

Madrid Rio Park. Symbolic Values and Contingent Valuation

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Abstract

In rehabilitation and urban development strategies is of central importance to evaluate alternative design solutions. A technique that makes it possible is Cost-Benefit Analysis (CBA), which allows to assess the economical convenience and the financial viability of a project, considering non monetizable costs and benefits. The value of non-market resources can be estimated with Contingent Valuation (CV), a utility-based method that ask to the users of a good, with the administration of questionnaires, to express the

maximum amount they would be willing to pay to preserve or improve the good.

The paper illustrates the application of the CBA with reference to the case of Madrid Río Park in the Spanish capital. Madrid Río is a linear park realized along Manzanares' riverbanks, an area passed through the M-30 motorway until the year 2004. The construction of six kilometres of tunnels enabled to retrieve this site and to create an extremely valuable public space.

1. INTRODUCTION

This contribution in part of a broadest study concerning the Cost Benefit Analysis of the Madrid Rio Park (Fig. 1) in the Spanish capital.

This park is the epiphenomenon of a wider project whose land-urban impact aims at driving the renovation process of a larger territorial context over a time span may be non compatible with the funding needs and the budget restrictions usually limiting the land policies of the local administrations, even in the main European capital cities.

Furthermore, as epiphenomenon, this work takes the shape of a good with a prevailing "ostensive" function, a status that is hard to validate in a situation of structural and constitutive budget restrictions:

- structural, as for the complex financial situation that, in the middle of the planetary economic crisis mainly involved the most indebted countries, become easy targets of sovereign debt speculation, with heavy consequences on their political situation; in such connections, any expansive welfare measure is interpreted as an "inconceivable abstraction" (Borges, 2005), both by gainers and losers, increasing individualism and affecting identity and inclusion of the local community;

- constitutive, because great part of manmade reality assumes its own identity, shape and reason of being from an "ethics of being" (Giuffrida, 2018) – natural, technological, economic and ethical limits – giving fulfilment and legitimacy to a shape otherwise incompressible, gratuitous, indeed.

Then, contrast, this big public work, due to the prevailing of its immaterial value, is a challenge passing from the layer of probability system to the possibility field one:

- the former typically comprises administrative activities decided and validated "ex ante" in coherence with the political program and the financial programming, excluding any modification of the current implementing and management ability;
- the latter, in contrast, typically includes political point measures or interventions, inducing discontinuity in the standard administrative course and in respect of the common expectations, being validated ex-post as a result of the cost-benefit balance.

Project evaluation, aiming at validating ex-ante, monitoring *in itinere* and justifying ex-post such point interventions, seeks the nature, the amount and the mix of these benefits, and their coherence with the cost amount, enveloping in one assertive statement the enthusiasm about the former,

and the sense of responsibility about the latter, given that the scarce resources allocation doesn't admit errors.

One of the main critical issues of social accounting valuation methods, such as Cost Benefit Analysis, concerns the benefits affected by the duality between factual nature and social destination, typically since when environmental, such as the GHG emissions, have been taken into account. Besides such an unconceivable abstraction, concerning impacts on the global ecosystem, which are incomparable to the concrete daily life contingent values, other distributive imbalance issues arise when the monetary justification of the allocation of undesired services (landfills, waste-to-energy plants, wind farms) isn't a sufficient motivation to those are specifically affected by the negative externalities.

Accordingly, the risk of assuming monetary measurement as reference for environmental compensation arises compromising the significance of social the consensus especially when benefits and costs occupy the grey zone separating intangibles and incommensurable goods.

Money is an effective measurement of the intangibles (Giuffrida and Trovato, 2018) in Cost-Benefit Analysis only if valuation science defines the social context and the negotiation conditions for the significance of such a monetary measurement.

In fact, if on the one hand the individualistic subjectivism underlying the approaches based on the individual preferences and simulated markets condescend to the assumption that everything *can be* sold and purchased, valuation science should tell us what *cannot be* sold or purchased.

Valuation science goes through many layers of reality connecting them into one, in particular, the value reality, overlaying and "truer" than the reality of facts: reality of value, in fact, belongs to the field of motivations, presiding over the responsible practice of decision making.

