Assessing the benefits of slow mobility connecting a cultural heritage

Ila Maltese *, Ilaria Mariotti [1], Alessandra Oppio [2], Flavio Boscacci [3]

DAStU - Politecnico di Milano, via Bonardi 3, Milan, Italy

The Southern surroundings of the metropolitan city of Milan up to the province of Lodi (in Lombardy region, in the North West of Italy), represent a very interesting area hosting religious sites (cloisters and abbeys), historic and naturalistic heritage. Actually, it is only connected by roads for motorized mobility, while pedestrian paths and cycle lanes are disregarded. In order to increase the accessibility and to connect the diffused heritage, in 2015 an infrastructural project for slow-mobility (bikers and pedestrians), titled "Cammino dei Monaci" (Monks' Route, henceforth CdM), has been developed by the Politecnico di Milano. The aim of the present paper is to estimate the benefits related to the CdM slow-mobility project, through the Contingent Valuation Method (CVM), and therefore the willingness to pay (WTP) declared by the 472 families, living within 3.75 km of the path. These benefits are expected to be intangible for the most: they are both environmental, in terms of reduced motorized mobility and increased quality of life, and cultural, due to the improved promotion of the historic and religious heritage system. Besides, they concern not only the "users" of the infrastructures, but also the "potential" users and the "non-users" (Litman, 2016, 2015, 2013, 2011). The results of the CVM show that the collective benefits outweigh the costs to develop the CdM, thus suggesting that the project is feasible and represents a good opportunity for the development of whole area. Furthermore, the paper fills the gap in the literature, since the CVM method has been mainly applied for evaluating environmental and cultural goods. Seven sections compose the paper. After the introduction, Section 2 describes the project, while Section 3 presents a brief literature review on the CVM. Section 4 is dedicated to the methodology, and specifically to the application of the CVM to the case-study. Section 5 focuses on data and descriptive statistics. The results of the econometric analysis follow in Section 6, while Section 7 provides some discussion and policy recommendations.

Keywords: Cultural heritage, Contingent valuation method, Total economic value, Sustainable mobility, Milan

1. Research aims

The "Cammino dei Monaci" (CdM) slow-mobility project, settled in the southern part of Metropolitan city of Milan up to the border with Emilia Romagna Region, connects historic, religious and naturalistic sites, thus generating both environmental and cultural benefits, which have no market. Furthermore, these intangible benefits concern not only the "current users" of the infrastructures, but also the "potential users" and the "non-users".

Within this framework, the present paper aims to assess the main benefits of the CdM project, through the application of the Contingent Valuation Method (CVM). According to this method and to the NOAA Panel guidelines, a survey has been carried out in 2015 by Politecnico di Milano, among the citizens of the project area (identified within 3.75 km of the path and not belonging to the same family unit), who were asked about their willingness to pay (WTP) for the project to be realized. Specifically, the non-market benefits resulting from the realization of the CDM have been monetized by measuring the average WTP, declared by the interviewees, and by multiplying it by the number of family units living within the affected area.

Article history:
Received 2 June 2016
Accepted 16 January 2017
Available online 24 February 2017

2. Introduction

The area including the Southern neighbourhoods of the Metropolitan City of Milan, the province of Lodi (in Lombardy region, in the North West of Italy), and the border with Emilia Romagna Region (North East of Italy), hosts religious sites and a rich historic and naturalistic heritage. Since this area is only connected by roads for motorized mobility, a slow-mobility infrastructural

* Corresponding author. Tel.: +02 2399 5506.
E-mail addresses: ila.maltese@polimi.it (I. Maltese), ilaria.mariotti@polimi.it (I. Mariotti), alessandra.oppio@polimi.it (A. Oppio), flavio.boscacci@polimi.it (F. Boscacci).
[1] Tel.: +02 2399 3928.
[2] Tel.: +02 2399 5176.
[3] Tel.: +02 2399 5502.

Published Journal Article available at http://dx.doi.org/10.1016/j.culher.2017.01.006

project, labelled "Cammino dei Monaci" (Monks' Route, CdM), has been planned in 2015 by the DAStU[4]-Politecnico di Milano, with the aim of realizing pedestrian and bicycle paths, achieving sustainable mobility for local trips and increasing the population's "green attitude" [1,2]. Furthermore, because of the abundant historic, naturalistic and religious heritage, the CdM slow-mobility project could also increase the green and religious tourism demand, and better connect all the minor scattered cities, which might thus share competences and tourism facilities.

Like in any other public good, the benefits associated with the CdM slow-mobility project are intangibles for the most: they are both environmental (i.e. reduced congestion, pollution, noise and increased quality of life), and cultural (i.e. improved promotion of the historic and religious heritage). Besides, as any biking facility, the CdM concerns not only its "users", but also the "potential users" and "non-users", who are positively affected in terms of reduced external costs like, e.g. noise and pollution [3,4].

The aim of the present paper is to assess the benefits resulting from the CdM project realization, and, due to its peculiarity of non-market good, thus generating environmental and cultural benefits, a Contingent Valuation Method (from now on, CVM) has been applied. In doing so, the scant existing literature on the application of CVM to transport infrastructures projects has been enriched.

