Exploring the Influence of an Extended Theory of Planned Behaviour on Preferences and Willingness to Pay for Participatory Natural Resources Management

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Abstract: In this paper we explore the role of the theory of planned behaviour in the context of preferences for a decentralized governance of natural resources. A choice experiment was carried out to elicit preferences of the tourists for alternative options of natural resource management in a case study in Italy and data were collected by means of personal interviews. Indicators to assess the planned behaviour of respondents were collected by means of Likert scales that were then included in the choice model. Differently from previous research on planned behaviour we use an extended version of the theory that includes moral norms and explicitly account for endogeneity of the indicators with a hybrid mixed logit model, in which a latent variable is used to explain both answers to the indicators and management choices. Results suggest a general preference of respondents for local governance and indicate that the latent variable has a significant effect on explaining preference heterogeneity and improve model fit. In addition, results suggest that the theory of planned behaviour is appropriate to model individuals' behavioural intention and can be used to tailor marketing activities aiming at increasing people's pro-environmental behaviours.

Keywords: theory of planned behaviour, hybrid mixed logit, willingness to pay, choice experiment, co-management

1. Introduction

Environmental values are difficult to evaluate in economic terms because of their non-market nature, therefore stated preferences surveys are frequently used to assess individuals' preferences. Stated preference surveys elicit willingness to pay (WTP) of good not traded in the market place, which is then used as a measure of the value people attach to that specific good (Hanley and Barbier, 2009). Choice Experiments (CE) are amongst the most flexible stated preferences approach, because they are based on the evaluation of single attributes of a good or service and allow addressing a very large number of situations (Hanley et al., 2002). In a CE setting the relevant attributes and attribute levels of a good or service are combined to create different alternatives and respondents are asked to choose their preferred in a sequence of choice tasks (Hensher et al., 2015).

It has been observed that using some behavioural theory to explain heterogeneity in preferences contributes to improve model estimates (Fischer and Hanley, 2007). In the environmental field, the theory on environmental value orientations towards wildlife help explaining different levels of WTP for wolves, lynx and salamanders (Grilli et al., 2018), while the new ecological paradigm is a predictor for preferences for endangered species (Aldy et al., 2012). Social norms were also found to have a significant effect on environmental preferences (Jones et al., 2010). In this paper we contribute to the behavioural literature of choices by studying the effect of the theory of planned behaviour (TPB) on environmental preferences. A novel aspect of our approach is that we assumed that planned behaviour is a latent and unobservable characteristics of the human behaviour, which can only be approximated by some stated measures such as Likert scales. The most common alternative approach is the direct inclusion of these variables in the utility function (Hess and Stathopoulos, 2013), which is problematic for at least two reasons, i.e. measurement errors and correlation with the error term (Hoyos et al., 2015), because Likert-type variables are only proxies that are collected with some degrees of inaccuracy. To solve this issue, we implemented a hybrid mixed logit model (HMXL). The HMXL is a simultaneous equation model in which a latent variable is used as a predictor for TPB indicators and for the choice model, so that TPB and CE are linked by this latent variable. Despite some increase in computational effort, the class of hybrid models is becoming popular because of the gain in explanatory power (Mariel et al., 2015).

The policy context of our analysis is the study of tourists' WTP for a participatory management of a tourism destination, i.e. the Monte Baldo Local Nature Park in the Province of Trento, which is located in the Italian Prealps. The traditional management and planning of territories has always been carried out by the Province of Trento, which is not efficient because it is not fully aware of the needs and opportunities of local communities and of the specific characteristics of natural resources. On the other hand, a co-management of local natural resources made together with local inhabitants may increase the quality of touristic offers and improve the recreational experience of visitors. A project to allow community-based management has been launched in several districts of the Province, including Monte Baldo. The project will create the so called "reserve network" for protected areas, aiming at involving local communities in management and balance ecological, social and economic aspects. Testing the theory of planned behaviour in this context is useful to understand the drivers of individuals' attitude towards natural resources management and the acceptability of conservation measures, so that potential sources of conflicts can be timely identified. In addition, the proposed model provides new insights on the sources of preference heterogeneity given by individuals' norms and beliefs.