Value judgement has a primary argumentative function, not *latu sensu* – it does not defend or prosecute a project or transaction – but *strictu sensu*: as value judgement seeks the true value (Giuffrida, 2017) it contributes to arise the behavioural coordination between private and public subjects that is necessary to connect daily needs to the *grandeur* of a municipality that has delivered to a local community, not yet having distinct boundaries, a majestic work.

As such, and in its unity, this work becomes capable of transfiguring into symbolic value all the functions that preside over the implementation of the individual and collective existential program, both environmental and cultural. In fact, since the "register of the symbolic" is the sphere of the formation of the person – for our purposes, that of the formation of the axiological/hedonic profile in an individual and ethical/aesthetic sense in a collective sense – although in the proposed experimentation these functions are specified as for the possibility of fruition of the infrastructure, they cannot be distinguished in primary

and secondary (practical and symbolic) as they all turn into a strongly characterized semantic field that integrates them into a single, articulated and inextricable self-representative – or, at the limit, self-ostensive – behaviour.

The proposed appraisal experience refers to communication, coordination and consensus, proposing a reasonable monetary measurement of the benefits of the intangible benefits of Madrid Rio Park by applying the Contingent Valuation Method (CVM).

This procedure fits in the set of the methods based on stated preferences, thus it presents some criticalities which we took account of by choosing in some cases the most prudent option.

Nonetheless, the results coming from scenarios combining the most significant provide a positive measure of the way people have responded to such a challenge.

2. MATERIALS

The western sector of the M-30 motorway, built between 1970 and 1974, transformed the area of the city of Madrid crossed by the river Manzanares into a "non-place". Such a great public work consisted of the undergrounding of the 6-km stretch of the M-30 motorway and the construction of 121 hectares of parkland in the area cleared out on the surface; an operation carried out on such a scale that it is comparable with the size of the city itself. The implementation of Madrid Río has been criticized because of the exorbitant costs of the works, but until now no study has evaluated the economic convenience of the project.

The M-30 motorway with a 32.5 km route surrounds the "central almond" (from the Spanish "almendra central") of Madrid, containing seven districts including the historic centre. In the stretch that runs along the river it constituted a barrier between two parts of the city, inside which the river disappeared, becoming inaccessible and invisible. The landfill of the motorway, between 2005 and 2007, has allowed both the improvement of the motorway functionality, and the recovery and usability of the resulting large public space (Fig. 2).

Madrid Río was realized between 2007 and 2011 following an international design competition organized by the Municipality of Madrid in 2005. The winner of the competition, the M-Rio group specially formed for the competition, managed to return the Manzanares to the citizens of Madrid with new green spaces, bridges and footbridges, cycle paths and many services, including sports facilities, play areas for children and adults, cultural activities, kiosks and restaurants.

3. METHOD

3.1 cost-benefit analysis

There are categories of goods, such as public goods, for which no trades take place and as a result the market is not



Figure 1 - Aerial view of Madrid Rio Park

able to define a price. The lack of a market price does not necessarily mean that they are valueless or that they are not economic assets.

Welfare economy aims at the best allocation of the social surplus by means the production of public works making rare resources and services (e.g. education, culture, health) accessible to everyone. For this purpose the value of the social capital needs to be estimated in order to support the decision making process by which the best allocation pattern can be implemented.

Public goods do not have a reference market and therefore do not have an exchange value but possess use values and no-use values whose sum provides the total economic value (TEV).

Use values derive from the physical interaction with the good and from the possibility of obtaining a personal benefit (extraction of raw materials, recreational value of the resources present in the area). The values of non-use are manifested when many subjects are willing to give up part of their income to preserve an asset, regardless of the possibility of using it.

The Cost-Benefit Analysis is a method used to guide the choice between alternative investment options selecting the best one, based on the comparison of costs and benefits. It supports decision-makers of public bodies who must choose between different projects or public intervention programs. Making a public good means allocating a resource to a particular use and renouncing all the benefits that would derive from alternative uses of that resource. Therefore it is important to apply an estimation method that maximizes the benefits that can be drawn from it.

CBA was developed for public investment with the aim of maximizing collective well-being and social net benefits. Most of the time CBA is carried out ex ante, before the project is implemented, in order to achieve the best



Figure 2 - View of the Manzanares River

possible resources allocation, but it can also be carried out – as in this study – ex post, to verify the validity of the intervention that has been realized.