A survey has been carried out in 2015 among the families living in the project area. In particular, they were asked about their Willingness To Pay (WTP) for the project to be realized. The data collected have been elaborated through a descriptive statistics; besides, an econometric analysis allowed to estimate the bid function for the project. Moreover, other questions in the test enabled a check for *consensus* about the project and to investigate the different components of the Total Economic Value (current use; potential use: option; non-use: existence and bequest), mainly used for evaluating environmental and cultural goods [5–8]. After the initial pre-test stage with 74 respondents, a sample of 472 individuals (not belonging to the same family unit) has been interviewed by means of face-to-face questionnaires. This is a representative sample of the family units living within 3.75 km of the trail (left and right side).

The average WTP has been estimated by means of Dichotomous Choice models. As expected, people's preferences are consistent with the (neoclassical) economic paradigm of the law of demand: if the bid goes up, the probability of a positive answer goes down.

Besides, the respondents who would use the CdM path for a pilgrimage,[5] are more favourable to a higher WTP, the same is true for those recognizing the CdM project's existence and option values. The total amount of benefits coming from the project is obtained by multiplying the average estimated WTP by the number of family units living in the affected area. It results that the benefits outweigh the costs, thus suggesting that the project could be a very good opportunity for the improvement and development of the whole area.

The paper is structured as follows. After the introduction and the project description (Section 2), a brief literature review on CVM application to mobility infrastructure evaluation is provided in Section 3. Section 4 presents data and methodology, while descriptive statistics and the results of the CVM follow in Sections 5 and 6, respectively. The last section provides discussion and policy recommendations.

3. The "Cammino dei Monaci" project

The CdM project, developed by DAStU-Politecnico di Milano in 2015,[6] is a slow-mobility infrastructure, mainly built along the 67.2 km of existing roads connecting the South of Milan to the border of the Emilia Romagna region, where it meets the Via Francigena, an ancient road and pilgrim route running from Canterbury (UK), passing through France, up to Rome. Historically, the area crossed by the project has always had an agricultural specialization originating from the industrious population working in the fertile Po valley,[7] Milan itself was mostly provided with the products of the valley, and the goods were delivered on the waterways. As a consequence of the long presence of the monks in the abbeys and cloisters of this area – which gives the name to the project – many religious reminders of that period still exist. Besides, the trail is in a predominantly rural location,[8] and passes through 40 small municipalities with a rich naturalistic, religious and historic heritage that should attract visitors, tourists and pilgrims; on the contrary, the area hosts only few tourism commodities like catering and accommodation.

The aim of the CdM project is thus twofold:

- to plan a slow-mobility infrastructure in order to make bikers and pedestrians travelling safer and more comfortably;
- to develop a complex network of stakeholders (municipalities, local and religious institutions, productive activities, tourism commodities etc.) in order to exploit this complex but promising cultural heritage.

To this aim, the following six areas, quite homogeneous in terms of vocation and attractive resources, have been identified:

- Milano delle Basiliche (Milan of the cathedrals), the southern part of the centre of Milan, rich of cathedrals and ancient roman and medieval ruins (i.e. "San Lorenzo alle Colonne", "Sant'Eustorgio" and "San Nazaro in Brolo");
- Milano Cistercense (Cistercian Milan), the southern part of the periphery of Milan, with industrious abbeys (i.e. Chiaravalle abbey and hamlet, Viboldone and Mirasole abbeys);
- Melegnano town, where history meets rural and environmental quality;
- Sant'Angelo Lodigiano village, a rural district, with many farmsteads and livestock resources;
- San Colombano al Lambro village, with a different view from the hills, a fortress, little hamlets and plantations devoted to viticulture;
- Sigerico village, an ideal village comprising 4 little villages (Senna Lodigiana, Orio Litta, Ospedaletto Lodigiano and Calendasco) that in the past hosted the Pilgrims going to Rome through the Via Francigena route.

4. Literature review on the CVM for assessing slow-mobility infrastructures

In recent years, Environmental Economics has stressed the importance of the concept of Total Economic Value (TEV) for capturing use (both current and potential) and non-use values of natural and cultural resources [5,6,9]. When dealing with slow-mobility infrastructures like functional or recreational cycling paths, dif-

[4] DAStU stands for Department of Architecture and Urban Studies.

[5] The southern part of the CdM crosses the Via Francigena, an ancient road and pilgrim route connecting Canterbury (UK) to Rome, passing through France.

[6] The "Cammino dei Monaci" is part of a more comprehensive network project titled MATERCULT, funded by Fondazione Cariplo.

[7] The Po river in the North, is the longest (652 km) and the most important river in Italy.

[8] About 75% of the area is not urbanised according to the official data provided by ISTAT (Italian National Institute of Statistics, see footnote 13) for 2011.

ferent categories of values have to be considered: current use, potential use (in the future, maybe: option value), and non-use (existence and bequest) [4].

