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Explicating the Conditions for (Un)sustainable Tourists' Behaviour in a Cultural Heritage Destination: A Mixed-Method Approach Based on the Theory of Planned Behaviour

Abstract

The study examines sustainable tourism behaviour at the historic city of Rothenburg ob der Tauber. The research aims to explain tourists' sustainable behaviour and to uncover configurations that lead to sustainable or unsustainable behaviour. The present study is based on the Theory of Planned Behaviour (TPB) as its theoretical framework. A mixed-method design is then employed, integrating quantitative and qualitative research methodologies. The quantitative arm of the study employs regression analysis, while the qualitative research uses the fuzzy-set Qualitative Comparative Analysis (fsQCA).

The findings from the regression analysis revealed that sustainability-oriented attitudes, social norms, and behavioural control have a statistically significant impact on tourists' sustainability-oriented behavioural intention, in descending order of importance. The fsQCA results showed that strong attitudes are a necessary condition for strong behavioural intention toward sustainable tourism activities. Weak social norms are an essential condition for weak behavioural intention toward sustainable tourism activities. Furthermore, the study identified the following sufficient conditions for a strong intention to engage in sustainable tourism activities: strong social norms paired with weak behavioural control, or strong attitudes in conjunction with strong social norms.

Keywords: fsQCA, QCA, sustainable tourists' behaviour, heritage tourism, city tourism, heritage destination, mixed-method, configurational theory

1. Introduction

The Theory of Planned Behaviour (TPB) is a well-established theoretical framework in the social sciences that seeks to explain behavioural intention, with applications in both environmental research (Esfandiar et al., 2021; Si et al., 2019) and tourism and hospitality research (Hansen et al., 2024; Ulker-Demirel & Ciftci, 2020). TPB has been used to explain tourists' pro-environmental behaviour, in addition to serving as a foundation for the conception of targeted behavioural interventions (Han, 2021). The TPB's popularity stems from its ability to identify the antecedents of a specific behavioural intention, namely attitudes, social norms, and perceived behavioural control. Previous literature on TPB in sustainable tourism argues that TPB is used to analyse pro-environmental tourists' behaviour as the best predictor of sustainable tourism growth (Esfandiar et al., 2021). Moreover, extant research assumes that simply explaining and supporting pro-environmental behaviour leads to achieving environmental sustainability, both in the heritage tourism setting (Alazaizeh

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Original Research Article
Vol. 74/ No. 1/ 2026/ 79 - 94
UDC: [338.48-6:7/8]+[338.48-4:316.62](430); https://doi.org/10.37741/t.74.1.5

et al., 2019) and in other tourism settings (Han, 2021; Wang et al., 2018). However, this approach leaves a significant knowledge gap in terms of understanding the antecedents of non-environmental tourists' behaviour- an issue with important implications for sustainable tourism theory and practice in our view. This gap was addressed by Yang et al. (2018) through the lens of TPB and a qualitative research approach, while Mamula Nikolić et al. (2021) addressed it through a quantitative research approach. Previous research has found a critical lack of mixed-methods in TPB-based research in tourism and hospitality (Ulker-Demirel & Ciftci, 2020). The present paper uses a mixed-methods approach to address a large theoretical and methodological gap in the literature on sustainable tourists' behaviour through a TPB lens.

Previous literature on tourists' sustainable behaviour has recognised that the Theory of Planned Behaviour can provide a promising basis for explaining and designing behavioural change interventions (Juvan & Dolnicar, 2017). Several studies examine the TPB framework in the context of heritage tourism (Duarte Alonso et al., 2015; Osiako & Szente, 2024; Toan et al., 2019) however, none of those consider the intention to engage in sustainable or pro-environmental tourism behaviour. Only two previous studies used TPB as a framework in the context of tourists' pro-environmental behaviour (Rao et al., 2022; Zhang & Ran, 2024). However, they both focus on general pro-environmental intent in a heritage destination context rather than on the use of specific sustainable tourism products and services.