Economic discipline has developed different approaches to cost-benefit analysis. The financial analysis determines the sustainability of the project, i.e. the validity in terms of cash flow, accounting only for inflows and outflows of the institution or of the agent making the investment. The purpose of this method is to determine the maximization of private profit and does not allow public to make significant evaluations from the point of view of the community.

The economic analysis goes beyond the financial analysis and determines the convenience of the project: costs and benefits are accounted, regardless of the subject to which they refer. The goal of this method is to maximize social well-being.

3.2 Costs and benefits

Costs and benefits are classified as: tangible, intangible and incommensurable (Rizzo, 1989). Tangible costs and benefits are in turn divided into direct and indirect; the former can be primary and secondary. The primary ones derive from the realization, maintenance and management of a work: the benefits are constituted by the value of the goods and services obtained and include the damages avoided by the intervention that has been realized; the

ecological, urban and symbolic. In general, the costs are the responsibility of the investor, the benefits primarily concern the community and secondly those who implement the work.

Indirect costs and benefits consist of the externalities generated by the project in the surrounding environment, on activities not directly related to it, in proportion to the percentage of value added compared to the production price. An example of indirect benefit is the increase in the value of properties located in the area of influence of the intervention. They generally compete with subjects other than the one that makes the investment.

The incommensurable costs and benefits are those that cannot be monetized, but only described.

3.3 Contingent Valuation

As anticipated, this contribution is part a wider study including the whole spectre of costs and benefits of the great bundle of works forming the park, concerning 1. the landfill of the urban motorway section, 2. the park, the secondary activities settled in the areas under concession agreements.

The contribution focuses on the intangible benefits coming from the park, estimated by performing the Contingent Valuation Method.

The park is a public good delivering immaterial services to community and generating environmental, social and cultural benefits (Maltese I., *et al.*, 2017; Oppio A. *et al.*, 2017; Berta, M., *et al.*, 2016), that can be hardly monetized due to the lack of a market for such goods (Bottero M. 2014; Chen B., Qi X., 2018).

It is possible estimate the money amount of such benefits performing the different methodologies proposed in literature (Bottero, 2015), assuming different way to represent these benefits through the *imputed*, *revealed* and *stated* preferences.

The latter have been assumed as a reference for calculating the Willingness to Pay (WTP) for Madrid Rio Park according to the Contingent Valuation Method (CVM).

CVM bases on direct survey performed in Experimental Economics and specifically used for cultural heritage, whose value couldn't be appropriately represented by any current market price, unable to take into account the typical characteristics and motivations for such goods and services having a social, cultural, environmental connotation, an ethical matter and an inter-temporal dimension, that cannot be captured by the individual system preferences; for the same reason they cannot be efficiently allocated on the market.

CVM has been defined by Mitchell e Carson (1989, pp. 2-3): "The CVM method uses survey questions to elicit people's preferences for public goods by finding out what they are willing to pay for specified improvements in them. The method thus aims at eliciting their [Willingness To Pay] in dollar amounts. It circumvents the absence of markets for

public goods by presenting consumers with hypothetical markets in which they have the opportunity to buy the good in question. The hypothetical market may be modelled after either a private goods' market or a political market. Because the elicited WTP values are contingent upon the hypothetical market described to the respondents, this approach came to be called the contingent valuation method".

The first application of CVM has been published in the Journal of Farms Economics da Ciriacy-Wantrup (1947) after the Executive Order n. 12291 from Mr. R. Reagan reinterpreting the CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act) in 1989, for estimating the environmental damage of Exxon Valdez Oil Spill, in 1992.

Then, NOAA panel (National Oceanic and Atmospheric Administration) developed and formalized some CVM guidelines, as a tool for the estimate of such monetary measures in Cost Benefit Analysis and the damage appraisal. Such guidelines can be synthesized in six basic recommendations (NOAA, 1993):

1. it should be based on direct interviews rather than telephone calls;
2. it should elicit interviewees WTP to prevent people from a future accident, then WTA (Willingness To Accept) for an occurred damage;
3. it should use a dichotomous choice elicitation format that is to say that interviewees should be invited to express how they should vote, in favour or against about an environmental quality change;
4. it should contain an accurate and comprehensible description of the program or policy under consideration and the related benefits in each of the scenarios;
5. it should include reminders of substitute goods for those in consideration and the related budget;
6. it should include a follow-up section at the end of the questionnaire to make sure that respondents have understood (or not) the choice they have been asked for.