The estimation of the investment (construction and maintenance) costs is an easy task, while the benefits from bicycle and walking facilities are certainly more difficult to be assessed since their value concerns intrinsic, intangible and non-monetary aspects such as cultural meaning, sense of identity, landscape perception [10]. The coexistence of several values, for current and future generations, plus the instance of providing an *ex-ante* evaluation of the project benefits, to be compared with the construction costs, has encouraged the use of CVM. Indeed, this method has the capability to measure all types of benefits from a non-market good or service, whenever non-use values (existence and bequest) are important value components [4,9,11,12]. Among the available evaluation techniques able to measure the monetary value of the cultural assets, the CVM has been widely used, and its reliability has been acknowledged by the NOOA Panel [13].

Despite the extensive literature on CVM for measuring the full range of values related to cultural heritage and environmental resources, only few studies concern the assessment of the benefits coming from slow-mobility infrastructures. The critical review proposed by Krizek [14] on the studies investigating the economic benefits of the bicycles facilities shows that Cost-Benefit Analysis (CBA) is the most well-known, and that, within the CBA, CVM is often applied together with other methods with the aim to better assess external-intangible costs and benefits [2,14,15]. Travel Cost Method (TCM) and Dichotomous Choice CVM, for example, have been combined for estimating the benefits of a mountain biking site in the US [16].

Furthermore, Betz et al. [17] suggest to combine the two of them for estimating the demand for visiting a greenway on the basis of consumer surplus' measure. Litman [3,42,18] investigates different methods – among which CVM – for estimating the value of "active transportation" (i.e. non-motorized transport improvement, like walking and cycling facilities). Besides, in the context of the Interreg IVb project "VALUE – Valuing attractive landscapes in the urban economy", CVM is included among the techniques aimed at identifying the value of urban slow-mobility infrastructures. An experiment to estimate the value of an urban private greenway in Indianapolis (Indiana) has been conducted together with an actual fundraising in 1997 [19]. More precisely, Viaud-Mouclier [20] proposes its application for the economic valuation of the cycling and walking path along the river Vesdre in Verviers (Province of Liege, Belgium). More recently, a CVM study has been carried out for eliciting the WTP for several slow-mobility infrastructure investment categories in Esslingen (Germany) with the purpose of incorporating the results of the economic valuation into the strategic spatial planning [21].

Thus, from a methodological point of view, in the present study the CVM has been developed with reference to the general recommendation provided by the NOAA Panel [13] and its resulting applications.

5. Methodology: the Contingent Valuation

When dealing with non-market goods, like public goods, it is very hard to determine their value [6,22,23]. Valuation methods for these goods can be divided into direct and indirect methods: the first ask directly the individual about the value attached on the non-market good, while the indirect methods[9] observe the individuals behaviour in a market which is linked to the non-market good [28].

Among the direct techniques, the CVM is the most applied one[10] for intangibles like health, cultural and environmental goods [24–26]. It is a survey-based stated preference method, which creates a hypothetical ("contingent") market: specifically, the CVM evaluates a change from the *status quo*, by asking respondents about the *status quo versus* an alternative state of the world, that is the project to be valued. In order to directly elicit the value of the non-market good from the respondents, they are asked how much they would be willing to pay for the good, if a hypothetical transaction could take place [6,27,28]. It is thus possible to measure the WTP for a good, i.e. the value the respondents place on the good. As a result, a "latent" demand curve can be quite easily traced [29] or estimated by means of a "controlling" regression analysis which, considering some explanatory variables (i.e. age, sex, income, education, etc.), works around the uncertainty. The "best" fitting function sorts from the data collected, depending on the way the WTP is asked, since the same question type can affect the answers and then the results [30,31].

Actually, there are several ways in which the WTP can be elicited using contingent valuation:

- "Bidding game": by asking a sequence of questions until maximum WTP is found;
- payment card: interviewee has to point out a card among different ones, which indicates the range of possible values;
- open-ended question: the respondent states the specific amount he/she is willing to pay;
- close-ended single-bounded referendum: a specific amount is proposed to the respondent and only one yes/no answer is expected;
- double-bounded referendum: a close-ended referendum with an additional follow-up question on the maximum WTP.

The most of the CVM applications mainly adopt the option "e", that is a Double-Bound Dichotomous Choice [23,32], where the respondent is asked if he/she would pay a certain amount (bid1 = X) for the good. The answer will be yes/no; an identical follow up question is then following by doubling (bid2/yes = 2X) or halving the first amount proposed (bid2/no = X/2), depending on the first answer being "yes" or "no", respectively. The expected demand curve is then calculated, based on the expected WTP, through an estimated probability function depending on the price. Actually, the consumers' surplus originating from the good is calculated as the definite integral of the demand curve up to the market equilibrium price. Specifically, the first amount proposed (bid1 = X) is very important, since it represents the referring point for the respondents. It is often calculated starting from a specific value deriving from pre-test or focus group preceding the Test; furthermore, more than only one value is proposed, originating from this specific value. Then, a discrete choice model is needed, since the answer to the two questions (the first one and the follow up question as well) are binary variables [33].

As it will be described in the next sections, the CVM proved to be a good technique for the *ex-ante* evaluation of the CdM, and specifically, for measuring the benefits associated to its non-use components (existence and bequest).