2. Background and review of the literature

2.1 Participatory management

Natural resource management has been traditionally carried out using top-down approaches, in which a governmental agency of a public administration takes decisions without consultation (Prell et al., 2007). This often means that decision-makers are distant from policy sites and do not possess a deep knowledge of local needs (Barrio and Loureiro, 2010). Top-down approaches are deemed to have failed because they are insensitive to local inhabitants and stakeholders (Maier et al., 2014; Stephen R. Kellert, Jai N. Mehta, S, 2000; Williams, 2014). Imposing decisions may generate conflicts, in particular when there are competing resource uses, and jeopardize cooperation (Gritten et al., 2013; Kiš, 2010). In contrast, participation-based models of management have been proposed. 'Adaptive management', 'ecosystem management' and 'co-management' are terms frequently used to indicate decision-making shared with stakeholders (Armitage et al., 2010; Doubleday, 2005; Jentoft, 1989). While the benefits of community-based forms of management are well-recognized in the literature (Collins, 1997; Ostrom, 2000, 1999; Saarikoski et al., 2010), empirical application are still limited (Baird et al., 2018; Huvila, 2008). The theoretical reasons to support participatory management are: (1) local communities and resource users have an experience-based knowledge to face management challenges and (2) participation increase democracy, legitimacy of the decisions and compliance with the legislation (Kangas et al., 2010; Songorwa, 1999; Usher et al., 2000). Tourists often show heterogeneous preferences for park and land management (Birol et al., 2006; Mäntymaa et al., 2018), therefore local knowledge and a deep contact with tourists is important to identify the most efficient solutions (Mueller et al., 2017). A close link between local knowledge and ecotourism planning has been highlighted by Zong et al. (2017), who found that interaction with local cultures is an important component of tourists' experience.

2.2 The theory of planned behaviour

TPB originates from the theory of reasoned action proposed by Fishbein and Ajzen, which assumes that much of the human behaviour depends on human will to carry out the behaviour (Ajzen and Fishbein, 1977; Fishbein and Ajzen, 1975). TPB represents a 'reasoned action' approach to consumer behaviour, assuming that intentions and behaviour are dependent on attitudinal, normative and control beliefs that individual holds in regard of the behaviour, as shown in figure 1.

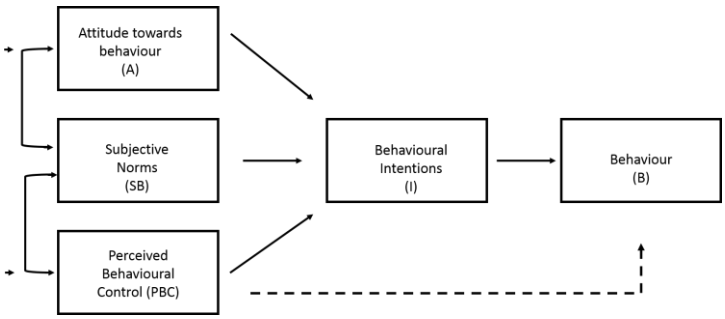

Figure 1: Components of the TPB and their influence on the final behaviour (Source: Fishben and Ajzen 1975)

The underlying idea of the TPB is that behaviours are affected by individuals' attitudes (A, i.e. whether the behaviour is considered positively or negative), social norms (SN, i.e. social pressure perceived by the individual to engage in a certain behaviour), perceived behavioural control (PBC, i.e. easiness or difficulty in performing the behaviour) and behavioural intentions (BI, i.e. individual's promptness to perform a given behaviour). The theory was subsequently updated with the inclusion of moral norms, which represents the moral satisfaction to carry out a specific behaviour, for example financially contribute for environmental conservation (Ajzen, 1991).

Within the field of stated preference valuation the interest towards TPB is growing and the appropriateness of the TPB over competing theories, e.g., the Value-belief-norm Theory (Stern et al., 1999) has been proven for the explanation of environmentally friendly behaviour (e.g., Kaiser and Scheuthle, 2003; López-Mosquera and Sánchez, 2012). The majority of these studies considers WTP linked to behavioural intentions (Bernath and Roschewitz, 2008). Some components of TPB have been proved to be correlated with stated WTP for non-market goods and services (Ajzen and Driver 1992; Bernath and Roschewitz, 2008; Meyerhoff 2013). Combining TPB in DCE frameworks has been used before (Mokwena and Zuidgeestb, 2017; Nocella et al., 2012; Osburg et al., 2016) but in different policy context and with different modelling approach. To the best of our knowledge, this is the first paper that used TPB indicators in a HMXL model.