As is also clear from the above recommendations, the provided "contingent" answer "how much is the Madrid Rio Park for current users?" is certainly extended to a barely individual rationality which, although informed, it doesn't come from discussion and therefore it doesn't comprises the decision-making component characterizing the political-administrative system.

CVM is a direct method supporting the evaluation of no market public (or mixed) goods, based on the detection of preferences expressed directly by the current or potential consumer (Stellin G., Rosato P., 1998) and therefore it be used for the estimate of VET (Total Economic Value), making it particularly suitable for the evaluation of benefits in Cost-Benefit Analysis (Pearce, DW, Turner RK, 1990).

This method evaluates WTP or WTA according to a given supply of a public good (Bateman *et al.*, 2002).

To implement CVM, a reference market is simulated for the asset to be estimated, and a statistically significant sample of people potentially interested in this asset is selected. Within such a simulated market, through direct interviews, WTP or WTA is observed.

The fundamental moment of the evaluation is the definition of the questionnaire structure; it should be able to induce the respondents to declare their real preferences. The questionnaire consists of three sections:

1. the first describes the effects of the work or policy, the contingent market and the conditions to access to the benefits of the work (introductory section);
2. in the second the interviewee is invited to declare his or her WTP for access to the work or its outcomes (evaluation section);
3. the third collects socio-demographic information on the interviewees, aimed at characterizing their profile, understanding the motivations of the stated WTP and verifying the understanding of the survey (final section).

The detection of WTP can take place in two main ways:

- detecting the interviewed maximum WTP based on the suggested values (close ended question) as recommended by the NOAA Panel, or by the single-bounded discrete choice technique, in which a single amount is proposed;
- detecting the maximum WTP stated by the interviewee who is required to set a specific amount (open ended question) or by the bidding game format technique, which simulates a sort of auction.

In this case study, the close-ended answer format was used. The questionnaire was administered via a digital platform. This choice differs from the first point of the previously mentioned NOAA Panel Guidelines, which suggests a direct administration of the questionnaire, but has allowed in this study, to involve a large number of respondents, according to methods closer to the communication tools today in use, that better reflect the needs of an increasingly accustomed population to declare and compare their preferences through the help of social media.

In particular, in this study the interviewee was invited to state his preference based on a set of values presented in the final structure of the questionnaire and obtained from a preliminary analysis and verification stage; here some questionnaires have been constructed according to the multiple-bounded discrete choice technique.

The final structure of the questionnaire thus reduces the problem of the starting point bias, as the interviewee is requested to choose over a set of values resulting from the individual preferences of the samples of population interviewed in the preliminary stage and not on a single value fixed a priori.

3.4 Operational Features of Contingent Valuation

The Contingent Valuation (CV) was based on the

administration of a questionnaire and on the analysis of the results obtained for the determination of the consumer surplus. The questionnaire consists of three parts:

- a descriptive introduction of the Madrid Rio Park,
- a part with questions regarding the relationship with the Park and the definition of the relevant market, the one of the recreational services;
- a part in which the interviewees' personal data and attitudinal information are requested.

Information was collected regarding the relationship between the interviewee and the green areas, useful for interpreting the attitude towards this type of goods. The collection of these data was subsequently used in the analysis phase to understand if there were significant relationships between WTP and other variables and to identify the presence of excessively high or low values of WTP, called outliers (Tempesta, 2005).

Therefore, the interviewees were asked for information about their knowledge of the Park, the satisfaction with the activities that can be realized in the Park and its importance in relation to these activities. Finally, through the simulation of a hypothetical market, the interviewee was asked to state his willingness to pay to avoid a qualitative deterioration. Two options have been proposed, to set-up an annual voluntary donation fund, managed either by Municipality or by a citizens' association, specifically established to support the Park's running costs. This is to capture any difference in confidence on the part of users towards a political-administrative or management-business approach, since in the second hypothesis the individual objectives based on which the respondents express their preferences could be more directly achieved. To carry out the Contingent Valuation it is necessary to identify a representative sample of the interested population.