5.1. The CVM applied to the Cammino dei Monaci project

As previously stated, in the survey, individuals were asked about the *status quo versus* the alternative state of the world originating from the possible realization of the CdM project. The aim is to

[9] Among the others: Hedonic Price Method and Travel Cost method.

[10] Conjoint Analysis being the other one.

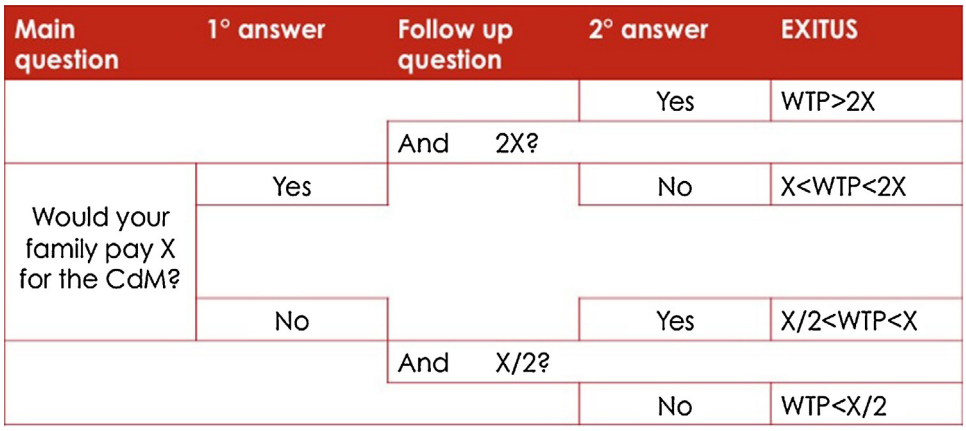

Fig. 1. The WTP question in the questionnaire.

"evaluate" the increasing of their utility due to the realization of this project. Since the CdM deals with a slow-mobility infrastructure settled in the same area where the interviewees live, the application of the CVM did not present any difficulty in terms of scenario description; nonetheless, a particular attention has been devoted to the preparation of the test and to the bidding mechanism.

In order to evaluate the benefits related to the project, a street intercept survey has been carried out from May 1st to June 16th 2015 among the citizens of the area, identified within a distance of 3.75 km on the left side and the right side of the trail, considering a reasonable distance of 15 km covered by bike at 15 km/h. Within this distance, 40 Municipalities in 4 different provinces (Milan, Lodi, Pavia, and Piacenza[11]) have been considered; data on population and family units come from the Last Census 2011 of Population by ISTAT.[12] Specifically, the population living in the area around the trail is about 815,000, belonging to about 415,000 family units.[13]

The face-to-face paper-questionnaire follows a well-established structure [34–36] and is composed of 4 sections:

- section 1, where the travel patterns and the propensity for using a bike were explored;
- section 2, aiming at investigating whether the interviewees knew the project and whether they were in support of it;
- section 3 was devoted to the estimation of the WTP; furthermore the interviewees were asked to rate the TEV components of the project: current use, option, existence and bequest values;
- section 4 collected the socio–demographic information data of the respondents.

Focusing on the TEV components, the respondents are invited to refer to a Likert scale 1–5 to declare their level of importance. While the current use-value concerns the use of the trail for commuting or leisure time to reach one or more places on the path, the option-value represents the chance to use it in the future (potential use). As concerns the "non-use"values: the existence-value of the CdM deals with the importance of knowing that the cycle and pedestrian path exists and can connect most of the cultural assets of the involved areas; the bequest-value refers to the sustainability aspects, that is, the interest in leaving to the future generations this heritage connected by a slow mobility infrastructure.

[11] Where Milan, Lodi and Pavia belong to Lombardy region while Piacenza is in the neighbouring Emilia Romagna Region.

[12] Istat (Italian National Institute of Statistics) is the main data collector and producer of official statistics in Italy.

[13] The respondents do not belong to the same family unit.

Table 1
Descriptive statistics.

Variable	Obs.	Mean	Std. Dev.	Min.	Max.
Age	472	42.54237	17.08659	16	87
Gender	471	0.473461	0.499826	0	1
Family unit size	471	3.046709	1.10605	1	6
Bike possession	472	0.824153	0.381094	0	1
CdM-knowledge	472	0.222458	0.416338	0	1
CdM-interest	472	1.822034	0.3883955	0	2
Use	472	3.527542	1.187016	1	5
Option	472	4.493644	0.76824	1	5
Existence	472	3.822034	1.133406	1	5
Bequest	472	4.169492	1.018346	1	5

The elicitation method adopted was a dichotomous choice question (Fig. 1). The central question on the WTP was based on the WTP mean value of 63 €, resulting from an open-ended pre-test conducted among 74 citizens; starting from this central value, a price vector (20, 40, 60, 80, 100 €) has been created. Actually, as the starting bid can affect the respondents' final WTP (anchor bias), they were presented with different starting bids extracted randomly from the vector above. Respondents had to say whether they were willing to pay this specific amount (bid1), which should be a *una tantum* voluntary donation per family unit to be provided to a non-profit *ad-hoc* trust fund responsible for financing the realization of the project. If the answer was yes, a new question (the follow up question) had been posed to the respondent where the starting amount is doubled (bid2 = bidhigh variable); if the answer was no, it has been halved, instead (bid2 = bidlow variable).