There is conflicting evidence regarding the existence of an attitude-behaviour gap in sustainable tourists' behaviour. One line of research claims that the sustainability attitudes at home or in general are poor predictors of travel-related sustainability-oriented behaviour (Becken, 2007; Bergin-Seers & Mair, 2009; Juvan & Dolnicar, 2014), while another strand of literature proposes an interplay of positive and negative environmental attitudes with environmental and non-environmental travel mode priorities, as a complex network of related and often conflicting phenomena (Hanna & Adams, 2019; Hares et al., 2010a; Kroesen, 2013; Mamula Nikolić et al., 2021). With the above research framework in mind, the present research seeks to empirically investigate the sustainability-oriented behavioural intention of heritage tourists in the historic city centre of Rothenburg ob der Tauber through a multi-method approach. To this end, the following two research questions have been created, with independent variables (IV) and/or conditions (C) and dependent variables (DV) and /or outcomes (O):

RQ1: *Do sustainability-oriented attitudes, behavioural control and social norms of heritage tourists (IVs) have a statistically significant impact on the sustainability-oriented behavioural intention of heritage tourists (DV)?*

RQ2: *What are the sufficient and necessary conditions within the TPB (C) for the presence and absence of sustainability-oriented behavioural intention among heritage tourists (O)?*

RQ1 will be addressed using multiple linear regression, while RQ2 will be addressed using fsQCA. RQ1 will be addressed through a multiple linear regression analysis to uncover the relevant antecedents of behavioural intention to engage in sustainable tourism behaviour. RQ2 will use fsQCA in a configurational analysis to reveal the configurational paths of factors leading to both high and low behavioural intention to engage in sustainable tourism behaviour.

2. Literature review

As of 2019, the Theory of Planned Behaviour has been cited more than 60,000 times (Tornikoski & Maalaoui, 2019), making it one of the most widely used models in behavioural research. The TRA (Theory of Reasoned Action), a predecessor of the Theory of Planned Behaviour, includes a person's beliefs as a starting point of the model, which then impacts attitudes and social norms, which in turn are antecedents of behavioural intention, leading to the behaviour itself (Fishbein, 1979). Although the TRA has been heavily criticised

from the outset (Sarver, 1983), it has evolved into the Theory of Planned Behaviour (Ajzen, 2011), and it remains a widely used methodology (Ajzen & Kruglanski, 2019; Khan & Idris, 2019). As for the TPB, it includes behavioural intention, which leads to the behaviour in question, as well as attitudes, social norms, and perceived self-efficacy (probably in response to the early criticism from Sarver (1983)), as antecedents of behavioural intention.

2.1. TPB in tourism research

Tourists' behaviour and motivations are an essential field of research for tourism researchers (Abbas et al., 2025). In this research field, the Theory of Planned Behaviour is a commonly used approach (Ulker-Demirel & Ciftci, 2020). Other frequently cited theories in tourism include norm activation theory, goal-directed behaviour, and value-belief-norm theory (Han, 2021). Previous studies employing TPB in sustainable tourism have used this theory to examine three types of tourists' environmental behaviour: environmentally radical, environmentally conservative, and environmentally disturbing (Wang et al., 2020). Other research has extended TPB's scope in tourism research. Additional variables include resultant self-transcendence and resultant conservation as antecedents, tourists' environmental consciousness as a moderating variable, and intention to visit an eco-friendly destination as a dependent variable (Ahmad et al., 2020). Other studies have added belief, constraint, and the "new ecological paradigm" as antecedents of the TPB model, with mountain hikers' pro-environmental behavioural intention as the dependent variable (Zarei et al., 2021). Some studies employ TPB alone (Caballero et al., 2019; Kaplan et al., 2015; Yuriev et al., 2020), while others combine TPB with the value-belief-norm (VBN) (López-Mosquera & Sánchez, 2012) and the Norm Activation Model (NAM) (Esfandiar et al., 2021). Sustainability-oriented tourists' activities researched in the previous TPB studies include hiking as a nature-based recreation (Zarei et al., 2021), walking and cycling (Bird et al., 2018), regional and traditional foods (Birch & Memery, 2020), and a vegetarian diet (M. J. Kim et al., 2020), all of which were included in the present study. However, in terms of approach, the aforementioned TPB-based studies all focus on combining TPB with other similar theories to overcome the oversimplification and linearity criticised by Shove (2010). However, there is a paucity of mixed-method approaches in TPB-centred research in tourism and hospitality (Ulker-Demirel & Ciftci, 2020), which could help address the identified simplicity of the resulting models and further expand TPB research in tourism.

2.2. TPB in environmental research

Theories that have been previously employed to explain environmental and sustainable consumers' behaviour include TRA and TPB, but also Norm Activation Theory (NAT), Goal-Directed Behaviour model (GDB), as well as Value-Belief-Norm (VBN) theory (Han, 2021). In recent years, stimulus-organism-reaction (SOR) has also been used as a theory to explain sustainable consumption (Berlanga et al., 2023). However, TPB is being increasingly used in environmental research, especially in the United States of America, China, the United Kingdom and Malaysia (Si et al., 2019). Many environmental research studies employ the TPB in its classical form (Caballero et al., 2019; Hasan et al., 2015; Mancha & Yoder, 2015; Niaura, 2013; Wang et al., 2020; Yuriev et al., 2020). Other environmental research studies extend the TPB. They do so either by including the impact of place attachment (place identity, place dependence, nature bonding, social bonding) on the intention to recycle (C. Wan et al., 2021), or by introducing environmental indebtedness as an emotional factor in the attitude variable (Xu et al., 2022).