A random sampling was carried out, in which every individual in the population had the same probability of being part of the sample. To be statistically significant a random sample must have an appropriate size. The sample size is determined by the formula:

$$n = \left(u \frac{\sigma}{e} \right)^2$$

where:

n = the size of the sample,

u = standardized variable, an index of the significance of the estimate, that is generally chosen equal to 90% or 95% which corresponds respectively to $u_{0,90} = 1,65$ and $u_{0,95} = 1,96$,

e = maximum error that is accepted from the estimated value of the variable with respect to the real value,

σ = standard deviation.

To understand whether there is a correlation between WTP

and other variables (such as income, education, age, etc.), the Chi Square test was applied.

The Chi-squared test allows us to verify if there is an association between two variables: with the use of contingency tables we calculate the difference between the observed frequencies and the expected frequencies, i.e. those that would be observed in the event that there was association between the two variables.

The unevenness existing between the observed frequencies and the expected frequencies is evaluated, under the null hypothesis that there is no association between the two variables taken into consideration, defining the statistical test χ^2 :

$$\chi^2 = \sum \frac{(F_O - F_A)^2}{F_A}$$

where F_O and F_A are the observed frequencies and the expected frequencies respectively. The more the frequencies observed differ from those expected, the higher χ^2 is. The distribution of χ^2 depends on the number of degrees of freedom ν that are defined by the number of rows r and of columns c of the frequency tables:

$$\nu = (r - 1)(c - 1).$$

Once calculated χ^2 and ν , the value obtained is compared to the critical printout: if the χ^2 exceeds the critical value, the null hypothesis is rejected with a risk of error $p < \alpha$.

In order for the test to be accurate it is necessary that in the table of expected frequencies the values are not lower than 1 and no more than 25% less than 5.

Finally, once the independence of the observed variables was ascertained, the WTP was calculated by multiplying the mean μ of the WTP calculated on the sample of the respondents for the total number of the users of the Park (Bottero and Mondini, 2016).

Once all costs and benefits were determined in monetary terms, the economic performances of the project were measured. The main performance indicators in the cost-benefit analysis (Florio, 2003) are the Net Present Value, the ratio between benefits and costs and the Internal Rate of Return (European Commission, 2015).

4. APPLICATION AND RESULTS

The results of the Contingent Valuation we carried out have been compared with the estimated construction and management costs of the park by consulting various sources: the Boletín Oficial del Estado (BOE) and the Boletín Oficial de la Comunidad de Madrid (BOCM), in addition to the publications of the Municipality of Madrid (2008, 2009, 2010, 2011a and 2011b) which list the activities carried out within a year from the Área de Gobierno de Urbanismo y Vivienda.

As for the sample dimensioning we considered that the sample was significant once the 500 interviews were reached: admitting an error e of 10% of the WTP (mean:

1.7 €) and being the σ of the WTP on average equal to 22 €, with $u = 1,65$, the result is

$$n = \left(1,65 \times \frac{22}{1,7}\right)^2 = 455.$$

The questionnaire responses were analysed to determine a probability density function that allows us to calculate the willingness to pay.

With reference to the two hypothetical funds, the first managed by a citizens' association and the second by the Municipality of Madrid, it can be observed that respectively 73.53% and 71.05% of the interviewees declared a positive WTP.

Four outlier responses have been identified, i.e. values resulting excessively high compared to the sample mean and to the income bracket to which they belong. These are "symbolic" answers that should be excluded from the calculation. However, since there are no objective criteria for recognizing outliers, the calculation of the average was made excluding 5% of the highest values and 5% of the lowest values declared.

To summarize the data in order to make them more comprehensible, the measures of central tendency have been used: the mean, the mode and the median.

The mean is the most important of the three central tendency (Table 1), although in some circumstances the median or mode can better represent the tendency of a variable in a set of observations, for example when these are influenced by a strong asymmetry of the distribution.

The mode was not representative of WTP because there are different values at which the observed frequencies coincide.

The median is considered the most correct estimator in the case in which the contingent assessment is carried out with the bidding game format method, in which the respondents are imposed dichotomous choices for each sum (Tempesta, 2005). In this case, since the multiple-bounded discrete choice technique was adopted, the measure used is the mean.