A supplementary set of information about the testing process (day, hour, place of testing, data collector) was also provided, while no check questions were posed due to the extreme simplicity of the project. The data collected have then been elaborated through discrete choice models in order to estimate a bid function, as explained before.

6. Descriptive statistics

The sample of 472 respondents turned out to be representative in terms of age classes, gender and geographical distribution among the 40 municipalities. Respondents are thus equally distributed between males and females; half of them are 31–60 years old, while 20% is younger and 30% elder. The average age is 42 years, a value that is slightly lower than that of Lombardy region (43.9), according to the data collected by Istat in 2015 (Table 1).

As concerns households, the average size 3 is a little bit over the regional average (2.3), following the ISTAT data. More than half of the respondents (58%) are working, while the rest is mainly

Table 2
Total Economic Value components.

Values	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
Use					
Current use	7	13	20	27	33
Potential use					
Option value	1	2	9	25	63
Non use					
Existence value	4	8	25	27	36
Bequest value	1	7	16	25	51

composed by students and retired people; moreover, 77% of the total sample has studied at least 13 years.

Focusing on the travel patterns, 82% of the interviewees owns a bike; out of them, 58% are moderate users, i.e. travelling at least 2 times a week by bike. Furthermore, more than half of the bike owners (58%) use it as a proper transport means, for going at work or at school, or for shopping, despite 79% of the whole sample declared that roads are unsafe. Half of the respondents can travel by bike for more than 1 hour, and the same is true for those walking; in particular, 56% of the respondents prefer bike to car for short distance travels and 25% also for longer distance travels, while 68% of the respondents prefer walking to car for short distance travels (less than 1 km) and 16% also for longer distance travels (more than 5 kms).

Respondents indicate a fair knowledge of the CdM project (22%), while 82% of the sample is even favourable to its realization. Besides, 57% of the respondents would use the path for a pilgrimage by foot or by bike. Finally, only 7% own a business in the affected area, but, since the most of the economic services are family oriented, the half of them do not expect higher revenues from the project.

Before searching for the respondents' WTP, people have been asked to score how important is the project as a whole, in terms of the TEV components. The question was based on a Likert scale 1 to 5, where 1 is "not important at all" and 5 is "very important". According to the already mentioned TEV framework (see Sections 3 and 4), the components of the project value have been pointed out (Table 2).

First, they were asked to score their importance for being able to use the CdM (current use value), that is, to walk or to go by bike through a part of the whole slow-mobility infrastructure for commuting or leisure purpose: 60% stated that it was important (4) or very important (5) to them.

The option value (potential use value) can be considered as the propensity for the conservation of the project, in order to be able to use it in the future. For the vast majority of the sample (88%), the importance of protecting this cultural and environmental resource system was great or very great.

Respondents were then asked to rate the importance of being aware of the existence of the CdM, apart from using it (non use–existence value). High values (4, 5) have been scored by 63% of the sample.

Finally, the sustainability attitude is investigated throughout the last question on the bequest value (non use, again). For 76% of the interviewees, it is at least important to provide the future generations with the unique historic, religious and naturalistic heritage connected by the CdM slow-mobility infrastructure and thus to retain and protect it.

Lastly, as concerns the main question about the WTP for the project to be realized, the distribution of the initial bid among the five groups, is presented in Table 3. Every group has approximately the same number of individuals. Besides, Table 3 shows that, following the law of demand, as the bid goes up the probability of a positive answer goes down.

Table 3
Bid 1 – frequency.

Bid 1	Freq.	Percent	Yes (%)	No (%)
20	92	19.49	60	40
40	102	21.61	54	46
60	93	19.7	38	62
80	95	20.13	27	73
100	90	19.07	31	69
Total	472	100		

Table 4
Logit and Probit models.

Variables	Coefficient	
	Logit model	Probit model
Bid1	−0.023793***	−0.01415***
Pilgrimage	0.520817***	0.316384***
Existence	0.458318***	0.277161***
Option	0.489611***	0.272321***
Cons.	−3.25438***	−1.872737***
Obs.	472	472
Prob.	0.0000	0.0000
Log likelihood	−275.69849	−276.01621
Pseudo R2	0.1420	0.1410

*** $P < 0.01$.

7. Contingent valuation method: the results

The present section is dedicated to the econometric analysis of the data collected by the contingent valuation survey that, as stated by the NOAA panel [13], together with the design of the questionnaire and its application, is the fundamental part of any contingent valuation study.

Before estimating the WTP econometrically, two discrete choice models (logit and probit) have been run (Table 4) in order to test the results of the descriptive statistics.[14] As expected, the bid1 variable is negative and statistically significant: as the bid goes up, the probability of a positive answer goes down, thus corroborating the results of the descriptive statistics (Table 3). Besides, two of the TEV components (existence and option) and the use of the CdM for a pilgrimage are positive and statistically significant, thus emphasizing that the respondents who recognize the importance of the CdM's existence and option values, are willing to subsidize it; the same holds for those who are favourable at using the CdM for a pilgrimage. Therefore, the results of the descriptive statistics are corroborated.