3. Methods

3.1 Study area

Monte Baldo Local Nature Park is located in the eastern Italian Prealps in the Province of Trento, which is an important tourist destination with around three million tourists per year and a good balance between winter and summer tourists. Monte Baldo Local Nature Park includes seven protected areas: five Natura 2000 areas, one regional nature reserve and two local nature reserves. The Park is very rich in flora biodiversity and includes 28.7 floristic species per km² compared to 2.3 of other local

parks, so that it became a popular destination for naturalists. It includes 10 species protected by the European Union and 60 species of wild orchids. The Park is rich in fauna biodiversity as well, because of the presence of several mammals, birds, reptiles and amphibians, even rare, such as the Yellow-bellied Toad (*Bombina Variegata*), a small toad protected by the European Union, which requires specific conservation measures to avoid extinction in Europe. Monte Baldo Local Nature Park belongs to the Reserves Network (RN) of the Province. The RN contains areas outside the national and regional parks that will benefit from the uniform management of their unique natural, scientific, historical-cultural and landscape values and through the functional interconnections between the different areas. The RN can thus be seen as the institutional expression of the concept of ecological network. The RN main objectives are the improvement of natural and semi-natural environments and resources and the development of sustainable human and economic activities (Provincial Law n. 11/2007). A pre-requisite of RN is the participation of local communities in decision-making, as a mean to identify and effectively address the local-specific needs of the territories, to increase the quality of conservation actions and to valorize the territory.

3.2 Data

Data were collected during the summer of 2017 by four trained interviewers. The questionnaire was administrated face-to-face to a random sample of tourists of the province of Trento. Interviewers asked every second tourist they met on-site to participate to the survey. It was decided to survey tourists because local communities took part in attribute selection through a participatory process that involved local stakeholders at all levels, therefore their preferences were already captured in the design of experiment. Surveying tourists allowed us to consider preferences of both residents and external stakeholders for a more inclusive decision making process. The interested reader may find more information on stakeholders' participatory process in (Martini et al., 2017).

The questionnaire was designed following the guidelines for stated CE available in the literature (Riera et al., 2012) and organized in four thematic sections. The first part of the questionnaire included warm-up questions and questions on the actual visit to Monte Baldo Local Nature Park, a brief explanation of the Reserves Network and some information on the current management of the park. The second section contained the choice cards preceded by the description of attributes and levels, the content of the cards and the way to answer the questions. We also included some cheap talks to reduce hypothetical bias (Cummings and Taylor, 1999; Fifer et al., 2014; Fox and Hudson, 2003). Cheap talks informed respondents that results could be used for policy, so they were asked to complete choice tasks with commitment and thinking as they had to actually pay the amounts they pick.

Subsequently the questionnaire included 12 questions related to the TPB theory, in which respondents had to indicate their degree of agreement with the statements on a 7 point-Likert scale, subsequently recoded into 3 classes. Answers to these questions represented potential indicators for the application of the LV but not all could be used as they would have boosted the number of parameters; therefore we only included one indicator for each component of the TPB, reducing the number of indicators to five (the list of indicators included in the final model is available in table1 of supplementary materials). We also conducted a sensitivity analysis using different combination of indicators but results did not changed significantly and estimated WTP were identical. The last section contained socio-demographic questions.

Alternatives were created manipulating levels of the attributes, which were chosen through a participatory process that involved experts, RN managers and local stakeholders (i.e. farmers, local associations, residents, government agencies). Several meetings were organized to list a number of potential actions that could be implemented and a first draft of attributes was obtained from official documents of these meetings. A first reduction of this list was made by local managers considering interventions that could be realistically implemented. The final set of attributes was reduced to four based on their importance for the destination, with the aid of local managers that helped to identify priorities. Table 1 shows attribute and attribute levels used for the experiment.

Table 1: Attributes and levels in choice cards

Attribute	**Description**	**Levels**
Biodiversity of the meadows	Actions to preserve meadow biodiversity, including orchids	- grazing animals (Bio_med) - Mowing (Bio_high) - no action (Null alternative)
Protection of the Yellow-bellied Toad	Actions to assure a viable and long-lasting population	- Conserve and restore alpine ponds where toads live (Toad) -no action (Null alternative)
Trails	Mountain path and trails where tourist can hike and practice sports	- Restoration of damaged trails (Trails1) - Restoration of damaged trails and enhancement (Trails2) -no action (Null alternative)
Local Organic Products	Incentives for the supply of local organic products in restaurants, hotels and alpine cottages	-Yes (Products) -No (Null alternative)
Entrance fee	Entrance fee to the park necessary to fund the above activities	0,3,6,9,12,15,18

