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Sustainability, technology and co-creation: a virtuous circle for sustainable tourism in Lisbon region

Sostenibilidad, tecnología y co-creación: un círculo virtuoso para el turismo sostenible en la región de Lisboa

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ABSTRACT

This study examines the interrelationship between sustainability values, technology, and co-creation in tourism. While prior research has underscored the significance of sustainability in influencing tourist behaviour, this study reveals that sustainability values do not directly affect co-creation intentions. Instead, technology emerges as a pivotal mediating factor, bridging the

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gap between sustainability awareness and active participation in co-creation. Employing a sample of 401 tourists in Lisbon, the study utilises Partial Least Squares (PLS) structural equation modelling to analyse the relationships among these variables.

The findings indicate that tourists with strong sustainability values perceive technology as an essential facilitator of responsible tourism. However, sustainability values alone do not significantly influence tourists' perception of co-creation value or their intention to engage in co-creation activities. These results suggest that although sustainability-conscious tourists may endorse eco-friendly tourism, they do not necessarily engage in participatory co-creation behaviours unless technology is incorporated into the process. This finding implies that sustainability is frequently regarded as a passive commitment rather than an interactive, co-created experience.

From a practical perspective, the study offers valuable insights for tourism stakeholders seeking to develop technology-driven solutions that enhance sustainable and interactive travel experiences. The findings suggest that digital platforms, artificial intelligence-powered tools, and blockchain-based transparency mechanisms can facilitate co-creation while fostering responsible tourism practices. By integrating sustainability and technological perspectives, this study contributes to theoretical advancements and provides strategic recommendations for promoting meaningful and sustainable tourism experiences in the digital era.

Keywords: sustainability, technology, co-creation, tourists, tourism, destination management.

RESUMEN

Este estudio examina la relación entre los valores de sostenibilidad, la tecnología y la co-creación en el turismo. Aunque la literatura previa subraya la sostenibilidad como un factor determinante en el comportamiento turístico, los hallazgos evidencian que no influye directamente en las intenciones de co-creación. En contraste, la tecnología actúa como mediador fundamental, vinculando la conciencia sobre sostenibilidad y la participación en procesos co-creativos.

A partir de una muestra de 401 turistas en Lisboa, se emplea el modelado de ecuaciones estructurales mediante mínimos cuadrados parciales (PLS-SEM) para analizar estas relaciones. Los resultados revelan que los turistas con valores sostenibles perciben la tecnología como un facilitador clave del turismo responsable. No obstante, dichos valores no inciden significativamente en la percepción del valor de la co-creación ni en la intención de participar en actividades co-creativas. Esto sugiere que, pese a su respaldo al turismo ecológico, los turistas no asumen un rol participativo sin la mediación tecnológica. Así, la sostenibilidad tiende a percibirse como un compromiso pasivo más que como una experiencia interactiva.

Desde una perspectiva práctica, este estudio ofrece directrices para desarrollar soluciones tecnológicas que favorezcan experiencias de viaje sostenibles e interactivas. Se resalta el papel de plataformas digitales, herramientas de inteligencia artificial y mecanismos de transparencia basados en blockchain en la facilitación de la co-creación y la promoción del turismo responsable. Al integrar sostenibilidad y tecnología, este estudio contribuye al conocimiento teórico y proporciona estrategias para potenciar experiencias turísticas sostenibles en la era digital.

Palabras Clave: sostenibilidad, tecnología, co-creación, turistas, turismo, gestión de destinos.

I. INTRODUCTION

Sustainability, technology, and co-creation are reshaping contemporary tourism**.** Sustainable tourism seeks to balance economic development with environmental and socio-cultural preservation (Pan et al., 2018). Digital technologies enable tourists to make responsible travel decisions, fostering both engagement and sustainability (El Archi et al., 2023; Saseanu et al., 2020). The tourism industry is transitioning from passive consumption to a more interactive model, wherein tourists collaborate with service providers, local communities, and digital platforms to co-create meaningful experiences (John & Supramaniam, 2024).

Despite extensive research on sustainable tourism and technological advancements, their combined influence on co-creation remains underexplored. Existing studies have investigated sustainability values and their effect on consumer behaviour (Loureiro & Nascimento, 2021; Wut et al., 2023); however, their direct impact on co-creation remains ambiguous. While technology is recognised as a catalyst for sustainability-driven actions, its specific role in fostering co-creation has not been sufficiently examined (Nicola-Gavrilă, 2023). The Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) underscore the significance of technology in consumer engagement (Davis, 1989; Venkatesh et al., 2003), yet their applicability to co-creation in tourism necessitates further investigation.

The primary objective of this study is to examine how sustainability values influence tourists' intentions to engage in co-creation and whether technology mediates this relationship. Specifically, it seeks to determine the extent to which sustainability values contribute to co-creation behaviours and the role of technology in amplifying this effect. By offering empirical insights into the interplay between sustainability, technology, and co-creation, this research is poised to contribute significantly to both academic discourse and industry practices.

This study advances scholarly understanding of sustainable tourism by demonstrating how technology mediates the relationship between sustainability values and co-creation. It challenges the assumption that sustainability values alone are the primary drivers of co-creation, instead highlighting the critical role of technology in facilitating these interactions. The findings refine established theoretical frameworks, including the Value-Belief-Norm (VBN) Theory and the Theory of Planned Behaviour (TPB), illustrating that perceived technological importance is a key determinant of co-creation engagement (Ajzen, 1991; Stern et al., 1999).

From a practical standpoint, this research provides valuable insights for tourism stakeholders, including destination managers, policymakers, and technology developers. It underscores the necessity for digital solutions that foster interactive and sustainable travel experiences. Future tourism strategies should prioritise technology-driven platforms that encourage tourists to engage in responsible and participatory travel practices.

By integrating sustainability and technology perspectives, this study bridges theoretical and empirical gaps, offering a foundation for future research and providing strategic direction for the development of engaging and sustainable tourism experiences in the digital era.

The article is organized as follows: the literature review examines the intersections of sustainability, technology, and co-creation, concluding with presenting the conceptual model and its associated hypotheses. The method section outlines the data collection and analysis process. The discussion interprets the findings in the context of existing literature, and the conclusion summarizes the study's contributions, limitations, and implications for future research.

II. LITERATURE REVIEW

2.1. Sustainability values and technology

Sustainability values shape individuals' attitudes and behaviours towards environmental conservation, social responsibility, and economic equity, serving as fundamental ethical principles that guide decision-making processes to foster long-term ecological and social well-being (Steg & Vlek, 2009). In tourism, tourists' sustainability values manifest in their commitment to minimising environmental impact, supporting local communities, and engaging in responsible travel behaviours (Loureiro & Nascimento, 2021; Wut et al., 2023). These values are pivotal in shaping tourists' preferences for sustainable tourism experiences, leading them to prioritise eco-friendly accommodations, responsible tourism activities, and ethical consumption practices. As sustainability becomes an increasingly integral aspect of travel planning, technology has emerged as a critical enabler of responsible tourism behaviours. Tourists are progressively adopting digital tools that support environmentally conscious decision-making, such as eco-friendly travel applications, smart energy management systems, and blockchain-based transparency platforms (Nicola-Gavrilă, 2023). These technological innovations not only enhance the feasibility of sustainable travel choices but also reinforce the perception that technology is fundamental in achieving sustainability objectives.