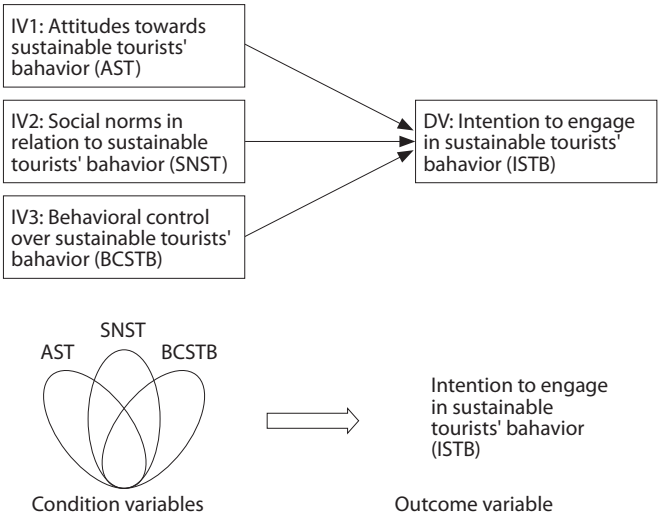
TPB models are being tested in a variety of settings, typically using multiple regression and structural equation modelling (Ajzen, 2020). More recently, however, QCA has increasingly been used to complement and extend quantitative data analysis (Wu et al., 2016). This is due to the use of fuzzy set theory and the resulting ability to distinguish between different types of causal connections and to distinguish between competing arguments: e.g. the inquiry of whether having high test scores is linked to later success in life, or

is it not having low scores (Ragin, 2009)? Combining quantitative and qualitative methods is considered to provide a more nuanced understanding in the social science methods literature (Meuer & Rupietta, 2017). However, while the advantages of integrating QCA within TPB research have been well documented in the previous TPB literature (Di Paola et al., 2016; M. Wan & Wan, 2020), no literature review article on TPB has addressed recent advances regarding the employment of QCA in conjunction with regression and SEM analysis, along with the benefits and pitfalls associated with QCA. The employment of TPB and QCA in parallel has emerged as a prominent approach in environmental research (Lee et al., 2022; M. Wan & Wan, 2020) and entrepreneurship research (Drăgan et al., 2021; Pérez-Macías et al., 2022; Sastre et al., 2022). In contrast, this approach is underrepresented in (sustainable) tourism research (Zheng et al., 2023). This represents a significant research gap.

3. Research design and questionnaire development

The research approach is based on the Theory of Planned Behaviour (TPB), an established theory within tourism research, particularly for explaining tourists' sustainability-oriented behavioural intentions. The research follows a multi-method design, as illustrated in Figure 1 below. The study thus examines the statistically significant impact of attitudes towards sustainable tourists' behaviour (AST), perceived social norms regarding sustainable tourists' behaviour (SNST), and perceived behavioural control over sustainable tourists' behaviour (BCSTB) on the intention to engage in sustainable tourists' behaviour (ISTB). Additionally, the analysis employs fsQCA to explore an alternative interpretation, treating the three independent variables as condition variables and the independent variable as the outcome variable.

Figure 1
Multi-method research design used with independent variables (conditions) and dependent variable (outcome)



The research employed a Likert-type variable, consisting of several question batteries on a five-point scale. The mean values for multiple questions were then used both for regression analysis and for a qualitative comparative analysis with additional calibration, in which the distances between the five points are not equal. The battery of questions for the Intention to engage in sustainable tourists' behaviour (ISTB) is presented in Table 2 below. These questions were based on previous literature. However, the questions were also validated and confirmed by the Rothenburg Tourist Service, a Destination Management Organisation. The goal was to select a set of questions that reflect the most relevant sustainability-oriented offers in the city of Rothenburg ob der Tauber. The context of Rothenburg ob der Tauber is well-suited for research on heritage tourism,

given its highly regarded cultural heritage and its prominent position in the German and European tourism markets, making sustainability a very relevant topic for the local population.