Two attributes are related to Monte Baldo's Park management actions to protect flora and fauna biodiversity, i.e. biodiversity of the meadows and protection of the Yellow-bellied Toad. Two other attributes are the restoration of walking path and the availability of local organic food products and aim to capture preferences for sustainable tourism. A fifth attribute was the cost of the chosen alternative as an entrance ticket to access the local park. Before showing the choice cards we provided

a detailed description of the attributes, how levels could be achieved and why an entrance fee was needed. We used an efficient design with priors using the D-error as efficiency measure to allocate attribute levels in the alternatives. Attributes, attribute levels and wordings were tested in a pilot using a sample of 66 tourists. We also used the pilot to collect priors for the design to use in the final survey. For the pilot we generated an Optimal Orthogonal Choice Design. The design was 96.90% efficient for estimating main effects and conditional logit model, under the null hypothesis of no information about the parameters, and other assumptions in Street and Burgess (2007) for designs optimal on the differences of attribute levels (Rose & Bliemer 2009). For the final survey we employed a sequential design (Ferrini and Scarpa, 2007; Bliemer, Rose, & Hess, 2008). The data of the first 383 questionnaires were used to improve the efficiency of the design, and therefore to build new and more efficient levels combinations. All experimental designs were prepared in NGene software (ChoiceMetrics 2012). Respondents had to complete 12 choice tasks, each of which was composed by three alternatives, two efficiently-designed alternatives and a null alternative. An example of choice card is available in supplementary materials (Figure 2).

The policy scenario was presented to respondents informing that in the closed past the management of the park was completely implemented by the Province of Trento, which was even across natural areas and local communities were not involved in decision-making. The option "no local management" in choice cards imply that management will be implemented as is the closed past by the Province, so that visitors could access for free to local parks but the local environment will not benefit of specific interventions. An alternative management is the development of the RN, in which municipalities and local inhabitants are in charge of the management of the areas and they could implement a number of intervention to improve the environment and the recreational experience of visitors. An entrance fee for Monte Baldo Local Nature Park is required because the Province of Trento will only partially fund the RN, with decreasing amounts over time.

We collected 819 fully complete questionnaires (response rate 65%), for a total of 19,656 observations. Respondents were on average 43 years old (median = 44, st.dev = 13), 49.7% female and 50.3% males. Concerning education, 8.9% of respondents held a primary education degree, 53.7% a high school diploma, 30% had a University degree (undergraduate or master) and 7.4% a postgraduate degree (PHD or similar). The median income class was in the range of 20-30K per year. 10% of respondents were members of an environmental association. Tourists' statistics are in line with

those available in local reports[1] and with others found in studies that used the same study area (Grilli et al., 2018).

3.3 Econometric approach

Hybrid models, also known as Integrated choice and latent variable models (Bolduc et al., 2005), are a big family of flexible econometric models allowing the incorporation of perceptions and cognitive processes in a random utility framework (Czajkowski et al., 2017). Examples of empirical applications are related to transportation (Hess et al., 2012), water quality protection (Dekker et al., 2016) and land management (Hoyos et al., 2015). Hybrid choice models are composed by up to three parts: structural equations, measurement equations and a discrete choice model.

Structural equations are created to specify the latent variable (LV), which is usually assumed to be linear in the parameters and with a normally distributed error. The LV is a function of some socio-demographic variables X_i:

$$LV_i = \Psi' X_i + \xi_i \quad (1)$$

with a matrix of coefficients Ψ' and an error ξ_i, which is assumed to follow a normal distribution. In our specification, the LV reflects the degree of respondents to follow the TPB that cannot be measured in a direct way. To approximate the TPB researches have to use a set of indicator questions whose answers are assumed to be determined by the latent variable. The set of measurement equations are those linking the LV to answers to indicator I:

$$I^*_i = \rho' LV_i + \eta_i \quad (2)$$

Where ρ is a coefficient indicating the effect of the LV on the indicator and η_i is a random disturbance. Likert-type indicators have an intrinsic ordering of the answers and were therefore modelled as ordered logits, which include threshold parameters to be estimated:

[1] A detailed description of regional tourism in Trentino (including tourists' profile) can be found at the following link: http://www.turismo.provincia.tn.it/binary/pat_turismo_new/report_andamenti_stagionali/REPORT_turismo_trentino._Rapporto_2015.1457448319.pdf

$$f(x) = \begin{cases} i_1 & if -\infty < \rho LV_i < \tau_1 \\ i_2 & if\ \tau_1 < \rho LV_i < \tau_1 + \delta_i \\ \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \\ i_k & if\ \tau_{(k-1)} < LV_i < +\infty \end{cases} \quad (3)$$

Where $\tau_1 \ldots \tau_{(k-1)}$ are the threshold parameters of the k classes to be estimated and δ_i the width of the class. As a consequence of answer recoding into three classes our model has two threshold parameters to be estimated. The new coding has the advantage to lower the number of parameters to estimate compared to the seven classes coding (two thresholds instead of six) and to maintain the order of preferences of the answers, therefore results are assumed not to vary significantly.