Table 1 - Central tendency indices of the WTP

Central tendency index	WTP civic association (EUR)	WTP Municipality fund (EUR)
Average	18.76	15.43
Mode	10	1;5;10
Median	10	5

To measure the variability, we use a measure of statistical dispersion, the standard deviation, which allows us to evaluate how much the values are dispersed around the mean. The standard deviation is defined as:

$$\sigma = \sqrt{\frac{\sum_{j=1}^n (x_j - \mu)^2}{n}}$$

and is € 24.44 and € 20.41 respectively.

The standard error of the mean allows us to understand how much the sample mean \bar{x} of the WTP is representative of the true mean of the population μ . It is defined as:

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

Where n is the number of observations and σ is the standard deviation. It is obtained $\sigma_{\bar{x}_1} = 1,23 \text{ €}$ e $\sigma_{\bar{x}_2} = 1,02 \text{ €}$. The standard error allows to calculate the confidence intervals of the mean, i.e. the intervals within which we can state with a certain level of confidence that the true average μ of the population is located. At the 95% confidence level we have:

$$\bar{x} - 1,96 \sigma_{\bar{x}} < \mu < \bar{x} + 1,96 \sigma_{\bar{x}}$$

- 1) $18,76 - 1,96 \times 1,23 < \mu < 18,76 + 1,96 \times 1,23 \rightarrow 16,34 < \mu < 21,17$
- 2) $15,43 - 1,96 \times 1,02 < \mu < 15,43 + 1,96 \times 1,02 \rightarrow 13,43 < \mu < 17,43$

Therefore, it is possible to state that, with a probability of 95% and a risk of error of 5%, the mean μ of the willingness to pay of the entire population is between € 16.34 and € 21.17 for a fund managed by a citizens' association and it is between € 13.43 and € 17.43 for a fund managed by the City of Madrid.

The values of μ for the two funds overlap in the interval [€ 16.34; € 17.43], furthermore calculating the average of the two sample averages $\bar{x}_1 = 18,76 \text{ €}$ and $\bar{x}_2 = 15,43 \text{ €}$ it is obtained the value $\bar{x} = 17,1 \text{ €}$. Therefore, it can be said that € 17.1 is the value that significantly summarizes the results obtained.

The chi-squared test was applied by aggregating the values of the observed variables (such as income, education level, age, etc.) in order to obtain greater accuracy.

WTP values greater than 100 were not included in the calculation because they would result in cells with values less than 1 in the expected frequency table.

Consider the null hypothesis that there is no relation between the income received and the willingness to pay.

Tables 2 and 3 show the values of the observed frequencies and the expected frequencies of the two variables.

The values obtained are: $\chi^2 = 21,30$; $\nu = 15$. The value of the χ^2 is less than the critical value, therefore it is possible to accept the null hypothesis and to state that there is no relation between income and willingness to pay.

Consider now the null hypothesis that there is no relation between the level of education and the willingness to pay. It is obtained $\chi^2 = 26,39$ and $\nu = 15$. In this case the value of χ^2 is greater than the critical value at $\alpha = 0,05$, so we can

Table 2 - Income and WTP: frequencies observed

Income (EUR)	WTP (EUR)						Total
	0	1-2	5-10	15-20	25-50	60-100	
>15.000	38	20	43	24	34	10	169
15.000-29.999	32	17	42	17	30	12	150
30.000-59.999	22	5	13	8	15	7	70
>60.000	11	6	1	3	3	5	29
Total	103	48	99	52	82	34	418

Table 3 - Income and WTP: frequencies of perfect independence

Income (EUR)	WTP (EUR)						Total
	0	1-2	5-10	15-20	25-50	60-100	
>15.000	42	19	40	21	33	13	169
15.000-29.999	37	17	36	19	29	12	150
30.000-59.999	17	8	17	9	14	6	70
>60.000	7	3	7	4	6	2	29
Total	103	48	99	52	82	33	418

state that there is a relationship between the level of education and the willingness to pay and reject the null hypothesis with a risk of error $p < 5\%$.

Chi-squared test does not provide the strength of the relationship between the two variables. A correlation index is the quadratic contingency coefficient C :

$$C = \sqrt{\frac{\chi^2}{\chi^2 + N}} = 0,8$$

C can take a value between 0 and 1, the closer it is to 1, the stronger the relationship is. Therefore, it can be said that there is a strong relationship between the WTP and the level of education.