Table 1
Explanation of the Likert-type batteries of questions for Intention to engage in sustainable tourists' behaviour (ISTB)

Likert-type variable	Statements in the questionnaire	Reference in the literature
Intention to engage in sustainable tourists' behaviour (ISTB)	I would like to take part in the hiking weeks in Rothenburg in spring or autumn.	Zarei et al. (2021)
	I would love to hike or bike around Rothenburg.	Bird et al. (2018)
	I would love to visit Rothenburg's private gardens, meet the locals and get closer to Rothenburg's nature.	Goh et al. (2017)
	I would love to use sustainable RECUP beverages.	Wan et al. (2021)
	I would love to try regional food and wine.	Birch & Memery (2020)
	I would love to visit a vegetarian restaurant in Rothenburg.	Çoker & van der Linden (2022) Kim et al. (2011)

The battery of questions for the ATS, SNST, and BSTB is presented in Table 2 below. These batteries were developed in line with the examples provided by Ajzen (2006) for designing specific questions for a TPB questionnaire. The battery of questions was then further developed using similar questionnaires from the previous literature on sustainable tourism. The full explanation is in Table 3 below.

Table 2
Explanation of the Likert-type batteries of questions for AST, SNST and BCSTB

Likert-type variable	Statements in the questionnaire	Reference in the literature
Attitudes towards sustainable tourists' behaviour (AST)	It is important to me that the destination I visit takes care of the environment	Mamula Nikolić et al. (2022)
	I would like to know much more about the sustainable offers of the destinations I visit during my trip	
	I worry about the future of our planet	
Perceived social norms in relation to sustainable tourists' behaviour (SNST)	Many people use sustainable ways of travelling more and more	Ajzen (2006)
	I feel that a lot of my friends and family expect me to travel in a sustainable way.	Heeren et al. (2016)
	People in my environment, like family and friends, would be proud if I travelled in a sustainable way (protecting nature, meeting locals, reducing litter, driving and flying less, etc.).	Heeren et al. (2016)
Perceived behavioural control over sustainable tourists' behaviour (BCSTB)	I am confident that I can act sustainably during my travel	Ajzen (2006)
	I am responsible for my own sustainable behaviour.	Ajzen (2006)

4. Data and methodology

The research is based on primary data collected through street questionnaires administered on May 11th and July 1st of 2022. The administration of these questionnaires was carried out by students enrolled in the tourism studies program, who surveyed the streets and public squares of Rothenburg ob der Tauber, Germany. The students approached tourists on the street, using a tablet connected to the public Wi-Fi network to feed the data directly into the online database. Before data collection, the students were instructed on how to approach tourists on the streets, how to inform potential participants of the study's goals and content, and how to obtain verbal informed consent. The students approached the respondents in pairs, ensuring that there were always at least two witnesses to the informed consent. The data collected were entirely anonymous. The online questionnaire and the accompanying database were programmed in the "Sosci Survey" platform. The full sample consisted of N=147 tourists. According to Sarstedt and Mooi (2014), this is a sufficient sample for conducting a regression analysis, as it should be 104 + K, where K indicates the number of independent

variables, which is 3 in this case. The dependent variables can be considered metric, thereby fulfilling the requirement for multiple linear regression, as they were calculated as the mean of numerous Likert-type variables. However, since our dependent variable does not meet the criteria for a proper ratio variable (e.g., height or weight), but we employ an ordinal, Likert-type scale, there are two approaches to address this issue. Firstly, the Likert scale, computed as the mean of multiple Items, is used in regression analysis. Secondly, an additional calibration of the Likert-scale data to make them usable for fsQCA analysis, as suggested by Emmenegger et al. (2014).

The present research employs a mixed-methods approach, combining multiple regression analysis (a quantitative research method) and fsQCA (a hybrid research framework). Previous literature acknowledges that TPB can be empirically tested using either multiple regression analysis or structural equation modelling (SEM) (Ajzen, 2020). In contrast, QCA has gained prominence in recent tourism and hospitality research (Kumar et al., 2023), making it a suitable methodological addition to regression analysis to form a mixed-methods approach. QCA has been utilised both as a standalone research method (Pappas & Woodside, 2021), and as a mixed-methods approach: in conjunction with a two-tailed t-test (Sukhov et al., 2021), and structural equation modelling (PLS-SEM) (Salem et al., 2022). QCA is a suitable methodology for analysing large-N datasets in the social sciences, mainly because it can calibrate fuzzy sets beyond the interval scale (Emmenegger et al., 2014). Specifically, QCA can take the form of crisp set QCA, in which values 0 or 1 are assigned based on membership in the set. QCA can also take the form of a fuzzy set, where any given value between 0 and 1 exists, and a possible so-called crossover or anchor point, where neither 0 nor 1 is counted (Legewie, 2018; Ragin, 2009).