The last part of our HMXL is a choice model based on the Random Utility Theory (RUM), which assumes that the utility of an individual depends on the characteristics of the alternative and a stochastic unobserved component. The utility U that an individual i obtains from an alternative j in the choice situation t is given by the following:

$$U_{ijt} = \beta_i{}' X_{ijt} + \beta'_i ASC_{ijt} + e_{ijt} \quad (4)$$

Where X_{ijt} is a matrix of attributes of the alternative j, β_i a vector of coefficients indicating the marginal contribution of the attributes to the utility, ASC_{ijt} is the alternative specific constant and e_{ijt} a random unobservable component, assumed to be i.i.d. extreme value type I distributed. The subscript in β_i indicates that coefficients are individual-specific and allow for heterogeneous preferences across respondents, providing therefore the mixed logit model (MXL), as oppose to the standard multinomial logit (MNL) that assumes homogeneous preferences. In this part of the HMXL we assume that the LV capturing individual's planned behaviour enters the utility function as an interaction term with the null alternative, which represents the centralized governance of natural areas:

$$U_{ijt} = \beta_i{}' X_{ijt} + \beta'_i ASC_{ijt} + \beta'_i LV_i ASC_{ijt} + e_{ijt} \quad (5)$$

This specification of the utility function allows understanding the global effect that the LV has on the choice between a bottom-up approach provided by the RN and the traditional governance. The resulting log-likelihood of the MXL model is defined as follows:

$$P_{ni} = \int \frac{e^{U_{ijt}}}{\sum_j e^{U_{ijt}}} \varphi(\beta|b,\Omega)d\beta \quad (6)$$

In which $\varphi(\beta|b,\Omega)$ is the probability density function of the distribution of the coefficients, which are commonly assumed to be normally distributed in applications to environment. In our Best-Worst format respondents are asked to state their most (best) and least (worst) preferred alternatives in a set of three alternatives *J*, say j_1, j_2,and j_3 in each of the twelve choice task t. We assume that each respondent choose his/her most preferred alternative *j* in each of *J*-1 sequential choice tasks (i.e., j_1 as first best and j_2 as second best), each containing one alternative less than the previous choice task. As the best-worst approach allows us to retain two choice-observations from each choice task we estimate our models by using the "exploded" parametric mixed logit model (Luce and Suppes 1965; Scarpa et al. 2011), whose probabilities are computed as the product between the probability of the best choice and that of the second best:

$$P_{ij}[ranking\ j_1, j_2, j_3] = \int \frac{e^{U_{itj1}}}{\sum_{j=j_1,j_2,j_3} e^{U_{ijt}}} \times \frac{e^{U_{itj2}}}{\sum_{j=j_1,j_2} e^{U_{ijt}}} \varphi(\beta|b,\Omega)d\beta \quad (7)$$

The HMXL model was estimated in R (R Core Team, 2013). WTP were calculate using the Krinsky-Robb methods with 5,000 draws (Krinsky and Robb, 1986).

4. Results and Discussions

Respondents answered to TPB indicators giving median and high scores frequently (table 2 in supplementary materials shows answers to all indicators). We conducted a Chi-squared test on all pairs of indicators to test the association between answers. All tests rejected the hypothesis of independence between answers (p-value = 0.000 for all pairs), therefore suggesting that large scores for one indicator are associated with large score for the others and *vice versa*. This result confirms previous studies that indicate a high correlation between the components of TPB (López-Mosquera et al., 2014).

We now move to the econometric models. The three components of the HMXL model were jointly estimated but they are presented in separate tables to facilitate the read. Estimated coefficients for explanatory variables included in equation (1) are summarized in Table 2. It can be noticed that the LV describing the propensity to follow the TPB is only influenced by gender, with women being less likely to behave according to the theory (Yang et al., 2018).

