental
- B**, Palácio de Cristal
- C**, Parque das Virtudes
- D**, Parque da Pasteleira
- E**, Parque da Quinta do Covelo
- F**, Parque da Quinta de São Roque da Lameira
- G**, Outro (sff especifique qual) _____

3. Se assinalou mais do que um parque na lista acima, diga sff qual deles frequenta, ou frequentou, mais vezes (indicando a seguir a letra respetiva).

Até ao final desta Parte III responda sff às questões seguintes a pensar no parque que assinalou na questão acima como sendo o mais frequentado por si da lista,

4. Qual a distância do Parque a sua casa?

- <500m
- 500-1000m
- 1000-1500m
- 1500-2000m
- 2000-5000m
- >5000m

5. Qual o meio de transporte que utiliza mais vezes para se deslocar ao Parque mencionado acima? (Sff escolha um só)

- Automóvel particular
- Mota ou motorizada particular
- Transportes públicos (autocarro, metro, etc.)
- Bicicleta
- Táxi
- A pé
- Outro meio de transporte (sff especifique): _____

6. Quando utilize o meio de transporte que indicou acima, quanto tempo normalmente demora a chegar ao Parque mencionado acima? _____ (minutos)

7. Aproximadamente com que frequência visita o Parque acima? _____ (dias por ano)

8. Normalmente em que altura do dia frequenta o Parque acima? (sff assinale todas os períodos que se aplicam no seu caso)

- Antes das 8:00 (manhã)
- Das 8:00-9:00 (manhã)
- Das 9:00-12:00 (manhã)
- Das 12:00-15:00 (tarde)
- Das 15:00-18:00 (tarde)
- Das 18:00-20:00 (tarde)
- Depois das 20:00 (tarde)

9. Em média quanto tempo permanece no Parque acima em cada visita que faz?

- Menos de meia hora
- Meia hora a 1 hora
- 1 hora - 1 hora e meia
- 1 hora e meia a 2 horas
- 2 a 5 horas
- Mais de 5 horas

10. Quais os meses do ano em que normalmente utiliza o Parque mencionado acima?
(assinale sff todos os que se aplicam)

- | | |
|------------------------------------|---|
| <input type="checkbox"/> Janeiro | <input type="checkbox"/> Julho |
| <input type="checkbox"/> Fevereiro | <input type="checkbox"/> Agosto |
| <input type="checkbox"/> Março | <input type="checkbox"/> Setembro |
| <input type="checkbox"/> Abril | <input type="checkbox"/> Outubro |
| <input type="checkbox"/> Maio | <input type="checkbox"/> Novembro |
| <input type="checkbox"/> Junho | <input type="checkbox"/> Dezembro ou <input type="checkbox"/> Todos os meses do ano |

11. Quais são os principais motivos das suas visitas ao Parque acima (sff assinale todas as que se aplicam ao seu caso):

- | | |
|---|--|
| <input type="checkbox"/> Observação de aves | <input type="checkbox"/> Tomar café/utilizar esplanadas |
| <input type="checkbox"/> Andar de bicicleta | <input type="checkbox"/> Conviver com família e crianças |
| <input type="checkbox"/> Ler/estudar | <input type="checkbox"/> Encontrar-se com amigos |
| <input type="checkbox"/> Passear cães | <input type="checkbox"/> Praticar desportos de equipa |
| <input type="checkbox"/> Turismo | <input type="checkbox"/> Usufruir ar puro e natureza |
| <input type="checkbox"/> Passagem | <input type="checkbox"/> Correr/jogging |
| <input type="checkbox"/> Caminhar | <input type="checkbox"/> Outra (sff especificar) _____ |

12. Qual o seu grau de satisfação com os seguintes aspetos referentes do Parque acima?

Aspetos referentes ao Parque da Cidade	Muito Bom	Bom	Satisfatório	Mau	Muito Mau	Não sei
Acessibilidade para pessoas com mobilidade reduzida (rampas, WC)						
Segurança						
Zona infantil						
Bebedouros e fontes de água potável						
Mobiliário urbano (bancos, papeleiras, pontos de iluminação, etc.)						
Sanitários públicos						
Balneários						
Coberto vegetal						
Caminhos						