The WTP is estimated by using the double-bounded or interval data model,[15] which allows the direct estimation of *beta* and *sigma* by adopting maximum likelihood [28].[16] A model with no control variables is first developed (Table 5), where the WTP is simply the *beta* constant and approximately equals to 47 euros.

The second step is to estimate the same WTP including control[17] (Table 6). The WTP evaluated using the average values for the explanatory variables is equal to 40.88 euro (Table 7).

The model without control variables shows a WTP of about 47 euros, while, being control variables included, the WTP decreases up to 40.88 €. This value multiplied by the number of family units

[14] Although a dichotomous choice question has been adopted (section 4.1), in order to test and corroborate the results of the descriptive statistics, only the bid1 is taken as explanatory variable in the discrete choice models.

[15] This model allows the efficient use of the data to estimate willingness to pay under the assumption that there is a single valuation function behind both answers. For details and mathematical formulas see Lopez-Feldman [28].

[16] Specifically, the STATA command doubleb, developed by Lopez-Feldman [28], has been used.

[17] The control variables resulting significant have been introduced in the model.

Table 5
WTP (with no control variables).

	Coef.	Std. Err	Z	P>|z|	[95% Conf. Interval]	
Beta						
_cons	47.23441	3.128918	15.10	0.000	41.10184	53.36698
Sigma						
_cons	61.17847	3.175142	19.27	0.000	54.9553	67.40163
N. Obs	472					
Wald chi2 (3)	.					
Prob.	.					

First-Bid Variable: bid 1. Second-Bid Variable: bid2. First-response Dummy Variable: answer1. Second-Response Dummy Variable: answer2.

Table 6
Model with explanatory variables.

	Coef.	Std. Err	Z	*P*>|z|	[95% Conf. Interval]	
Beta						
Pilgrimage	17.24667	5.999129	2.87	0.004	5.488598	29.00475
Existence	12.79998	3.044169	4.20	0.000	6.833524	18.76645
Option	18.13891	4.713732	3.85	0.000	8.900171	27.37766
_cons	−93.71779	19.61433	−4.78	0.000	−132.1612	−55.27441
Sigma						
_cons	55.05377	2.829831	19.45	0.000	49.5074	60.60013
N. Obs.	472					
Wald chi2 (3)	79.16					
Prob.	0.0000					

First-Bid Variable: bid 1. Second-Bid Variable: bid2. First-response Dummy Variable: answer1. Second-Response Dummy Variable: answer2.

Table 7
WTP for mean values.

Answer1	Coef.	Std. Err	z	*P*>|z|	[95% Conf. Interval]	
WTP	40.88071	6.305663	6.48	0.000	28.52183	53.23958

(414,928) of the population within the selected area, gives a value of 16,962,257 € to the positive externalities of the project that outweigh the costs to realize it (8,381,556.53 €[18]).

8. Conclusions

In this paper, the benefits associated with the CdM slow-mobility project are estimated through the CVM, thus directly asking the WTP for the project to be realized to a significant and representative sample of inhabitants living 15 minutes by bike far from the trail.

The choice of this methodology, which is mainly used for the environmental and cultural goods assessment, appeared relevant to estimate the CdM, which is not only a slow-mobility infrastructure, but potentially an attraction for tourists, being part of a wider naturalistic, historic and religious heritage system. Besides, as stated in Section 3, like any cycle and pedestrian path, the CdM will generate benefits not only to its users, as a functional and recreational infrastructure, but also to the non-users. Again, the potential use (option value) and non-use (existence and bequest values) components of the TEV analytical framework are better explored by the CVM, which can easily estimate also the external positive impact of the project, thus providing monetized benefits. Furthermore, the direct investigation of the single TEV components shows a very clear preference for the project by the most of the respondents (60% at least for each TEV component, 72% on average), proving that the project was met with a great collective consensus.

The data collected by a face-to-face questionnaire to a sample of 472 respondents and processed by means of CVM, show that the CdM is not only feasible and convenient, but also a good opportunity fostered by the residents. As a matter of fact, the respondents would contribute with an expected average amount of 40,88 € which, multiplied by the number of families located within the buffer, generates 16,962,257 € of total benefits, an amount that doubles the CdM construction costs (8,381,556.53 €). The results might be surprising; nonetheless, the construction costs of a slow-mobility infrastructure are usually quite low, and in the case of the present case study, the costs have been only approximately calculated.

As concerns the CVM limits and biases, which are always underlined in the literature, no specific problem has been encountered in this application. As the project to be evaluated is an infrastructure to be realized in the same area where the respondents live, "information bias" was not expected at all; nor was the "strategic bias" since most of the respondents have considered the "non-use" components more important than the "use" ones. Instead, the double nature of the project, both environmental and cultural, can take advantage of the "association bias", which usually generates confusion about the good to be evaluated.