Table 2: Model estimates for the LV explanatory variable

LV Variables	Coefficient	St. err.
Female	-.249*	0.097
Age_class1	1.135	1.294
Age_class2	0.993	1.322
Age_class3	0.268	1.52
Education	0.038	0.167
Constant	0.201**	1.175
ξ_i (LV error)	1.457	0.453

*p < 0.1, **p < 0.05

Table 3 shows results for the measurement equations, in which answers to indicator variables are explained by means of the LV. It can be noticed that threshold parameters Tau1 and Tau2 are always significant, indicating that an ordered analysis was appropriate to model the data (Greene and Hensher, 2009). The coefficient Rho indicating the effect of the LV is also significant for all coefficients, therefore the LV is appropriate to model the indicators.

Table 3: Ordered logit results for the five TPB indicators

	Attitude (ATT)		Subjective Norm (SN)		Perceived Behavioural Control (PBC)		Personal Moral Norms (PMN)		Behavioural Intention (BI)	
	Coeff.	St.err	Coeff.	St.err	Coeff.	St.err	Coeff.	St.err	Coeff.	St.err
τ_1	-3.83***	0.62	-5.47***	0.80	-4.69***	0.98	-1.82***	0.10	-4.50***	0.57
τ_2	4.29***	0.25	4.24***	0.31	4.45***	0.47	2.12***	0.10	4.99***	0.51
ρ	-1.46**	0.50	-2.23***	0.67	-1.49***	0.60	-.09*	0.05	-2.14***	0.54

***p < 0.01, **p < 0.05, *p < 0.1

We now move to Table 4 that shows results of the choice models, i.e. the focus of our study. We show a MXL model without LV as a reference model and the HMXL that was estimated simultaneously with the parameters shown above.

It can be seen that MXL and HMXL show consistent results for common parameters as there are no changes in the sign of the coefficients, only their magnitude changes. Consistently with economic

theory, the coefficient associated with the cost of the ticket for the local park is negative and indicates that utility for individuals decreases when the cost increases.

Table 4: Results of the MXL and HMXL models

	MXL				HMXL			
Parameters	**Mean**	**Std. err**	**Std. dev.**	**Std.err**	**Mean**	**Std. err**	**Std. dev.**	**Std.err**
Cost	-.177***	.005	(fixed)		-.179***	.005	(fixed)	
Bio_med	.131***	.02	.072	.047	.131***	.02	.002	.002
Bio_high	.326***	.026	.408***	.028	.325***	.027	.415***	.028
Toad	.514***	.031	.664***	.026	.526***	.031	.703***	.027
Trails1	.369***	.023	.286***	.038	.363***	.024	.326***	.036
Trails2	.707***	.034	.657***	.031	.708***	.035	.693***	.032
Products	.468***	.021	.403***	.020	.452***	.021	.425***	.021
Central Gov. (null alternative)	-2.719***	.113	2.897***	.123	-3.669***	.582	1.049***	.14
Central Gov. x LV			-		1.602***	.498	.513***	.133
LL			-10860				-10831	
AIC			21798				21740	
BIC			22105				22047	
Obs				10080				
Respondents				819				

***p < .01, **p < .05, *p < .1

Coefficients for the medium and high improvement of biodiversity of the meadows were both significant and positive, therefore tourists' utility increases with increasing meadow biodiversity. The coefficient for a high improvement of biodiversity is larger than the coefficient for the medium improvement, which indicates a non-linearity in preference that favours the high improvement. People showed positive attitudes towards the protection of the Yellow-bellied Toad, as suggested by the positive and significant coefficient. Positive attitudes for the protection of biodiversity and for the Yellow-bellied Toad were both anticipated because Trentino is a tourist destination particularly suitable for nature-based tourism; in addition a positive attitude to protect biodiversity is detected in several previous studies (to name a few, Bandara and Tisdell, 2005; Biénabe and Hearne, 2006;

Ezebilo, 2010; Yao et al., 2014). Respondents were also interested in the extension of the walking path. Similarly to meadow biodiversity, a non-linearity between medium and high improvement was detected, with the high improvement being much more preferred compared to the medium. This is an indication of strong tourists' preferences for a destination that offers several walking facilities, which is expected given that walking and hiking are among the most common outdoor activities in mountain areas. The availability of local organic products is also a variable of interest for tourists, with a positive and significant coefficient. The coefficient for the null alternative is negative and very large in absolute value, which indicates that tourists derive a strong disutility from the centralized governance. Therefore, results suggest strong preference of tourists for a participatory management in which local communities are able to take decisions on RN and natural areas. In the HMXL model it can be noticed that the interaction of the coefficient for the central governance with the latent variable is positive and highly significant; this indicates that the TPB has a strong and significant influence to explain preference heterogeneity.