Applying the same test, it has been verified that there is no association between WTP and age, place of residence or birth, profession.

On the other hand, it is possible to state that there is an association between the WTP and the knowledge of the Madrid Río Park, with $\chi^2 = 24,72$ greater than the critical value at $\alpha = 0,1$, therefore with a risk of error $p < 10\%$. Also in this case the contingency coefficient $C = 0,78$ provides a strong degree of association between the two variables.

As mentioned, the calculation of the total value of the WTP was made by multiplying the average μ of the WTP calculated on the sample of the respondents for the total number n of the users of the Park.

In particular, a first evaluation of the WTP was carried out with reference to the entire population of the municipality of Madrid, equal to 3.2 million inhabitants and then, as a precautionary measure, the population of users was reduced to the population segment represented by the

sample, that is from 15 to 69 years, equal to 2.3 million inhabitants.

The range of values is shown in Table 4.

Table 4 - Minimum and maximum WTP values in the two users population hypotheses

	WTP average (μ)	Inhabitants total	Inhabitants age 15-69
		3.198.645	2.293.052
Civic Fund	18,76	€60.006.580	€ 43.017.656
Average CF.MF	17,10	€ 54.680.836	€ 39.199.724
Municipality-fund	15,43	€ 49.355.092	€ 35.381.792

The results of the comparison between the monetary values of costs and benefits are shown for the six scenarios described above, in Table 5.

In all scenarios the indices are positive and in particular the less favourable one shows a satisfactory performance.

Figure 3 shows the trend of the results as the scenario changes, outlining the average elasticity of each index, highlighting the greater elasticity of both the NPV and the DPbP.

Table 5 - Minimum and maximum performance indices in the two user basin hypotheses and for the two fund hypotheses

User basin (million inhabitants)	Civic fund 3			Municipality fund		
	3.2	Aver	2.3	3.2	Aver	2.3
Intangible B (EUR million)	60	55	49	43	39	35
NPV (EUR million)	278	220	163	94	53	11
B/C	1.75	1.59	1.44	1.25	1.14	1.03
IRR	10%	9%	8%	7%	6%	5%
ERR	74%	65%	56%	44%	36%	28%
DPbP (year)	18	20	22	26	30	37

Figure 4 shows the overall benefits and costs, calculated elsewhere (Giannelli, 2018), discounted at the SDR of 2.5%. The figure highlights the percentage of intangible benefits in the highest part of the histograms.

5. DISCUSSIONS E CONCLUSIONS

Madrid Rio Park (Figg. 5-6) is a public work characterised by the duality of complexity and unity, two features that the economic subjective analysis such as the stated preference analysis, revealed as complementary and able to corroborate the general consensus for the local municipal board, despite the heavy debt sustained by the city community.

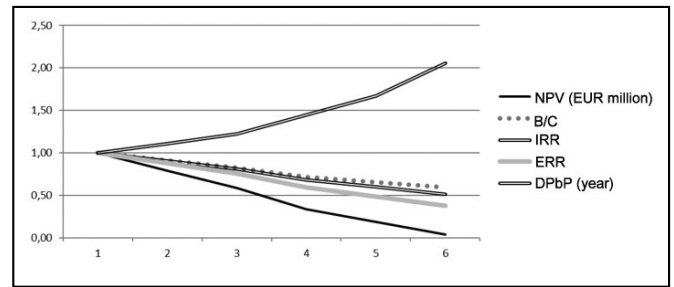


Figure 3 - Performance of the various performance indices compared to the six scenarios. Base: Scenario 1

The balance of the money value of the investment and the added value has been tested by estimating the intangibles through the CVM application that measured the wide surplus even considering the more restrictive hypotheses according to a prudence based approach.

As a measurement, the monetary representation encounters several criticalities; otherwise, assumed as a language, money allows us to enlarge the rigid accountant's vision of it, and to assume a project perspective in turn.