The relationship between sustainability values and technology adoption is supported by various theoretical frameworks. The Value-Belief-Norm (VBN) Theory (Stern et al., 1999) and the Theory of Sustainability Values and Travel Behaviour (Sirakaya-Turk et al., 2024) posit that environmentally conscious individuals exhibit a higher propensity to adopt technology-driven sustainable practices, such as carbon footprint tracking applications and AI-powered itinerary planners, to ensure alignment between their travel choices and eco-conscious behaviours. Furthermore, the Theory of Planned Behaviour (TPB) (Ajzen, 1991) and Self-Determination Theory (SDT) (Deci & Ryan, 1985; Ryan & Deci, 2000) propose that sustainability-conscious tourists cultivate a positive attitude towards technology, driven by intrinsic motivation and social norms, thereby encouraging the adoption of smart mobility solutions and eco-friendly accommodations. Additionally, the Technology Acceptance Model (TAM) (Davis, 1989) highlights perceived usefulness as a key determinant of technology adoption, while Cognitive Dissonance Theory (Festinger, 1957) suggests that digital solutions, such as paperless check-ins and carbon offsetting applications, help mitigate inconsistencies between tourists' behaviours and sustainability values, reinforcing their reliance on technology for responsible travel.

Empirical research further substantiates this relationship, demonstrating that these travellers integrate technology-driven solutions—such as AI-powered itinerary planners, carbon footprint tracking applications, and IoT-enabled smart hotels—to ensure their travel

behaviours align with sustainability values (Deci & Ryan, 2000; Majid et al., 2024). Moreover, Nicola-Gavrilă (2023) finds that tourists increasingly perceive technology as a fundamental enabler of sustainability, as it facilitates responsible travel choices. Similarly, when tourists perceive a destination as committed to sustainability, they are more likely to engage with technology-driven sustainable practices, including adopting smart mobility solutions and digital platforms for eco-conscious decision-making (Abou Kamar et al., 2024; Pradhan et al., 2018; Prakhar et al., 2024).

Given these theoretical and empirical insights, tourists with strong sustainability values are anticipated to perceive technology as a key enabler of responsible travel. Accordingly, the following hypothesis is proposed:

H1: Tourists' sustainability values positively influence their perceived importance of technology.

2.2. Sustainability values, perceived value of co-creation and intention to co-create

The concept of co-creation, introduced by Prahalad & Ramaswamy (2004), recognises that consumers actively contribute to value creation rather than passively receiving products and services. Initially examined in management and marketing, co-creation has since been widely applied across various disciplines, including tourism and hospitality. It involves establishing an experiential environment in which consumers engage in active dialogue to shape personalised experiences, thereby enhancing value for all stakeholders. Its theoretical foundation, rooted in Service-Dominant (S-D) Logic (Vargo & Lusch, 2004), underscores the significance of intangible services and the interactions between providers and consumers. It emphasises that value is co-created through collaborative processes involving multiple stakeholders.

Binkhorst (2006) was among the first scholars to explore co-creation in tourism, highlighting the role of tourists as innovation partners in designing and enhancing travel experiences. Binkhorst & Den Dekker (2009) further observed that tourists make significant contributions to the creation of memorable experiences by interacting with service providers before, during, and after their trips, ensuring that services align with their expectations and preferences. Prebensen et al. (2013) posited that co-creation enables tourists to tailor their experiences according to their interests and values, resulting in greater satisfaction and personal development. This active involvement fosters meaningful interactions and multi-sensory engagement.

From the perspective of tourists, the perceived value of co-creation encompasses psychological, functional, social, and experiential benefits. By actively participating in the creation of their travel experiences, tourists gain a sense of ownership, practical advantages, social connections, and lasting memories. This engagement not only enhances satisfaction but also contributes to the sustainability and success of tourism destinations and service providers, positioning tourists as integral partners in the value-creation process and leading to more enriched and personalised travel experiences (Hallaj et al., 2022; John & Supramaniam, 2024).

Sustainability values influence tourists' perceptions of co-creation and their willingness to participate, as they seek to align their travel experiences with responsible tourism principles. Sustainability-conscious tourists regard co-creation as a valuable mechanism for

responsible tourism, integrating their travel experiences with environmental, economic, and socio-cultural sustainability principles. From an environmental perspective, they perceive co-creation as a means of contributing to conservation efforts, responsible wildlife tourism, and eco-friendly accommodations, reinforcing their commitment to sustainability (Elliot et al., 2023; Polat, 2022). Their positive perception is grounded in the belief that active engagement enhances sustainability outcomes, making travel experiences more meaningful and fulfilling.

In terms of economic sustainability, these tourists recognise co-creation as a means of supporting local businesses and artisans, thereby contributing to community resilience while fostering authentic travel experiences (Sthapit et al., 2024; Wang et al., 2024). This reinforces their appreciation of co-creation and strengthens their willingness to participate, positioning it as a crucial element of responsible tourism development (John & Supramaniam, 2024). Similarly, within the context of socio-cultural sustainability, tourists view cultural co-creation as an opportunity to engage in heritage conservation, traditional craftsmanship, and community-led tourism initiatives, fostering cultural exchange and mutual respect (Aydın & Alvarez, 2020; Grissemann & Stokburger-Sauer, 2012). This favourable perception further increases their intention to engage, as they regard co-creation as essential to cultural preservation and meaningful travel experiences (John & Supramaniam, 2024).

Several theoretical perspectives elucidate how sustainability values influence both the perceived value of co-creation and the intention to participate. The Value-Belief-Norm (VBN) Theory (Stern et al., 1999) and the Theory of Sustainability Values and Travel Behaviour (Sirakaya-Turk et al., 2024) propose that individuals with strong sustainability values inherently recognise co-creation as valuable and are more likely to engage in it. The Theory of Planned Behaviour (TPB) (Ajzen, 1991) reinforces this notion by emphasising that attitudes, social norms, and perceived behavioural control shape how tourists perceive and engage in co-creation. Additionally, Self-Determination Theory (SDT). Ryan & Deci (2000) highlights intrinsic motivation as a key determinant, further increasing participation intentions. Meanwhile, Cognitive Dissonance Theory (Festinger, 1957) suggests that sustainability-conscious tourists may experience discomfort when their travel behaviours contradict their values. Co-creation serves as a means of restoring alignment, reinforcing both their appreciation of co-creation and their willingness to participate.

Empirical research substantiates this relationship, demonstrating that sustainability-conscious tourists not only perceive co-creation as essential but also actively seek participation in sustainability-driven activities (Basu, 2024; Jiang et al., 2021; Xu et al., 2020). Given their commitment to responsible, ethical, and participatory travel, sustainability-conscious tourists strongly associate co-creation with sustainability and exhibit a greater willingness to engage in it (Nicola-Gavrilă, 2023). This leads to the following hypotheses:

H2: Tourists' sustainability values positively influence their perceived value of co-creation.

H3: Tourists' sustainability values positively influence their intention to participate in co-creation activities.

2.3. Technology, perceived value of co-creation and intention to co-create

Technology plays a fundamental role in enabling and enhancing co-creation experiences by providing tools and platforms that facilitate tourist engagement,

personalisation, and interaction. From a theoretical perspective, the Service-Dominant (S-D) Logic (Vargo & Lusch, 2004) offers a framework for understanding how technology supports real-time collaboration, reinforcing its role in value co-creation. The Experience Economy Framework (Pine & Gilmore, 1998) further underscores the significance of memorable and personalised experiences, which are enhanced through technology-driven co-creation. Tourists who integrate digital tools into their travel experiences derive greater value from co-creation, as such technologies enhance engagement, participation, and customisation (Neuhofer, 2016a; Neuhofer et al., 2013; Risteska, 2019).

In relation to tourists' willingness to participate in co-creation activities, the Technology Acceptance Model (TAM) (Davis, 1989; Venkatesh & Davis, 2000) provides valuable insights into how perceptions of a technology's usefulness and ease of use influence both the perceived value of co-creation and the likelihood of engagement. When technology is deemed efficient, accessible, and beneficial, tourists are more inclined to utilise digital platforms, thereby enriching their co-creation experiences through facilitated interaction, feedback, and collaboration. The Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) further supports this perspective by positing that performance expectancy, effort expectancy, social influence, and facilitating conditions determine tourists' intentions to adopt technology. If tourists perceive that technology enhances their travel experiences, is user-friendly, and is widely supported, they are more likely to engage in co-creation activities.