The regression analysis results are designated as "high" or "low" correlation, a standard approach for reporting Likert-scale results. Conversely, the results of the fsQCA analysis are referred to as "strong" and "weak," as they correspond to crisp sets calibrated from the Likert scales and resemble binary variables in depicting the presence or absence of a particular condition.

The study included 147 participants, providing a diverse demographic representation, as shown in Table 3 below. Regarding gender distribution, 46.3% of the participants were male, and 50.3% were female. Participants were categorised into seven age groups, mostly evenly distributed, with more respondents in the older categories and somewhat more in the 35-44 age group (17%). Many participants (78.9%) resided in Germany, while 21.1% were international residents. Regarding home residency region, 46.9% lived in urban areas, while 53.1% reported residing in rural areas. Educational backgrounds varied among participants: 44.9% had completed primary school, 23.8% had a high school diploma, and 31.3% had a university degree.

Table 3
Demographic characteristics of the sample

Sample characteristics of the study participants	n	%	Sample characteristics of the study participants	n	%
Gender			Domestic/international residence		
Male	68	46.3 %	Germany	116	78.9 %
Female	74	50.3 %	International	31	21.1 %
Age			Home residency region type		
14-18	15	10.2 %	Urban	69	46.9 %
19-24	16	10.9 %	Rural	78	53.1 %
25-34	21	14.3 %	Education		
35-44	25	17.0 %	Primary school	66	44.9 %
45-54	21	14.3 %	High school	35	23.8%
55-64	24	16.3 %	University	46	31.3 %
>65	25	17.0 %			

5. Results

5.1. Results of the multiple regression analysis

The results of the multiple regression analysis address RQ1, specifically the statistical significance of the impact of attitudes, social norms, and behavioural control on behavioural intention. Table 4 provides an overview of the three multiple regression models. All three models exhibit similar Adj. R-square value, as presented in Table 4 below. The Adj. The R value for the model with all three independent variables (AST, SNST, and BCSTB), as suggested by the TPB, is the highest (Adj. R-square=0.29). However, the explained variance is only slightly higher than in a model including AST (Adj. R-square=0.25) or AST and SNST as independent variables (Adj. R-square=0.28).

Table 4
Summary of three different multiple regression models

Model No.	Dependent variable	Independent variables	R	R-square	Adj. R square	Std. error of the est.
1	ISTB	AST	0.50	0.25	0.25	0.70
2	ISTB	AST, SNST	0.54	0.29	0.28	0.70
3	ISTB	AST, SNST, BCSTB	0.56	0.31	0.29	0.68

ISTB - Intention to engage in sustainable tourists' behaviour; AST- Attitudes towards sustainable tourists' behaviour; SNST- Perceived social norms in relation to sustainable tourists' behaviour; BCSTB- Perceived behavioural control over sustainable tourist behaviour.

The Variance Inflation Factor (VIF) values presented in Table 5 below demonstrate the absence of multicollinearity, as the values (1.00, 1.24, 1.24, 1.47, 1.26, and 1.32) are significantly below the threshold of VIF=5. The results presented in Table 6 below indicate that the impact of the attitudes towards sustainable tourists' behaviour on the intention to engage in sustainable tourists' behaviour exhibits a significantly higher positive standardized regression coefficient (β=0.34) than the impact of perceived social norms (β=0.18) and perceived behavioural control over sustainable tourists' behaviour (β=0.17). Furthermore, the impact of the attitudes towards sustainable tourists' behaviour on the intention to engage in sustainable tourists' behaviour is statistically significant at a p≤0.01 level, while the impact of perceived social norms and perceived behavioural control over sustainable tourists' behaviour is statistically significant only at a p≤0.05 level, but not at a more stringent level of p≤0.01. This means that the positive impact of attitudes towards sustainable tourists' behaviour on the intention to engage in such behaviour is unequivocally confirmed. Conversely, the impact of perceived social norms and perceived behavioural control over sustainable tourists' behaviour on intention to engage in sustainable tourists' behaviour, while still significant, exhibits a considerably lesser degree of predictive significance, and potentially could also be interpreted as not having statistical significance if it were to be set at a p≤0.01 level.