Given that a slow mobility infrastructure could be exploited not only for commuting and local leisure, but also for tourism purposes, a further investigation could be carried out among non-residents, especially tourists and excursionists. Actually, cycle tourism proves to benefit local trade and business opportunities, especially in rural areas, by utilizing existing and often under-used facilities [37]. Furthermore, the CdM, with its connectedness purpose, can also offer big opportunities to small towns as concerns both business and employment [38,39]. A multiplier effect might also be considered in a further assessment analysis, and it will be worthwhile to consider also the possible direct revenues from tourists, since historical and cultural heritage is involved.

The results suggest to put forward the following policy implications. First, the CdM project can represent a novelty by fostering the adoption of a modern comprehensive planning approach which considers the built, the cultural and the historic environment together with the biophysical one. Within this perspective, the traditional spatial planning for a transport infrastructure is integrated not only with the goal to achieve sustainable mobility but also with the aim of building up a shared cultural identity among the involved Municipalities.

[18] According to the FIAB Onlus (http://www.fiab-onlus.it), in Italy one cycle-path meter can cost 30 €/lm at min till 200 €/lm at max for a new realization. In the CdM the estimated average cost is about 125 €/lm.

Secondly, following Hanemann [41], placing a monetary value on non-market goods can be essential for a sound policy: since consensus to the project seems to be widely granted by the adopted methodology, local governments are driven to act as soon as possible and throughout a participatory approach [40].

Finally, since 2016 had been announced to be an Extraordinary Holy Year for pilgrims heading to Rome, mainly using the via Francigena, religious tourism represented a first opportunity for these little Municipalities to build up connectivity and to share tourism facilities.

Acknowledgments

The authors gratefully acknowledge the financial support by Fondazione Cariplo.

The authors would sincerely like to thank all the respondents, who have been extremely helpful by giving their time and information. A special thanks go to the students of the Course of Environmental Economics and Sustainability held by Ilaria Mariotti with the collaboration of Ila Maltese, at the Polytechnic of Milan, who carried out the in-person interviews. The authors are also very grateful to Pierluigi Marchesini and Fabio Manfredini for the valid support in checking the project details and the population data, respectively.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.culher.2017.01.006.

References

[1] S. Handy, X. Cao, P. Mokhtarian, Correlation or causality between the built environment and travel behavior? Evidence from Northern California, Transport. Res. Part D Transp. Environ. 10 (6) (2005) 427–444, http://dx.doi.org/10.1016/j.trd.2005.05.002.

[2] T. Ruiz, J.C. Bernabé, Measuring factors influencing valuation of non motorized improvement measures, Transport. Res. Part A 67 (2014) 195–211, http://dx.doi.org/10.1016/j.tra.2014.06.008.

[3] T. Litman, Evaluating Active Transport Benefits and Costs, Victoria Transport Policy Institute, 2015, pp. 134–140.

[4] T. Litman, Evaluating Active Transport Benefits and Costs, Guide to Valuing Walking and Cycling Improvements and Encouragement Programs, Victoria Transport Policy Institute, 2016.

[5] D. Pearce, G. Atkinson, S. Mourato, Cost-benefit analysis and the environment: recent developments, Organisation for Economic Co-operation and development, 2006.

[6] D. Pearce, R. Turner, Economics of Natural Resources and the Environment, Harvester Wheatsheaf, London, UK, 1990.

[7] D.S. Noonan, Contingent valuation and cultural resources: A meta-analytic review of the literature, J. Cult. Econ. 27 (3–4) (2003) 159–176.

[8] D. Throsby, Determining the value of cultural goods: How much (or how little) does contingent valuation tell us? J. Cult. Econ. 27 (3–4) (2003) 275–285.

[9] S. Mourato, M. Mazzanti, Economic Valuation of Cultural Heritage: Evidence and Prospects, in: M. De la Torre (Ed.), Assessing the Values of Cultural Heritage Research Report, The Getty Conservation Institute, Los Angeles, US, 2002, pp. 51–76.

[10] Value, The Value Project–Final Report, South Yorkshire Forest Part-nership/ Sheffield City Council, 2012 (available at http://www.value-landscapes.eu/, last access, March 7th, 2016).

[11] T.H. Tuan, S. Navrud, Capturing the benefits of preserving cultural heritage, J. Cult. Herit. 9 (3) (2008) 326–337.

[12] A. Bedate, L.C. Herrero, J.Á. Sanz, Economic valuation of the cultural heritage: Application to four case studies in Spain, J. Cult. Herit. 5 (1) (2004) 101–111, http://dx.doi.org/10.1016/j.culher.2003.04.002.

[13] K. Arrow, R. Solow, P.R. Portney, E.E. Leamer, R. Radner, H. Shuman, Report of the NOOA Panel on Contingent Valuation, Federal Register 58 (1993) 4601–4614.

[14] K.J. Krizek, Estimating the economic benefit of bicycling and bicycle facilites: An interpretive review and proposed methods, Essays Transp. Econ. (2007) 219–248, http://dx.doi.org/10.1007/978-3-7908-1765-2-14.

[15] V. Vandermeulen, A. Verspecht, B. Vermeire, G. Van Huylenbroeck, X. Gellynck, The use of economic valuation to create public support for green infrastructure investments in urban areas, Landscape Urban Plan. 103 (2011) 198–206.