Empirical evidence substantiates the argument that technology enhances the perceived value of co-creation. Research demonstrates that digital solutions, including mobile applications, social media, virtual reality (VR), and information and communication technologies (ICTs), create interactive environments where tourists can share information, personalise their experiences, and interact seamlessly with service providers and fellow travellers (Guo et al., 2024; Mgoduka et al., 2024). These interactions foster a sense of connection, involvement, and empowerment, thereby reinforcing the perceived value of co-creation (Han et al., 2021; Prebensen & Xie, 2017; Reichenberger, 2017). Smart tourism technologies have been shown to enhance tourist participation and satisfaction by facilitating real-time feedback and improving service interactions (Garanti, 2023; Kumar, 2019). Tourists who consider technology an integral part of their travel experiences report greater satisfaction with co-created experiences, particularly in smart tourism environments where digital tools foster engagement (Gretzel et al., 2015). Furthermore, studies indicate that when tourists engage in co-creation through digital platforms, they experience greater enjoyment and fulfilment, as these tools enable seamless collaboration and more personalised experiences, reinforcing the role of technology in value creation (Xie et al., 2020).

With respect to tourists' willingness to participate in co-creation activities, empirical research suggests that technology serves as a key motivator for active participation. By providing real-time feedback mechanisms, fostering virtual communities, and enabling seamless interactions with service providers, technology empowers tourists to engage in co-creation (Buonincontri & Micera, 2016). Tourists who recognise the value of digital tools for customisation and interaction exhibit a stronger intention to collaborate with service providers and actively contribute to their travel experiences (Buonincontri et al., 2017; Marques & Borba, 2017; Neuhofer, 2016b; Xie et al., 2021). Additionally, research suggests that technology-enabled co-creation environments, including smart tourism platforms and interactive applications, significantly increase tourists' willingness to engage in co-creation

activities, particularly in dynamic and personalised settings (Rihova et al., 2018). The accessibility and efficiency of technology further facilitate participation by reducing perceived barriers and enhancing tourists' ability to shape their own experiences (Neuhofer et al., 2015; Teixeira et al., 2021).

Given that technology enhances both the perceived value of co-creation and the intention to participate in it, the following hypotheses are proposed:

H4: Tourists' perceived importance of technology positively influences their perceived value of co-creation.

H5: Tourists' perceived importance of technology positively influences their intention to participate in co-creation activities.

2.4. Perceived value of co-creation and Intention to co-create

The concept of co-creation in tourism underscores the active role of tourists in shaping their travel experiences through collaboration with service providers and local communities. The extent to which tourists perceive value in co-creation significantly influences their willingness to engage in such activities, as they seek meaningful and personalised experiences that align with their expectations and preferences (Prebensen & Xie, 2017).

The Value Co-Creation Theory posits that service providers do not merely deliver value but are co-created through consumer and business interactions (Grönroos, 2017; Prahalad & Ramaswamy, 2004). When tourists perceive high value in co-creation activities—whether through personalisation, engagement, or meaningful interactions—they are more likely to continue participating in such experiences. Furthermore, Expectancy-Disconfirmation Theory (Oliver, 1980) supports this assertion by suggesting that satisfaction and future behavioural intentions depend on whether experiences meet or exceed expectations. If tourists perceive co-creation activities as fulfilling and surpassing their expectations, they are more likely to develop stronger intentions to engage in future co-creation experiences. Moreover, the Experience Economy Framework (Pine & Gilmore, 1998) highlights the significance of creating memorable and meaningful experiences, reinforcing the notion that perceived value plays a central role in sustained engagement.

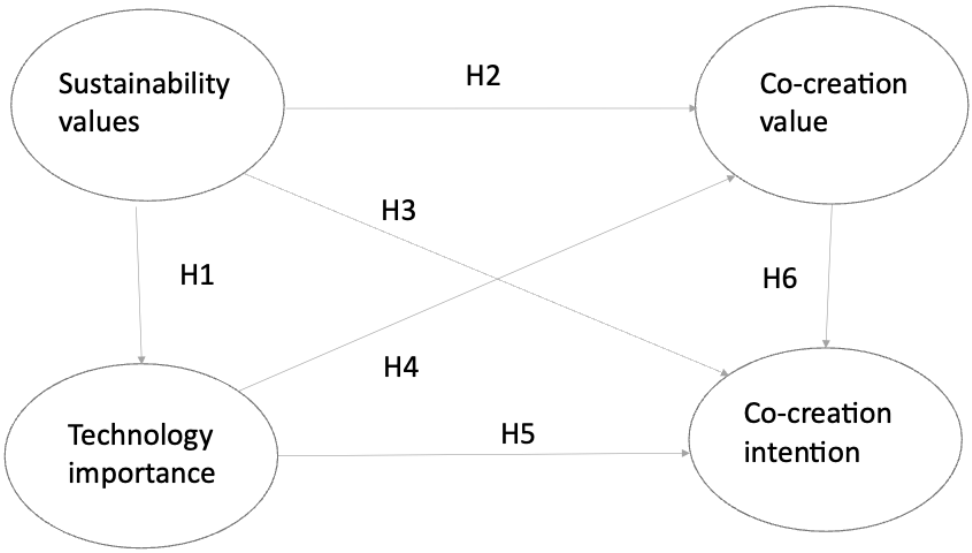
Empirical research substantiates the positive relationship between perceived value and participation in co-creation. Studies indicate that tourists who perceive high value in co-creation—whether through enriched experiences, personal fulfilment, or enhanced service interactions—are more likely to engage in similar activities in the future (Lin et al., 2017). Additionally, satisfaction with co-creation strengthens both emotional and behavioural commitment, thereby increasing tourists' willingness to participate again (Dutta et al., 2021). The role of psychological engagement and perceived authenticity further reinforces their intention to continue co-creating, as these factors enhance the meaningfulness of the experience (Sugathan & Ranjan, 2019).

Given the theoretical and empirical evidence, the following hypothesis is proposed:

H6: Tourists' perceived value of co-creation positively influences their intention to participate in co-creation activities.

Figure 1 presents the conceptual model summarizing all proposed six hyphoteses:

Figure 1. Conceptual model



Source: Own elaboration.

III. METHODOLOGY

A sample of 401 valid responses from Lisbon tourists was analysed through variance based Partial Least Squares (PLS), using SmartPLS 4.0 to validate the research hypotheses.

3.1. Data collection and instruments

A self-administered survey was employed to gather information from a convenience sample of tourists in the Lisbon region. Thirteen strategic sampling locations were pinpointed to ensure comprehensive coverage of the area. Data collection took place from February to April 2024 during which participants completed the questionnaire using electronic tablets provided by the data collector.

A scale from (Buerke et al., 2017) was adapted to measure sustainability values. The metric for technology importance combined the scales of Goo et al. (2022) and Shen et al. (2020). Both constructs were measured on a Likert scale of 7 points from 1- not at all important to 7- extremely important. The co-creation construct was measured on a 7-point Likert scale, ranging from 1 (completely disagree) to 7 (completely agree). The co-creation value was adapted from scales developed by Sweeney & Soutar (2001) and Roy et al. (2023) while the co-creation intention was measured using an adapted scale from Casaló et al. (2010). Items were fine-tuned as necessary to ensure precision (Appendix). Additionally, two marketing experts meticulously reviewed the measures to confirm their relevance and contextual fit.

Other variables included in the questionnaire intended to describe the participants' demographic profile (described in section 3.2) and travelling behaviour (described in chapter IV).