Concerning standard deviations of random coefficients, it can be seen that only the coefficient for the medium increment of biodiversity is not significant, while all other coefficients are. This indicates that preferences are heterogeneous across respondents and it is a strong evidence that a model with random coefficients better describe the data compared to a fixed coefficients model like the standard multinomial logit model.

The analysis of model fit statistics indicates that the hybrid model allows a gain in the level of log-likelihood of about 30 points, which is also reflected in lower AIC and BIC. This indicates that the hybrid model performed better than the standard MXL for our dataset.

Table 5: Krisky-Robb confidence intervals for WTPs

	Baseline MXL model			HMXL		
Attribute	Lower	Median	Upper	Lower	Median	Upper
Bio_med	1.04	1.47***	1.91	1.03	1.45***	1.90
Bio_high	3.14	3.68***	4.23	3.10	3.65***	4.17
Toad	5.21	5.81***	6.41	5.29	5.89***	6.49
Trails1	3.66	4.17***	4.68	3.54	4.06***	4.58
Trails2	7.29	7.98***	8.66	7.23	7.93***	8.61
Products	4.86	5.29***	5.71	4.62	5.06***	5.49
Central Gov.	-33.42	-3.71***	-27.99	-32.90	-23.20***	-13.60

*** indicates p-value < .01

With regard to welfare estimates, we show WTPs for attribute levels in Table 5. It can be noticed that all WTPs are positive with the exception of the variable capturing preferences for the central governance. Tourists were willing to pay €1.45 and around €3.7 for the medium and high enhancement of biodiversity, respectively. The protection of the yellow-bellied toad was also valued positively, with a WTP of around €6. Walking paths were also highly valued and WTP is highly non-linear, with the WTP for a high improvement being roughly the double than WTP for a medium improvement.

The negative WTP for the central management indicates that respondents would be worse-off if RN was managed by central authorities, so they should be compensated. It can be noticed that both the baseline and the HMXL models provide negative WTP estimates but the HMXL have a much lower central value, which is the result of the interaction term with the latent variable capturing the planned behaviour. Therefore, when considering the extent to which individuals follow a planned behaviour the disutility from central governance is lower. In the base MXL model the negative WTP (i.e. required compensation) for the centralized governance was very large compared to the values of WTPs for other attributes, so a possible effect of including the TPB component could be to smooth the effect of hypothetical bias, i.e. overstated WTP due to the hypothetical nature of the proposed scenario (Carson et al., 1996; Morrison and Brown, 2009), although a detailed analysis for this aspect requires further investigation.

In general, we found that analysing data under the framework of the TPB contributed to increase the quality of the estimates and to better identify preferences of respondents. Although more research should be necessary to effectively determine the effect of TPB on preference formation, this work confirms the available literature as it has been shown that behavioural intentions are useful predictors of human preferences, in particular concerning leisure and recreational choices (Ajzen and Driver, 1992).

4.1 Policy implications

A broad conclusion that can be drawn from our experiment is that tourists are in favour of the development of the RN network, even if this imply paying a ticket to contribute to local management activities. This is revealed by the positive WTP for all the attributes of RN development that were proposed by the local community. In this regard, the findings of our study confirm that local communities are aware of what is needed to improve destination management and be more attractive for the development of nature-based tourism. While the main focus of the RN project is biodiversity conservation (Martini et al., 2017), results suggests that visitors understand the potential benefits of

RN to integrate human and nature needs and achieve a balance between ecological, social and economic aspects. A pro-active role of the local community provides concrete advantages in destination management and this is revealed by tourists' decision to support RN initiatives.

In addition, the integration of the TPB in the estimation provided interesting insights on the behavioural aspects of tourists. Understanding motives behind values is important for a correct assessment of values themselves. TPB indicators were all significant, therefore suggesting that all five components of TPB explain part of tourists' behaviour. This might have interesting managerial and policy consequences as they allow an accurate insight on how individuals perceive environmental management, so that effective conservation policies can be tailored based on users preferences, as suggested by Spash et al. (2009). Understanding the behavioural drivers of tourists' willingness to contribute to environmental protection through increased participation of local communities is important for effective communication strategies and destination management.

5. Conclusions

In this paper we implemented a hybrid latent class mixed logit model to explain the effect of individuals' planned behaviour on preferences for a decentralized management of natural resources. A stated CE was carried out in a study in the Italian Prealps to collect the data, in which the null alternative was represented by the traditional standard management while costly alternatives were options for local managements. Although the baseline MXL and the HMXL returned similar estimates in terms of WTP, it was found a significant effect of the latent attitudes to behave according to the TPB, which helps explaining preferences for local-based management. It was detected a large disutility of respondents for the null alternative, i.e. for the central governance. The model including indicators of individuals' planned behaviour performed better compared to the baseline, suggesting a better fit for the data. For the cited reasons, future applications might include TPB in their study. A more frequent application of TPB on environmental studies is desirable to confirm findings available in the literature and to better describe psychological roles on preferences.