What F. Rizzo stated about could be considered about the significance of money function in estimating economic goods in the perspective of the economic-appraisal semiotics he proposed:

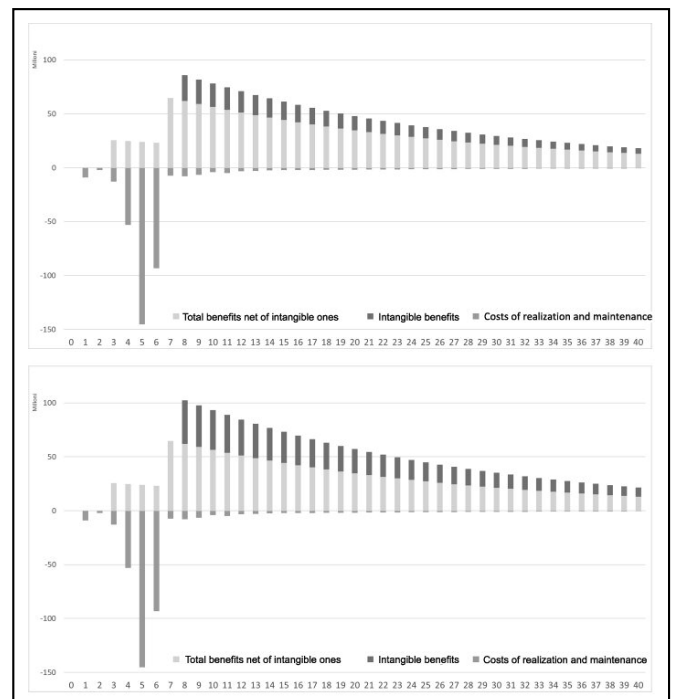


Figure 4 - Comparison of benefits and total costs discounted in the two hypotheses of minimum (top) and maximum (bottom) WTP



Figura 5 - Sal6n de Pinos

“The relationship between similar and dissimilar aspects of the economic goods is not static or precisely definable. In the semantic-economic field all goods are more or less comparable or assimilable according to their (owned or assigned) liquidity degree. Liquidity makes goods exchangeable or tradable, so expanding their technical-economic capability to be replaced (Rizzo F., *Valore e valutazioni. La scienza dell'economia o l'economia della scienza*. Milano, FrancoAngeli, 1999, p. 356).

The comparison of monetary costs and benefits of an investment defines the context in which the technical-



Figura 6 -Arganzuela Park

economic dissimilarities of such goods can be reduced, so sacrifices can be appropriately compensated.

Such a compensation concerns substantially the spatial, temporal and social dimensions.

1. The *spatial dimension* concerns the transfer of wealth from the marginal areas towards the central ones; this transfer includes the reallocation of urban function between different areas, and the redefinition of the hierarchies centre/periphery as a result of the individuation of the areas from which labour and capital are extracted to concentrate in the central areas.
2. The *temporal dimension* concerns the equilibrium between present investment amount and future revenues as represented by the social discount rate size, synthesizing the availability of community to differ present consumptions on the one hand, and the cost of capital according its different funding sources; social discount rate coordinates this two different complementary needs turning them to the social well being increase

3. The *social dimension*, overarching the ones mentioned above, concerns the allocation of the territorial wealth (as accumulated in the urban capital delivering streams of recreational, cultural and environmental services) between different social strata. Public works characterized by a prevailing symbolic function are relevant for society when they increase the accessibility to the rare services.

Although with the limits of the contingent valuation, the results of these applications cope with this triple justification.

In particular, as for social dimension, concerning solidarity, identity and inclusion, the positive response from the sample reveals the success of the Park as medium, or issue, of social communication.

In this perspective these remarks measurement and assessments allowed us to corroborate the awareness of the duality characterizing capital accumulated for making city an "event" highlighting how a great public work is able to recover the eventual attribute of a city: "an event is

that effect the effect that exceeds its own causes" (Zizek, 2014).

Such exceeding is the subject of the hermeneutic path typically distinguishing the valuation science.

The above-mentioned duality is the opposition of "work rank" and "product rank". In the specific context of urban policies:

- "work" has an iconic value, is self-referential and results from the creative gesture that is typical of political acting;
- "product" has a semantic value, is hetero-referential and results from administrative practice.

By definition, *work rank* is aesthetic, *product rank* is ethic. Work creates value by itself, and the more the two conditions fairly contaminate each other, the more work delivers a greater part of the created value to community.

The role of valuation science is to account for such a delivery, as well as to respond to community calling to account the possibility to be crossed by the value created by work.

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