3.2. Sample profile

The sample consists of 411 individuals, with the majority aged 26-35 (38.4%) and 54.5%

aged 35 or younger. The 36-45 age group makes up 19.5%, and those aged 56 and above account for 12.9%. The gender distribution is fairly balanced, slightly skewed towards women (51.8%). A high level of education is evident, with 67.6% having completed tertiary education. Most participants are employed full-time (58.4%), and 17% are self-employed or entrepreneurs. Income distribution shows 51.8% earning €20,000-€40,000 annually and 36.5% earning less than €20,000. The sample includes diverse nationalities, with the highest from Spain and the UK (11.4% each) and the USA (9.7%). This profile depicts a young, educated, and diverse group with varied professional and economic backgrounds.

3.3. Data analysis

The data was validated, ensuring that each indicator had no more than 5% missing values and that each subject had no more than 15% missing values. The missing values problem was handled using the mean values replacement procedure (Hair et al., 2017). The model was estimated using PLS and path weighting scheme algorithm. Since the data resulted from human responses, it is difficult to meet rigorous assumptions that are typically required with more traditional multivariate statistics (Hair et al., 2017, 2018; Matthews et al., 2018; Vinzi et al., 2010).

IV. RESULTS

Out of 411 respondents, 70.3% had visited Lisbon before, averaging 1.58 visits, with a median of 1 visit. Among returning visitors, 59.8% had visited once and 32.8% twice, totaling 93%. For travel arrangements, 64.5% preferred independent travel, 34.1% used travel agency services, and 1.5% used other means. The most common stay durations were 1-2 weeks (42.8%), 4-7 days (27.3%), and 3-4 weeks (16.5%). Travel companions included friends (31.9%), spouses or partners (28.2%), family members (24.8%), solo travelers (13.4%), and colleagues (1.7%).

The analysis shows that average ratings for all constructs (co-creation intention, co-creation value, sustainability importance, and technology importance) are within the positive range of the 1 to 7 Likert scale (5.43 – 6.77). The low standard deviations (0.71 – 1.57) indicate a high level of agreement among respondents. This suggests strong consensus and consistently positive attitudes towards digital platforms, sustainability, and technology in travel experiences, highlighting the robustness of these positive perceptions.

4.1. Measurement model

The conceptual model was assessed in two steps: the measurement and structural models.

Indicator loadings were all above or equal to 0.7, except two, one belonging to the measurement of technology importance (Allow to record and store memories for others) and another belonging to the measurement of co-creation value (I feel that my collaboration with others (travellers, tourism companies or bureaus) enhance my travel experience). These two indicators were eliminated from the model. All the remaining indicators were statistically significant ($p<0.01$) by bootstrap analysis (no sign changes) performed with 5,000 samples of the same size as the original sample (Appendix). The indicators of internal consistency, reliability, and convergent validity (AVE) (Table 1) showed high values, as Cronbach's Alpha and composite reliability were all above 0.7, and AVE were all above 0.5. Comparing

constructs' correlation with the AVE square root, results show that all the constructs fulfilled the discriminant validity by Fornell-Larcker' criterion (Hair et al., 2017) (Table 2).

Table 1. Constructs and assessment of convergent validity

Constructs	Cronbach's alpha	Composite reliability	Average variance extracted
Sustainability values	0.873	0.884	0.702
Technology importance	0.876	0.881	0.711
Co-creation value	0.877	0.883	0.791
Co-creation intention	0.932	0.904	0.716

Source: Own elaboration

Table 2. Constructs and assessment of divergent validity by Fornell-Larcker' criterion

Constructs	Sustainability value	Technology importance	Co-creation value	Co-creation intention
Sustainability values	0.896			
Technology importance	0.256	0.901		
Co-creation value	0.102	0.380	0.944	
Co-creation intention	0.557	0.656	0.557	0.846

Source: Own elaboration.

Full collinearity tests (Table 3) presented results of variance inflation factors (VIF) below 3.3 for all latent variables, indicating a model free of common method bias (Kock, 2015).

Table 3. VIF values

	VIF
Sustainability values -> Co-creation value	1.070
Sustainability values-> Technology	1.000
Sustainability values -> Co-creation intention	1.070
Technology importance -> Co-creation value	1.070
Technology importance -> Co-creation intention	1.238
Co-creation value -> Co-creation intention	1.169

Source: Own elaboration.

4.2. Structural model

The structural model assessment showed that the sustainability values are not a predictor of co-creation value or intention. All path coefficients of the other relationships were statistically significant ($p<0.01$) by bootstrap analysis (no sign changes) performed with 5,000 samples of the same size as the original sample (Hair et al., 2017). The path coefficients of the relationships supported by the empirical analysis were positive, representing positive impacts among the latent variables (Table 4).

Table 4. Assessment of the path coefficients of the structural model

Constructs relationships	Path coefficients	T statistics	P values
Sustainability values -> Co-creation value	0.005	4.714	0.933
Sustainability values-> Technology importance	0.256	0.084	0.000
Sustainability values ->Co-creation intention	-0.019	6.042	0.590
Technology importance -> Co-creation value	0.379	0.539	0.000
Technology importance -> Co-creation intention	0.524	7.238	0.000
Co-creation value -> Co-creation intention	0.359	6.669	0.000

Source: Own elaboration

The model explained approximately 54% of the dependent variable, co-creation intention (table 5). Other endogenous variables are poorly explained in the model, which is expected because they are explained by only one variable. Technology importance is explained by sustainability values and co-creation value is explained by technology importance.

Table 5. Structural model assessment

	Technology importance	Co-creation value	Co-creation intention
Adjusted R^2	0.063	0.141	0.537

Source: Own elaboration

The results of the total and indirect effects showed a significant impact of sustainability values on co-creation intention through the importance of technology. In conclusion, technology importance fully mediates the relationship between sustainability values and co-creation intention since there is no significant direct relationship between the two constructs, and sustainability values does not impact co-creation value. The analysis of effect size (f2) showed a large effect of technology importance on co-creation intention and medium effects of technology importance on co-creation value and of value co-creation value on co-creation intention. Sustainability values exert a small effect on the importance of technology (Table 6).

Table 6. Effects and mediation

Constructs relationships	Total effects	Total indirect effects	f-square
Sustainability values -> Co-creation value	0.102	0.097	0.000
Sustainability values-> Technology importance	0.256*		0.070
Sustainability values ->Co-creation intention	0.152*	0.170*	0.001
Technology importance -> Co-creation value	0.379*		0.157
Technology importance -> Co-creation intention	0.660*	0.136*	0.482
Co-creation value -> Co-creation intention	0.359*		0.240

Note: * significant p<0.01

Source: Own elaboration

V. DISCUSSION AND CONCLUSION

5.1. Discussion

This study provides key insights into the interrelationships between sustainability values, perceptions of technology, and co-creation in tourism. It confirms that tourists' perception of technology is crucial in fostering co-creation. However, it challenges the assumption that sustainability values directly influence co-creation value or the intention to engage in co-creation. This contradicts previous research that suggests sustainability-conscious tourists are more inclined to participate in co-creation due to their ethical commitment to responsible tourism (Adongo et al., 2018; Polat, 2022). The absence of a direct link between sustainability values and co-creation calls into question theoretical frameworks such as the Value-Belief-Norm (VBN) Theory and the Theory of Planned Behaviour (TPB), which argue that strong sustainability values should translate into corresponding behaviours. The study suggests that additional factors, such as situational motivations, awareness of co-creation, and cultural perspectives on sustainability, may play a more significant role in shaping co-creation behaviours than previously assumed.