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Supplementary materials

Figure 2: example of choice card

		A Scenario	**B Scenario**	**No local management**
	**Biodiversity of the meadows**	Medium	High	Low
	**Protection of the Yellow-bellied Toad**	No	Yes	No
	**Trails**	Restoration and enhancement	Restoration	No actions
	**Local organic products**	No	Yes	No
	**Entrance ticket**	9 €	12 €	0 €
Which one is your **favorite** scenario?				
Which one of the remaining is the **worst** scenario?				

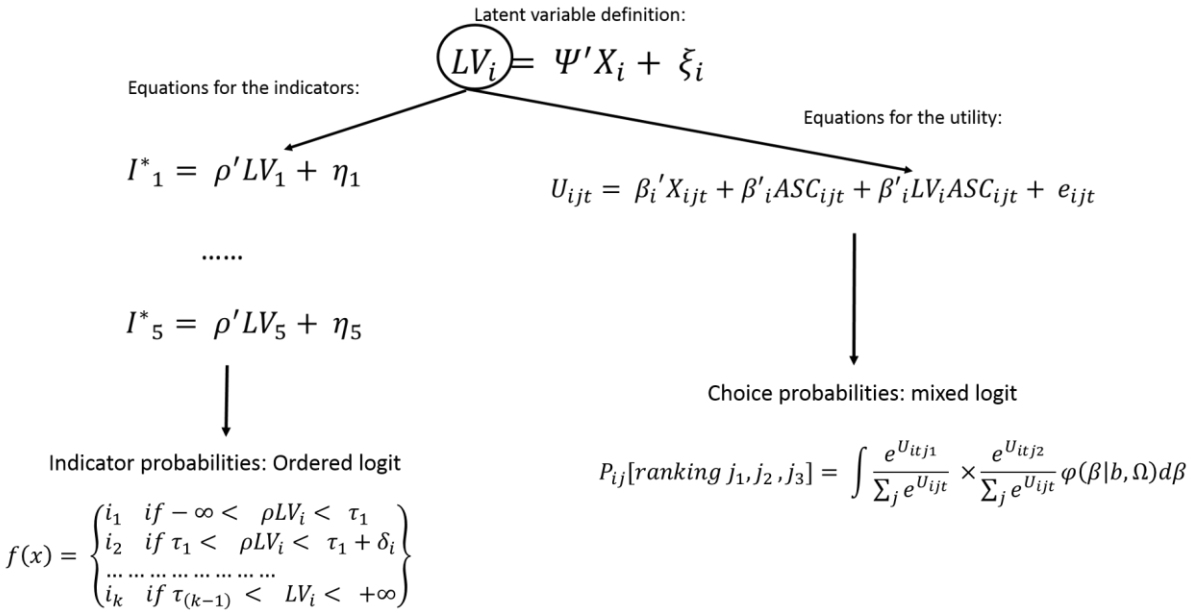

Figure 3: Scheme of the econometric model

Table 6: Questions used as indicators for the TPB

Indicator	Abbreviation	Question	Response scale
Attitude	ATT	If I paid a park entrance fee to finance the projects of local population, protect biodiversity and contribute to sustainable tourism I would feel…	Not satisfied- very satisfied (1-7)
Subjective norm	SN	People I respect would pay an entrance fee to the park to finance the projects of local population, protect biodiversity and contribute to sustainable tourism	Agree (1-7)
Perceived behavioural control	PBC	I can easily afford to pay an entrance fee to finance the projects of local population, protect biodiversity and contribute to sustainable tourism	Agree (1-7)
Personal moral norm	PMN	I feel I should pay an entrance fee to finance the projects of local population, protect biodiversity and contribute to sustainable tourism	Agree (1-7)
Behavioural intention	BI	I will pay an entrance fee to finance the projects of local population, protect biodiversity and contribute to sustainable tourism if requested by the park	Likely (1-7)

Table 7: Percentages of answers to indicator questions

	Score of respondents (%)		
Indicator	**Low**	**Median**	**High**
ATT	14.29	54.33	31.38
SN	13.06	37.85	49.08
PBC	9.04	50.06	40.9
PMN	14.65	43.96	41.39
BI	18.68	50.18	31.14