Table 5
Coefficients in each of the three regression models

Model no.	Depend. variable	Independ. variables	Non-stand. coefficients		Standard co-eff. (ß)	Collinearity statistic	
			Regr. coeff. (B)	std. Error		Toleance	VIF
1	ISTB	(Constant)	1.57**	0.25			
		AST	0.46**	0.07	0.50	1.00	1.00
2	ISTB	(Constant)	1.31**	0.27			
		AST	0.38**	0.07	0.41	0.81	1.24
		SNST	0.18*	0.07	0.21	0.81	1.24
3	ISTB	(Constant)	1.13**	0.28			
		AST	0.31**	0.08	0.34	0.68	1.47
		SNST	0.16*	0.07	0.18	0.79	1.26
		BCSTB	0.14*	0.07	0.17	0.77	1.32

The asterisk * denotes a statistical significance at a standard p≤0.05 level, while ** denotes the statistical significance at the more stringent p≤0.01 level

As illustrated in Table 6, the potential multicollinearity problem can be addressed again using the Condition Index (CI). Given that the CI value in the final row is CI=12.29, it can be deduced that multicollinearity is not a concern, as this value falls below the threshold of CI=30. Further insights into the diagnosis of collinearity are provided in Table 6 below.

Table 6
Collinearity diagnosis

Model no.	Dependent variable	Independent variables	Eigenvalues	Condition index	Share of variance			
					(Constant)	AST	SNST	BCTSB
1	ISTB	(Constant)	1.97	1.00	0.01	0.01		
		AST	0.03	8.65	0.99	0.99		
2	ISTB	(Constant)	2.93	1.00	0.01	0.00	0.01	
		AST	0.04	8.38	0.24	0.11	0.98	
		SNST	0.03	10.58	0.75	0.88	0.01	
3	ISTB	(Constant)	3.89	1.00	0.00	0.00	0.00	0.00
		AST	0.05	8.65	0.00	0.00	0.65	0.47
		SNST	0.04	10.58	0.51	0.09	0.32	0.47
		BCSTB	0.03	12.29	0.48	0.91	0.03	0.05

5.2. Results of the fuzzy set qualitative comparative analysis

The results of the fsQCA address RQ2, which concerns the sufficient and necessary conditions for the presence and absence of sustainability-oriented behavioural intention. Initially, a calibration procedure was performed for the Likert scale, where responses 1 and 2 were coded as absence of the condition (0), and responses 3, 4, and 5 as presence of the condition (0.2, 0.8, and 1, respectively). The calibration details are presented in Table 7 below. The calibration procedure was guided by the recommendations of Emmeneger et al. (2014), who noted that, after calibration, the QCA is better suited for the analysis of Likert-type data than regression analysis, due to its conceptual clarity.

Table 7
Likert scale calibration for conducting a fuzzy set qualitative comparative analysis

Fuzzy set	0	0	0.2	0.8	1
Ordinal variable on a Likert scale	1	2	3	4	5
	Don't agree at all	Disagree	Can't decide	Agree	Agree totally
Mean values of multiple Items	1.0-1.4	1.5-2.4	2.5-3.4	3.5-4.4	4.5-5

The analysis of the truth table concerns robustness as a necessary condition for a possible causal relationship between the phenomena and employs two robustness tests. The results of these tests are presented in Table 8 below. Firstly, only solutions with a frequency greater than four were considered. This approach aligns with the recommendations set forth by Fiss (2011), who stipulated a minimum frequency of 3 for a sample size of n=205; other authors recommend three or higher for sample sizes of 150 and above (Pappas & Woodside, 2021). Secondly, the minimum raw consistency was set at 0.73. This strategy yielded three solutions, which can be presented as follows through Boolean analysis:

Intention=attitudes•social norms•behavioural control + attitudes•social norms•~behavioural control + ~attitudes•social norms•~behavioural control

Sign • means "and"; Sign ~ means "weak", while the absence of the sign ~ means "strong"

Table 8
Truth table of the fuzzy set qualitative comparative analysis

Attitudes (AST)	Social norms (SNST)	Behavioural control (BCSTB)	Frequency	Intention	Raw consistency	PRI consistency	SYM consistency
0	0	0	32 (21%)	0	0.45	0.12	0.12
1	1	1	31 (21%)	1	0.84	0.73	0.75
1	0	0	27 (19%)	0	0.62	0.29	0.29
1	0	1	27 (18%)	0	0.70	0.44	0.45
1	1	0	12 (8%)	1	0.84	0.58	0.58
0	0	1	8 (6%)	0	0.68	0.20	0.20
0	1	0	6 (4%)	1	0.73	0.19	0.19
0	1	1	4 (3%)	0	0.80	0.33	0.33

The analysis of sufficiency yielded three solutions: complex, parsimonious and intermediate solution. These solutions are presented in Table 9 below. The three solutions were found to have equivalent solution coverage (0.62) and solution consistency (0.77), as well as consistency (0.76 and 0.82), raw coverage (0.33 and 0.60) and unique coverage (0.02 and 0.60). The analysis indicates that the presence of strong social norms, coupled with weak behavioural control, and the existence of strong attitudes and social norms appear to be two sufficient conditions for the presence of a strongly oriented behavioural intention towards sustainable tourism activities.