The study supports the hypothesis that tourists with strong sustainability values are more likely to perceive technology as a key enabler of responsible travel. This aligns with behavioural adoption theories such as VBN and TPB, which argue that individuals with strong environmental values and a positive attitude towards sustainable practices are more inclined to utilise technology for responsible travel. Empirical evidence further substantiates this, showing that sustainability-conscious tourists integrate eco-friendly travel applications and carbon footprint tracking systems into their travel experiences (Deci & Ryan, 2000; Majid et al., 2024; Nicola-Gavrilă, 2023). However, potential biases, such as self-reporting effects, may have influenced these findings, as respondents might have overstated their reliance on technology. Additionally, a disproportionate number of tech-savvy travellers in the sample may have contributed to an inflated perception of the relationship between sustainability values and the significance of technology.

Contrary to expectations, the study does not support the hypothesis that sustainability values directly influence tourists' perception of co-creation value or their intention to engage in co-creation. One possible explanation is that tourists may perceive sustainability as a passive consumption choice rather than an interactive engagement process such as co-creation. While sustainability values may influence overall travel behaviours, they do not necessarily translate into participatory activities. Additionally, self-reported data may have introduced bias, as respondents could have overstated their sustainability commitments without engaging in co-creative behaviours. Cultural factors may also be at play, as in some societies, sustainability is seen as a collective rather than an individual responsibility, reducing the likelihood of sustainability-conscious tourists engaging in co-creation (Hofstede, 2001; Reisinger, 2012). In certain contexts, tourism remains a service-oriented experience, where tourists expect pre-designed sustainability initiatives rather than actively participating in co-creation (Mkono & Tribe, 2017). Although previous research suggests that sustainability-conscious tourists value co-creation as a means of engaging with local communities and contributing to responsible tourism (John & Supramaniam, 2024; Polat, 2022), the present findings indicate that experiential and technological factors may have a greater impact on co-creation than sustainability principles alone.

The study confirms that tourists attributing high importance to technology tend to perceive greater value in co-creation activities. This is consistent with Service-Dominant (S-D) Logic (Vargo & Lusch, 2004) and the Experience Economy Framework (Pine & Gilmore, 1998), both of which emphasise technology's role in enhancing personalised and interactive tourist experiences. Empirical research further supports this perspective, showing that digital platforms and mobile applications enhance tourist engagement in co-creation by enabling real-time interaction and customisation opportunities (Han et al., 2021; Prebensen & Xie, 2017; Reichenberger, 2017).

The study also provides empirical support for the hypothesis that tourists who perceive technology as essential are more inclined to engage in co-creation activities. This aligns with the Technology Acceptance Model (TAM) (Davis, 1989), which argues that perceived usefulness and ease of use drive technology adoption. Additionally, the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003) suggests that various factors impact technology adoption. This may explain why tourists who value technology are more likely to participate in co-creation. Empirical studies reinforce this perspective by demonstrating that digital tools facilitate co-creation by enabling seamless communication, user-generated content, and deeper engagement with service providers (Rihova et al., 2018).

Finally, the study confirms that the perceived value of co-creation significantly influences tourists' intention to engage in co-creation. This finding aligns with Value Co-Creation Theory (Prahalad & Ramaswamy, 2004) and Expectancy-Disconfirmation Theory (Oliver, 1980), suggesting that individuals are motivated to engage in co-creation when they anticipate meaningful benefits and personal fulfilment. Empirical research further supports this argument, demonstrating that co-creation enhances satisfaction, social bonding, and personal enrichment, ultimately increasing tourists' willingness to participate in future co-creation activities (Sugathan & Ranjan, 2019).

5.2. Theoretical contribution

This study is a significant contribution to theory because it enriches our understanding of the interplay between technology, co-creation, and sustainability values in tourism. In past studies, these factors have been examined in a vacuum. Still, in this study, an innovative contribution is constructed through a combination of them in a model explaining technology's role in mediating co-creation. Unlike in previous studies, in which a direct causality between sustainability values and co-creation is argued, this study refutes such an assumption and presents a more nuanced perspective: sustainability values impact co-creation indirectly through the perceived salience of technology. As a theoretical contribution, it refines VBN Theory and TPB in sustainable tourism and suggests that technological perception, rather than sustainability values alone, guides direct intentions towards co-creation.

Furthermore, this work extends both the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) to tourism for sustainability, describing technology's perceived utility among tourists and its encouragement of its use in co-creation. Unlike conventional implementations of both frameworks, this study demonstrates that technology not only facilitates adoption but also serves as a key driving force in shaping tourists' participatory behaviour in sustainable tourism strategies. By situating technology in a mediator role, this work develops a new theoretical lens for explaining the

evolving role of digital solutions in tourism co-creation, contributing to both technology and sustainability adoption studies.

In conclusion, this study bridges critical gaps in the existing literature by integrating sustainability values into established theoretical frameworks such as TAM, UTAUT, TPB, SDL, and the Value Co-creation Theory. By highlighting the nuanced roles that sustainability values and technology play in influencing tourists' attitudes and behaviors, the research underscores the interconnectedness of these elements in fostering sustainable tourism practices. The findings offer a deeper understanding of how sustainability-driven technology adoption and co-creation activities can enhance tourist experiences, satisfaction, and loyalty. These insights pave the way for future research to explore additional dimensions of sustainability and technology in tourism, ultimately contributing to the advancement of both theory and practice in this dynamic field.

5.3. Practical contribution

This study provides novel and practical insights for tourism stakeholders, including destination managers, policymakers, and tourism enterprises, by illustrating how advanced technology can transform co-creation experiences and sustainable tourism practices in ways that have not been previously explored. Unlike conventional approaches that consider sustainability and technology in isolation, this research underscores their interdependent relationship. It introduces pioneering ways in which they can collectively enhance tourist engagement and encourage responsible travel behaviours.

Tourism businesses should move beyond conventional digital interfaces and develop AI-enhanced, interactive platforms that enable tourists to co-create personalised travel experiences dynamically. For example, AI-powered itinerary planners incorporating real-time sustainability insights can generate adaptive travel recommendations. At the same time, augmented reality (AR) can provide immersive previews of eco-friendly destinations, establishing a new benchmark for tourist engagement.

Destination managers have the opportunity to revolutionise sustainable decision-making through the integration of emerging technologies. Blockchain-enabled certification systems can provide real-time transparency in sustainable tourism practices, while Internet of Things (IoT)-driven environmental monitoring systems can enable tourists to track and minimise their ecological footprint instantly. These innovations offer an unprecedented level of engagement in sustainability efforts.

Unlike traditional static sustainability initiatives, this study advocates a more dynamic approach in which tourists actively contribute to conservation efforts. Participatory eco-tourism projects—such as AI-facilitated reforestation programmes that allow tourists to monitor planted trees in real time—can foster stronger connections between travellers and sustainability initiatives. Furthermore, AI-powered digital forums and smart communities can facilitate large-scale knowledge exchange on best practices in sustainable tourism.

Traditional gamification has primarily focused on basic reward systems; however, this study proposes next-level engagement strategies, such as blockchain-based sustainability tokens redeemable for travel incentives. AI-driven gamified sustainability challenges, in which tourists compete globally to reduce their carbon footprints, can establish an entirely new paradigm for incentivising responsible tourism behaviours.

Destination managers can harness AI-powered predictive analytics to make data-driven decisions in real time, optimising tourist flow to mitigate over-tourism while promoting underexplored sustainable attractions. Unlike conventional data tracking, this study suggests a more advanced level of intelligence, in which machine learning models continuously refine sustainability strategies based on emerging travel trends and visitor behaviours.

By adopting these innovative strategies, tourism stakeholders can bridge the gap between sustainability intentions and participatory tourism behaviours while setting a new benchmark for integrating advanced technology into responsible tourism practices. This study highlights the necessity of leveraging cutting-edge technological solutions to facilitate co-creation and sustainability in ways that align with the evolving expectations of modern travellers, ultimately reshaping the future of the tourism industry.