(continue sff a responder a este questionário na Parte IV/pág.10, a seguir)

Parte IV: Valor Pessoal do Parque da Cidade

Como foi dito já, um dos propósitos deste questionário é medir o valor que o Parque da Cidade tem para si. Embora a Câmara Municipal do Porto não tenha qualquer intenção de cobrar entradas no Parque no futuro, a questão que lhe vamos colocar envolve pedir-lhe que imagine que são cobradas entradas. Fazemos isso por ser um dos métodos mais utilizados para medir o valor económico de um serviço público para o qual não há preços.

A seguir damos-lhe alguma informação adicional para uniformizar o mais possível o contexto da pergunta entre todos os inquiridos.

Os diversos parques públicos existentes atualmente em Portugal tem políticas nem sempre iguais no que se refere às condições para a população os utilizar. Conforme verificamos, para a grande maioria dos parques públicos em Portugal a utilização é gratuita, mas em alguns casos é cobrado um bilhete de entrada, que pode ir até um máximo de 9€ por pessoa e por visita (tais como o Parque e Jardim da Fundação Serralves, o Parque Biológico de Gaia, a Estufa Fria e a Estufa Quente, em Lisboa, etc.)

Pedimos-lhe agora que imagine que é cobrada uma entrada cada vez que utiliza o parque da Cidade, tal como o utiliza correntemente. Tendo isso em conta, **pode dizer-nos qual o preço máximo que estaria disposto a pagar para entrar no Parque da Cidade?**

_____ Euros

Se o preço máximo que referiu acima foi de 0 (zero) Euros, pode dizer-nos qual a razão dessa sua resposta?

- O Parque da Cidade é para mim indiferente
- Não acredito que os gestores do Parque utilizassem eficientemente o meu dinheiro
- Já pago impostos suficientes para suportar os serviços públicos
- Essas despesas adicionais seriam demasiado para as minhas possibilidades
- Teria coisas mais interessantes em que aplicar o meu dinheiro
- Outra razão (especifique sff) _____

(continue sff a responder a este questionário na Parte V/pág.11, a seguir)

Parte V: Perfil pessoal do entrevistado

1. Género

- Homem
- Mulher

2. Idade (anos)

- 15-18 46-65
- 19-24 66-70
- 25-35 71-80
- 36-45 >80

3. Quantas pessoas vivem no seu agregado familiar?

Faixa Etária	Nº de Pessoas
- 12 anos	
12 – 17 anos	
18 – 24 anos	
25 – 39 anos	
40 – 49 anos	
50 – 65 anos	
+ 65 anos	
Total	

4. Grau de escolaridade mais alto que completou?

- Primário
- Básico
- Secundário (12º ou equivalente)
- Bacharelato/Licenciatura
- Pós-graduação/Mestrado
- Doutoramento

5. Atividade profissional

- Estudante
- Empregado assalariado
- Empregado por conta-própria
- Desempregado
- Reformado

6. Pertence a algum grupo ou organização de defesa ambiental?

- Sim (sff especifique qual) _____
- Não

7. Pode dizer qual é, em média, o rendimento líquido mensal somado de todos os residentes permanentes em sua casa, incluindo salários, rendas e outras remunerações (em Euros)?

- A B C D E F G H I

8. Qual a sua freguesia de residência? _____

9. Qual o código postal da sua residência? _____ - _____

Anexo – Classes de Rendimento de rendimento líquido mensal somado de todos os residentes permanentes em sua casa (agregado familiar), incluindo salários, rendas e outras remunerações (em Euros):

Rendimento líquido mensal do agregado familiar (Euros)	Identificador
- 500 €	A
501-1000€	B
1001-2000€	C
2001-3000€	D
3001-4000€	E
4001-5000€	F
5001-6000€	G
6001-12000€	H
+ 12000	I