Table 9
Analysis of sufficiency: Complex, parsimonious and intermediate solutions

	Solution coverage	Solution consistency		Consistency	Raw coverage	Unique coverage
Complex solution	0.62	0.77	Social norms*~Behavioural control	0.76	0.33	0.02
			Attitudes*Social norms	0.82	0.60	0.60
Parsimonious solution	0.62	0.77	Social norms*~Behavioural control	0.76	0.33	0.02
			Attitudes*Social norms	0.82	0.60	0.60
Intermediate solution	0.62	0.77	Social norms*~Behavioural control	0.76	0.33	0.02
			Attitudes*Social norms	0.82	0.60	0.60

Frequency cut-off: 4; Consistency cut-off: 0.73; Model: Intention = f (Attitudes, Social norms, Behavioural control), Algorithm: Quine-McCluskey

The analysis of the necessary condition for strong behavioural intention revealed that strong attitudes, with a consistency of 0.87, are a necessary condition for strong behavioural intention towards sustainable tourism activities, as shown in Table 10 below.

Table 10
Analysis of the necessary condition for strong behavioural intention

Outcome variable	Conditions tested	Consistency	Coverage
Intention	Attitudes	0.87	0.63
	Social norms	0.64	0.75
	Behavioural control	0.74	0.67

The investigation into the necessary condition for weak behavioural intention revealed that weak social norms, with a consistency level of 0.82, are a necessary condition for weak behavioural intention towards sustainable tourism activities. This finding is presented in Table 11 below. The two analyses of the necessary condition highlight asymmetric necessary conditions for strong and weak levels of behavioural intention to engage in

sustainable tourism activities. Strong attitudes are a necessary condition for strong behavioural intention, while weak social norms are a necessary condition for weak behavioural intention towards sustainable tourism activities.

Table 11
Analysis of the necessary conditions for weak behavioural intention

Outcome variable	Conditions tested	Consistency	Coverage
~ Intention	~Attitudes	0.58	0.85
	~Social norms	0.82	0.74
	~ Behavioural control	0.70	0.77

6. Discussion on theoretical and practical implications

The present study's findings on the necessary conditions for strong/weak behavioural intention towards sustainable tourists' activities reveal asymmetric conditions. The necessary condition for the existence of strong behavioural intention towards sustainable tourists' activities is the presence of strong attitudes towards them. However, the necessary condition for weak behavioural intention towards sustainable tourism activities is the presence of weak social norms, not weak attitudes, as one would logically infer from regression analysis results. This asymmetric finding aligns with the earlier conclusions reported by Yang et al. (2018). This is a very relevant and novel finding in the sustainable tourists' behaviour literature, as it addresses the major criticism of explanation of the climate-related behaviour (through TPB and other theoretical lenses) that this research should go beyond the linear "ABC" (attitude-behaviour-choice) approach as a dominant paradigm (Shove, 2010). This includes, in our opinion, the discussion on the attitudes-behaviour gap of sustainable tourists' behaviour (Hares et al., 2010; Juvan & Dolnicar, 2014; Mamula Nikolić et al., 2021). The results of this study confirm that the attitude-behavioural intention link exists for sustainable behaviour. However, a novel finding is that a social norm-behavioural intention link exists for unsustainable tourists' behaviour, providing a basis for further theorising on this asymmetric relationship. In addition, discussions on the attitude-behaviour gap should consider both the social norms and acknowledge the asymmetric paths leading to sustainable and unsustainable behaviour of tourists. The results of the study contribute to the field of understanding tourists' sustainability-oriented behavioural intention in heritage destinations through the TPB framework. Thereby, it contributes and expands the previous TPB research on behavioural intention in the heritage destinations, which dealt with visiting heritage buildings (Duarte Alonso et al., 2015) and heritage visitation among the general population (Osiako & Szente, 2024), as it introduces the novel sustainability-oriented behavioural intention measuring instrument for visitors of sustainable heritage destinations. The present study also contributes to this body of knowledge by questioning the strength and importance of behavioural control in this process and highlighting the complex nature of social norms regarding sustainability-oriented behavioural intentions, thereby moving beyond a linear relationship. This contrasts with the findings of Duarte Alonso et al. (2015), who confirmed the validity and linear effects of attitudes, subjective norms, and perceived behavioural control on the behavioural intention to engage in heritage-building visitation. These results contribute to the broader field of TPB-based research on tourists' environmental behaviour by confirming the complex nature of subjective norms in relation to behavioural intention, as previously identified in the literature (Wang et al., 2020). The present study contributes to the research on sustainable tourism by developing an intention measuring instrument (Table 1) for intention to engage in sustainable tourists' behaviour, by using a set of common behaviours related to sustainable tourism (visiting nature and greenery, hiking, cycling, walking, vegetarian and regional food, recycling). This further builds on recent efforts to measure pro-environmental behaviour in heritage destinations (Rao et al., 2022; Zhang & Ran, 2024).