5.4. Conclusions

The study investigates the interaction between sustainability values, technology, and co-creation in tourism, revealing key insights that contribute to understanding sustainable tourism practices. The findings highlight the pivotal role of technology as a mediator between sustainability values and co-creation intentions. Tourists who prioritise sustainability recognize the importance of technology in achieving sustainable tourism goals, aligning with the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT). This recognition enhances the perceived importance of technology, which fully mediates the relationship between sustainability values and co-creation intentions, as sustainability values alone do not directly influence these intentions.

Moreover, the perceived importance of technology significantly enhances tourists' engagement in co-creation activities by facilitating easier adoption of sustainable practices, thus acting as a bridge between sustainability values and co-creation intentions. Advanced technologies such as mobile apps, interactive platforms, and virtual reality tools play a crucial role in enabling and enhancing co-creation experiences, leading to higher satisfaction and engagement among tourists. This finding aligns with the Service-Dominant Logic (SDL) and the Experience Economy framework, emphasising personalised and memorable experiences in creating consumer value.

Overall, the study underscores that sustainability values, while relevant in many consumer contexts, do not significantly impact either the perceived value of co-creation or the intention to co-create. Instead, elements such as interaction quality, personalisation, and active engagement with service providers are more critical determinants. These findings challenge well-established behavioural theories like VPN and TPB, which emphasise the role of values in shaping behavioural intentions. The results suggest that companies aiming to foster co-creation should prioritise enhancing the customer experience rather than assuming that sustainability values alone will drive participation.

In conclusion, the integration of sustainability and technology is essential to enhance co-creation in tourism. These insights provide valuable guidance for tourism stakeholders in designing strategies that align with the evolving preferences of sustainability-minded tourists, promoting a more sustainable and fulfilling tourism landscape. The study bridges critical gaps in the existing literature by incorporating sustainability values into established theoretical frameworks, ultimately contributing to both theory and practice in sustainable tourism.

5.5. Main Limitations

This study presents several limitations that should be considered when interpreting its findings and their implications for both theory and practice. Although the study focused on the Lisbon region and included a sufficient sample size of 401 tourists for the analysis, this geographic limitation may hinder the generalizability of the results. Additionally, the use of convenience sampling further limits the sample's representativeness. Despite efforts to ensure diversity, convenience sampling is inherently non-random and may not accurately reflect the broader tourist population. Employing more rigorous sampling methods, such as stratified random sampling, would enhance the reliability and validity of the results.

Self-reported survey data introduces inherent biases such as social desirability and recall biases. Respondents may over-report socially desirable behaviors or under-report undesirable ones, potentially skewing the findings. Furthermore, the cross-sectional design captures only a moment, failing to account for changes in attitudes and behaviors over time. Longitudinal studies would better understand the evolution of sustainability values, the importance of technology, and co-creation intentions.

Although the conceptual model tested in this study is robust, it may not account for all possible variables influencing the interplay between sustainability, technology, and co-creation. Factors such as tourists' prior experiences with technology, overall satisfaction with past travel experiences, and other personal or situational factors were not included in the model but could play significant roles.

In conclusion, while the study offers valuable insights into the interplay of sustainability values, technology, and co-creation in tourism, these limitations suggest further research. Future studies should address these limitations by employing longitudinal designs, more comprehensive models, advanced analytical techniques, and representative sampling methods.

5.6. Future Research

Future research should build upon this study's findings by addressing its limitations and exploring new dimensions of the interplay between sustainability values, technology, and co-creation in tourism. Expanding the geographical scope to include diverse cultural and regional contexts would enhance the generalizability of the findings, with comparative studies across different countries and cultures providing deeper insights into how regional variations influence tourists' sustainability values, technology adoption, and co-creation behaviours. Longitudinal studies are essential to capture the dynamic nature of tourists' attitudes and behaviours over time. By tracking changes in sustainability values, technology importance, and co-creation intentions, researchers can better understand the long-term impact of these factors on tourist behaviour and the effectiveness of technological interventions in promoting sustainable tourism practices.

Incorporating a broader range of variables into the conceptual model, including tourists' prior experiences with technology, overall satisfaction with past travel experiences, and personal or situational factors, could provide a more comprehensive understanding of the determinants of co-creation in sustainable tourism. These variables can help identify additional mediators or moderators that influence the relationships explored in this study.

Exploring the role of emerging technologies, such as artificial intelligence, virtual reality, and the Internet of Things, in enhancing sustainable tourism and co-creation experiences could also provide valuable insights for tourism stakeholders. Understanding how these advanced technologies can be leveraged to promote sustainability and enrich tourist experiences could offer actionable insights.

These efforts will contribute to advances in scientific knowledge, leading to a more comprehensive understanding of the interplay between sustainability values, technology, and co-creation in tourism. This, in turn, will aid in developing more effective strategies for promoting sustainable tourism and enhancing tourist experiences.

REFERENCES

Abou Kamar, M., Maher, A., Salem, I. E., & Elbaz, A. M. (2024). Gamification impact on tourists' pro-sustainability intentions: integration of technology acceptance model (TAM) and the theory of planned behaviour (TPB). *Tourism Review*, *79*(2), 487–504. https://doi.org/10.1108/TR-04-2023-0234

Adongo, C. A., Taale, F., & Adam, I. (2018). Tourists' values and empathic attitude toward sustainable development in tourism. *Ecological Economics*, *150*, 251–263. https://doi.org/10.1016/j.ecolecon.2018.04.013

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Aydın, B., & Alvarez, M. D. (2020). Understanding the tourists' perspective of sustainability in cultural tourist destinations. *Sustainability (Switzerland)*, *12*(21), 1–18. https://doi.org/10.3390/su12218846

Basu, M. (2024). Tech-Driven Horizons: Pioneering Sustainable Tourism for Environmental Resilience and SDGs Triumph. In *The Need for Sustainable Tourism in an Era of Global Climate Change: Pathway to a Greener Future* (pp. 215–247). Emerald Publishing Limited. https://doi.org/10.1108/978-1-83608-668-020241032

Binkhorst, E. (2006). The co-creation tourism experience. *XV International Tourism and Leisure Symposium*, 1–13.

Binkhorst, E., & Den Dekker, T. (2009). Agenda for Co-Creation Tourism Experience Research. *Journal of Hospitality Marketing & Management*, *18*(2–3), 311–327. https://doi.org/10.1080/19368620802594193

Buerke, A., Straatmann, T., Lin-Hi, N., & Müller, K. (2017). Consumer awareness and sustainability-focused value orientation as motivating factors of responsible consumer behavior. *Review of Managerial Science*, *11*(4), 959–991. https://doi.org/10.1007/s11846-016-0211-2

Buonincontri, P., & Micera, R. (2016). The experience co-creation in smart tourism destinations: a multiple case analysis of European destinations. *Information Technology and Tourism*, *16*(3), 285–315. https://doi.org/10.1007/s40558-016-0060-5

Buonincontri, P., Morvillo, A., Okumus, F., & van Niekerk, M. (2017). Managing the experience co-creation process in tourism destinations: Empirical findings from Naples. *Tourism Management*, *62*, 264–277. https://doi.org/10.1016/j.tourman.2017.04.014

Casaló, L. V., Flavián, C., & Guinalíu, M. (2010). Determinants of the intention to participate in firm-hosted online travel communities and effects on consumer behavioral intentions. *Tourism Management*, *31*(6), 898–911. https://doi.org/10.1016/j.tourman.2010.04.007

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*, *13*(3), 319. https://doi.org/10.2307/249008

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. Springer US. https://doi.org/10.1007/978-1-4899-2271-7

Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, *11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Dutta, K., Sharma, K., & Goyal, T. (2021). Customer's digital advocacy: the impact of reviews and influencers in building trust for tourism and hospitality services. *Worldwide Hospitality and Tourism Themes*, *13*(2), 260–274. https://doi.org/10.1108/WHATT-09-2020-0123