[16] P. Fix, J. Loomis, Comparing the economic value of mountain biking estimated using revealed and stated preference, J. Environ. Plan. Manage. 41 (2) (1998) 227–236.

[17] C. Betz, J. Bergstrom, J.M. Bowker, A Contingent Trip Model for Estimating Rail-trail Demand, J. Environ. Plan. Manage. 46 (1) (2003) 79–96.

[18] T. Litman, Evaluating Non-Motorized Transportation Benefits and Costs, Victoria Transport Policy Institute, 2011, pp. 134–140.

[19] G. Lindsey, G. Knaap, Willingness to pay for urban greenway projects, J. Am. Plan. Assoc. 65 (3) (1999) 297–313.

[20] C. Viaud-Mouclier, Valuing Attractive Landscapes in the Urban Economy - Cycling and walking path along the river V Esdre–Final Report, 2012, pp. 2012.

[21] J. Wilker, K. Rusche, Economic valuation as a tool to support decision-making in strategic green infrastructure planning. Local Environment, Int. J. Just. Sustain. 19 (6) (2014) 702–713 (Special Issue: Rescaling Sustainability).

[22] J.A. Hausman (Ed.), Contingent Valuation: A Critical Assessment, North Holland, Amsterdam, 1993.

[23] R.C. Bishop, D. Romano, Environmental Resource Valuation: Applications of the Contingent Valuation Method in Italy, Springer Science & Business Media, 1998.

[24] R.C. Bishop, T.A. Heberlein, Measuring values of extra-market goods: are indirect measures biased? Am. J. Agric. Econ. 61 (1979) 926–930.

[25] S. Andreoli, R. Brau, V. De Magistris, La valutazione economica dei beni culturali: il metodo della Contingent Valuation, in: W. Santagata (Ed.), Economia dell'arte. Istituzioni e mercati dell'arte e della cultura, Utet, Torino, 1998.

[26] G. Sirchia, La valutazione economica dei beni culturali, Carocci, Roma, 2000.

[27] R.C. Bishop, R.T. Woodward, Valuation of environmental quality under certainty. The Handbook of Environmental Economics, Blackwell, Oxford, UK, 1995.

[28] A. Lopez-Feldman, Introduction to contingent valuation using Stata, Munich Personal RePEc Archive: Centro de Investigacion y Docencia Economicas (Cide) (MPRA WP 41018), 2012.

[29] S.V. Ciriacy-Wantrup, Major economic forces affecting agriculture with particular reference to California, Agricultural Experiment Station, University of California, 1947.

[30] R. Danielis, La teoria economica e la stima dei costi esterni dei trasporti. In ANFIA-ACI (a cura di), I Costi e i Benefici Esterni del Trasporto, Turin, Italy, 2001.

[31] U.S. Ahmed, K. Gotoh, Cost-Benefit Analysis of Environmental Goods by Applying Contingent Valuation Method, Springer-Verlag, Tokyo, 2006.

[32] J. Cooper, M. Hanemann, Referendum contingent valuation. How many bids are enough, USDA Research Service, Food and Consumer Economics Division, Working Paper, May, 1995.

[33] E. Marcucci, Scelte di trasporto e modelli a scelta discreta, Collana Economia e Politica Industriale. Franco Angeli, Milano, 2011.

[34] P. Riganti, R. Scarpa, Categorical nesting and information effects on WTP estimates for the conservation of cultural heritage in Campi Flegrei, in: R. Bishop, D. Romano (Eds.), Environmental Resource Valuation: Applications of Contingent Valuation Method in Italy, Kluwer Publisher, Boston, 1998, pp. 245–259.

[35] P. Riganti, K.G. Willis, Component and temporal value reliability in cultural goods: the case of Roman Imperial remains near Naples, in: S. Navrud, R.C. Ready (Eds.), Valuing cultural heritage: applying environmental valuation techniques to historic buildings, monuments and artifacts, Edward Elgar Publishing, 2002 (Ch. 10, p. 142).

[36] A. Alberini, P. Riganti, A. Longo, Can people value the aesthetic and use services of urban sites? Evidence from a survey of Belfast residents, J. Cult. Econ. 27 (3–4) (2003) 193–213.

[37] G. Deenihan, B. Caulfield, Do tourists value different levels of cycling infrastructure? Tourism Manage 46 (2015) 92–101, http://dx.doi.org/10.1016/j.tourman.2014.06.012.

[38] M. Lazzeroni, N. Bellini, G. Cortesi, A. Loffredo, The territorial approach to cultural economy: new opportunities for the development of small towns, Eur. Plan. Stud. 21 (4) (2013) 452–472.

[39] S.D.S. Salazar, J.M. Marques, Valuing cultural heritage: the social benefits of restoring and old Arab tower, J. Cult. Herit. 6 (1) (2005) 69–77.

[40] R. Bianchi, S. Mattia, Il valore dell'Ambiente, Intervento pubblico e CVM, Guerini, Milan, 2000.

[41] W.M. Hanemann, Valuing the environment through contingent valuation, The Journal of Economic Perspectives 8 (4) (1994) 19–43.

[42] T. Litman, Evaluating Active Transport Benefits and Costs, Victoria Transport Policy Institute, 2013.