The practical implications for understanding the sustainable and non-sustainable behavioural intentions in an iconic heritage city destination are highly relevant to destination managers. The findings demonstrate the

necessity of diversified communication strategies when addressing tourists with high and low intentions to engage in sustainable tourism activities. Dealing with high-behaviour-intention tourists, e.g., those interested in sustainable tourism, communication should target tourists' attitudes towards these activities. Conversely, tourists exhibiting low behavioural intention to engage in sustainable tourist activities should be targeted by focusing on their low social norms regarding sustainable behaviour. This finding emerges as the most relevant practical learning from this research.

7. Limitations and future research directions

The limitations of the study are attributable to its specific context, namely, the independent variables: heritage city destinations in Central Europe. Consequently, researchers should exercise caution when generalising the findings to other types of destinations. Another potential limitation of the TPB approach is its inability to measure behaviour itself, only behavioural intention. The present study focuses exclusively on environmentally conservative behaviour (hiking, biking, park visits, recycling, regional food and wine, and vegetarian diet). It does not address environmentally radical or disturbing behaviour, as previously defined by Wang et al. (2020) which should be taken into account when generalising results.

The present research points to the complexity of human behaviour by establishing a link between social norms and behavioural intention regarding the behaviour of unsustainable tourists. This finding also calls for new, asymmetric theories and approaches to explain the broad spectrum of sustainable tourists' behaviours. In this sense, the link between social norms and unsustainable behaviour merits further exploration in future research. Furthermore, future research could expand the present research in several important and relevant fields. Firstly, by including a larger sample of respondents over a more extended period, more significant insights could be drawn from the research findings. Secondly, the analysis of differences in behavioural intention to engage in sustainable tourism activities across different nationalities of tourists could be conducted, as well as whether there are differences between the summer/winter seasons and during the Christmas market and/or other significant events. The present research employs the TPB framework as a single framework, thereby following the mainstream tourism and environmental research (Caballero et al., 2019; Mancha & Yoder, 2015). It does not extend the framework with complementary theories such as VBN, VIPN, or NAM. This is a topic that merits further examination in future research by combining theories within more complex frameworks and employing more complex research designs through various mixed-method strategies. Future research should engage more with how tourists engage with sustainable tourism offers, such as visiting nature and greenery, hiking, cycling, walking, vegetarian and regional food, and recycling. This is a set of behaviours that can be replicated with measuring instruments in other studies on heritage and other destinations.

8. Conclusions

A significant theoretical and methodological contribution of the present study to extending knowledge in this research area is the employment of a multi-method approach within the TPB framework, utilising fsQCA (a hybrid research method) in conjunction with multiple regression analysis (a quantitative research method). A mixed-method approach to Likert-type data for TPB research, involving regression analysis and fuzzy set QCA, was employed in the present research and extends the scope and methodological options for researchers in sustainable tourism and environmental research with a behavioural focus.

The findings demonstrate the efficacy of a mixed-method approach within a TPB framework in tourism and hospitality research, making an essential contribution to the field's body of knowledge. The findings of the present fsQCA study demonstrate that the sufficient condition for firm behavioural intention toward sustainable tourists' activities is a combination of strong attitudes and strong social norms, or a combination of strong social norms and weak behavioural control, albeit the latter in a much smaller number of cases.

The configurational approach enabled the identification of counterintuitive configurations in relation to the multiple regression model. This demonstrated that tourists' actual behaviour is much more complex and multifaceted than linear models can capture.

The findings indicate that sustainability-oriented destination marketing in heritage necessitates the implementation of diversified communication strategies, tailored to address the diverse needs of various target demographics. For example, it would make sense to target weak behavioural control by reducing barriers to the use of sustainable tourism services and providing more information about those products to the public.

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Submitted: March 12, 2025
Revised: August 27, 2025
Accepted: October 21, 2025