El Archi, Y., Benbba, B., Zhu, K., El Andaloussi, Z., Pataki, L., & Dávid, L. D. (2023). Mapping the Nexus between Sustainability and Digitalization in Tourist Destinations: A Bibliometric Analysis. *Sustainability*, *15*(12), 9717. https://doi.org/10.3390/su15129717

Elliot, E. A., Adams, R., & Tsetse, E. K. K. (2023). Customer Value Co-Creation: Environmental Sustainability as a Tourist Experience. *Sustainability (Switzerland)*, *15*(13). https://doi.org/10.3390/su151310486

Festinger, L. (1957). *A Theory of Cognitive Dissonance*. Stanford University Press. https://doi.org/10.1515/9781503620766

Garanti, Z. (2023). Value co-creation in smart tourism destinations. *Worldwide Hospitality and Tourism Themes*, *15*(5), 468–475. https://doi.org/10.1108/WHATT-06-2023-0070

Goo, J., Huang, C. D., Yoo, C. W., & Koo, C. (2022). Smart Tourism Technologies' Ambidexterity: Balancing Tourist's Worries and Novelty Seeking for Travel Satisfaction. *Information Systems Frontiers*, *24*(6), 2139–2158. https://doi.org/10.1007/s10796-021-10233-6

Gretzel, U., Sigala, M., Xiang, Z., & Koo, C. (2015). Smart tourism: foundations and developments. *Electronic Markets*, *25*(3), 179–188. https://doi.org/10.1007/s12525-015-0196-8

Grissemann, U. S., & Stokburger-Sauer, N. E. (2012). Customer co-creation of travel services: The role of company support and customer satisfaction with the co-creation performance. *Tourism Management*, *33*(6), 1483–1492. https://doi.org/10.1016/j.tourman.2012.02.002

Grönroos, C. (2017). Christian Grönroos: I did it my way. *Journal of Historical Research in Marketing*, *9*(3), 277–301. https://doi.org/10.1108/JHRM-12-2016-0028

Guo, J., Xu, J., & Pan, Y. (2024). How Do Location-Based AR Games Enhance Value Co-Creation Experiences at Cultural Heritage Sites? A Process Perspective Analysis. *Applied Sciences*, *14*(15), 6812. https://doi.org/10.3390/app14156812

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (SAge, Ed.; Second). Sage Publications, Inc. https://doi.org/2016005380

Hair, J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2018). *Advanced issues in partial least squares structural equation modelling* (Sage, Ed.; First). Sage Publications, Inc. https://doi.org/10.1007/978-3-319-05542-8_15-1

Hallaj, Z., Bijani, M., Abbasi, E., Valizadeh, N., & Mohammadi, M. (2022). Tourism Development During the Pandemic of Coronavirus (COVID-19): Evidence From Iran. *Frontiers in Public Health*, *10*. https://doi.org/10.3389/fpubh.2022.881381

Han, X., Praet, C. L. C., & Wang, L. (2021). Social interaction in co creating the tourist experience An exploratory study of Chinese visitors to Japan. In *Sustainable and Collaborative Tourism in a Digital World*. Goodfellow Publishers. https://doi.org/10.23912/9781911635765-4845

Hofstede, G. (2001). Culture's consequences: Comparing values, behaviors, institutions, and organizations across nations (2nd ed.). Thousand Oaks, CA: Sage Publications.

Jiang, X., Kim, A., Kim, K. (Anthony), Yang, Q., García-Fernández, J., & Zhang, J. J. (2021). Motivational Antecedents, Value Co-Creation Process, and Behavioral Consequences in Participatory Sport Tourism. *Sustainability*, *13*(17), 9916. https://doi.org/10.3390/su13179916

John, S. P., & Supramaniam, S. (2024). Value co-creation research in tourism and hospitality management: A systematic literature review. *Journal of Hospitality and Tourism Management*, *58*, 96–114. https://doi.org/10.1016/j.jhtm.2023.11.008

Kock, N. (2015). Common method bias in PLS-SEM : A full collinearity assessment approach. *International Journal of E-Collaboration*, *11*(4), 1–10. https://doi.org/10.4018/ijec.2015100101

Kumar, D. (2019). MODELLING THE ENABLERS OF SUSTAINABLE VALUE CO-CREATION AT TOURIST DESTINATIONS. *Proceedings of the 45th International Academic Conference, London*. https://doi.org/10.20472/IAC.2019.045.023

Lin, Z., Chen, Y., & Filieri, R. (2017). Resident-tourist value co-creation: The role of residents' perceived tourism impacts and life satisfaction. *Tourism Management*, *61*, 436–442. https://doi.org/10.1016/j.tourman.2017.02.013

Loureiro, S. M. C., & Nascimento, J. (2021). Shaping a view on the influence of technologies on sustainable tourism. *Sustainability (Switzerland)*, *13*(22). https://doi.org/10.3390/su132212691

Majid, G. M., Tussyadiah, I., & Kim, Y. R. (2024). Exploring the Potential of Chatbots in Extending Tourists' Sustainable Travel Practices. *Journal of Travel Research*. https://doi.org/10.1177/00472875241247316

Marques, L., & Borba, C. (2017). Co-creating the city: Digital technology and creative tourism. *Tourism Management Perspectives*, *24*, 86–93. https://doi.org/10.1016/j.tmp.2017.07.007

Matthews, L., Hair, J., & Matthews, R. (2018). PLS - SEM : THE HOLY GRAIL FOR ADVANCED ANALYSIS. *Marketing Management Journal*, *28*(1), 1–14.

Mgoduka, S., Kaseeram, I., & Heeralal, S. (2024). An Analysis of the Effectiveness of Information and Communication Technology Technologies in Providing Customer Feedback to Enhance B2C Value Co-creation: A Focus on the Tourism Industry. *International Review of Management and Marketing*, *14*(4), 83–91. https://doi.org/10.32479/irmm.15922

Mkono, M., & Tribe, J. (2017). Beyond Reviewing. *Journal of Travel Research*, *56*(3), 287–298. https://doi.org/10.1177/0047287516636236

Neuhofer, B. (2016a). *Innovation Through Co-creation: Towards an Understanding of Technology-Facilitated Co-creation Processes in Tourism* (pp. 17–33). https://doi.org/10.1007/978-3-642-54089-9_2

Neuhofer, B. (2016b). Value Co-creation and Co-destruction in Connected Tourist Experiences. In *Information and Communication Technologies in Tourism 2016* (pp. 779–792). Springer International Publishing. https://doi.org/10.1007/978-3-319-28231-2_56

Neuhofer, B., Buhalis, D., & Ladkin, A. (2013). Co-creation Through Technology: Dimensions of Social Connectedness. In *Information and Communication Technologies in Tourism 2014* (pp. 339–352). Springer International Publishing. https://doi.org/10.1007/978-3-319-03973-2_25

Neuhofer, B., Buhalis, D., & Ladkin, A. (2015). Technology as a Catalyst of Change: Enablers and Barriers of the Tourist Experience and Their Consequences. In *Information and Communication Technologies in Tourism 2015* (pp. 789–802). Springer International Publishing. https://doi.org/10.1007/978-3-319-14343-9_57

Nicola-Gavrilă, L. (2023). Empirical Approaches Regarding Interdependency between Technology and Sustainable Tourism. *Journal of Environmental Management and Tourism*. https://doi.org/10.14505/jemt.v14.4(68).25

Oliver, R. L. (1980). A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions. *Journal of Marketing Research*, *17*(4), 460–469. https://doi.org/10.1177/002224378001700405

Pan, S.-Y., Gao, M., Kim, H., Shah, K. J., Pei, S.-L., & Chiang, P.-C. (2018). Advances and challenges in sustainable tourism toward a green economy. *Science of The Total Environment*, *635*, 452–469. https://doi.org/10.1016/j.scitotenv.2018.04.134

Pine, J., & Gilmore, J. (1998). Welcome to the Experience Economy. *Harvard Business Review*, *76*(4), 97–105.

Polat, I. (2022). Environmental Sustainability, Value Co-Creation, and Innovation in Service Industries With the Lens of S-D Logic. In *Social Customer Relationship Management (Social-CRM) in the Era of Web 4.0* (pp. 128–152). https://doi.org/10.4018/978-1-7998-9553-4.ch006

Pradhan, M. K., Oh, J., & Lee, H. (2018). Understanding Travelers' Behavior for Sustainable Smart Tourism: A Technology Readiness Perspective. *Sustainability*, *10*(11), 4259. https://doi.org/10.3390/su10114259

Prahalad, C. K., & Ramaswamy, V. (2004). Co-creation experiences: The next practice in value creation. *Journal of Interactive Marketing*, *18*(3), 5–14. https://doi.org/10.1002/dir.20015

Prakhar, P., Jaiswal, R., Gupta, S., & Gupta, S. K. (2024). Decoding tourist perceptions and behavioral intentions to use electric vehicles for sustainable tourism with the lens of technology continuance theory. *International Journal of Tourism Cities*. https://doi.org/10.1108/IJTC-01-2024-0033

Prebensen, N. K., Vittersø, J., & Dahl, T. I. (2013). VALUE CO-CREATION SIGNIFICANCE OF TOURIST RESOURCES. *Annals of Tourism Research*, *42*, 240–261. https://doi.org/10.1016/j.annals.2013.01.012

Prebensen, N. K., & Xie, J. (2017). Efficacy of co-creation and mastering on perceived value and satisfaction in tourists' consumption. *Tourism Management*, *60*, 166–176. https://doi.org/10.1016/j.tourman.2016.12.001

Reichenberger, I. (2017). C2C value co-creation through social interactions in tourism. *International Journal of Tourism Research*, *19*(6), 629–638. https://doi.org/10.1002/jtr.2135

Reisinger, P. Y. (2012). *Cross-Cultural Behaviour in Tourism*. Routledge. https://doi.org/10.4324/9780080490861

Rihova, I., Buhalis, D., Gouthro, M. B., & Moital, M. (2018). Customer-to-customer co-creation practices in tourism: Lessons from Customer-Dominant logic. *Tourism Management*, *67*, 362–375. https://doi.org/10.1016/j.tourman.2018.02.010

Risteska, J. (2019). IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGIES ON MOTIVATION IN TOURISM. *Knowledge International Journal*, *34*(1), 215–220. https://doi.org/10.35120/kij34010215r

Roy, S. K., Singh, G., Hatton, C., Dey, B., Ameen, N., & Kumar, S. (2023). Customers' motives to co-create in smart services interactions. *Electronic Commerce Research*, *23*(3), 1367–1400. https://doi.org/10.1007/s10660-022-09633-w

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Saseanu, A. S., Ghita, S. I., Albastroiu, I., & Stoian, C.-A. (2020). Aspects of Digitalization and Related Impact on Green Tourism in European Countries. *Information*, *11*(11), 507. https://doi.org/10.3390/info11110507

Shen, S., Sotiriadis, M., & Zhang, Y. (2020). The Influence of Smart Technologies on Customer Journey in Tourist Attractions within the Smart Tourism Management Framework. *Sustainability*, *12*(10), 4157. https://doi.org/10.3390/su12104157

Sirakaya-Turk, E., Oshriyeh, O., Iskender, A., Ramkissoon, H., & Mercado, H. U. (2024). The theory of sustainability values and travel behavior. *International Journal of Contemporary Hospitality Management*, *36*(5), 1597–1626. https://doi.org/10.1108/IJCHM-12-2022-1512

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, *29*(3), 309–317. https://doi.org/10.1016/j.jenvp.2008.10.004

Stern, P. C., Dietz, T., Abel, T., Guagnano, G. A., & Kalof, L. (1999). A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism. *Human Ecology Review*, *6*(2), 81–97. http://www.jstor.org/stable/24707060

Sthapit, E., Ji, C., Dayour, F., & Badu-Baiden, F. (2024). Memorable wildlife tourism experience: Evidence from the Mole National Park. *Journal of Destination Marketing & Management*, *33*, 100904. https://doi.org/10.1016/j.jdmm.2024.100904

Sugathan, P., & Ranjan, K. R. (2019). Co-creating the tourism experience. *Journal of Business Research*, *100*, 207–217. https://doi.org/10.1016/j.jbusres.2019.03.032

Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of Retailing*, *77*(2), 203–220. https://doi.org/10.1016/S0022-4359(01)00041-0

Teixeira, P., Teixeira, L., Eusébio, C., Silva, S., & Teixeira, A. (2021). *The Impact of ICTs on Accessible Tourism* (pp. 1–25). https://doi.org/10.4018/978-1-7998-6428-8.ch001

Vargo, S. L., & Lusch, R. F. (2004). Evolving to a New Dominant Logic for Marketing. *Journal of Marketing*, *68*(1), 1–17. https://doi.org/10.1509/jmkg.68.1.1.24036

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*, *27*(3), 425. https://doi.org/10.2307/30036540

Venkatesh, V., & Davis, F. D. (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies. *Management Science*, *46*(2), 186–204. https://doi.org/10.1287/mnsc.46.2.186.11926

Vinzi, V. E., Chin, W. W., Henseler, J., & Wang, H. (2010). Editorial: Perspectives on Partial Least Squares. In & H. W. (Eds.) V. E. Vinzi, W. W. Chin, J. Henseler (Ed.), *Handbook of Partial Least Squares: Concepts, Methods and Applications.* (p. 813). Heidelberg Dordrecht London New York: Springer. https://doi.org/10.1007/978-3-540-32827-8_1

Wang, R., Wu, C., Wang, X., Xu, F., & Yuan, Q. (2024). e-Tourism Information Literacy and Its Role in Driving Tourist Satisfaction With Online Travel Information: A Qualitative Comparative Analysis. *Journal of Travel Research*, *63*(4), 904–922. https://doi.org/10.1177/00472875231177229

Wut, T. M., Lee, D., & Lee, S. W. (2023). Does Attitude or Intention Affect Behavior in Sustainable Tourism? A Review and Research Agenda. *Sustainability*, *15*(19), 14076. https://doi.org/10.3390/su151914076

Xie, J., Tkaczynski, A., & Prebensen, N. K. (2020). Human value co-creation behavior in tourism: Insight from an Australian whale watching experience. *Tourism Management Perspectives*, *35*, 100709. https://doi.org/10.1016/j.tmp.2020.100709

Xie, L., Guan, X., Liu, B., & Huan, T.-C. T. C. (2021). The antecedents and consequences of the co-creation experience in virtual tourist communities: From the perspective of social capital in virtual space. *Journal of Hospitality and Tourism Management*, *48*, 492–499. https://doi.org/10.1016/j.jhtm.2021.08.006

Xu, F., Bai, Y., & Li, S. (2020). Examining the Antecedents of Brand Engagement of Tourists Based on the Theory of Value Co-Creation. *Sustainability*, *12*(5), 1958. https://doi.org/10.3390/su12051958

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Appendix

Constructs and indicators	Average	Std deviation	Loadings	T statistics	P values
Co-creation intention (Casaló et al., 2010)					
The ease of use of digital platforms strongly motivates my intention to use them	6.00	1.36	0.791	17.780	0.000
The usefulness of digital platforms significantly influences my intention to use them	5.58	1.41	0.880	26.908	0.000
My desire for personalisation strongly motivates my intention to use collaboration platforms	5.80	1.41	0.855	34.469	0.000
The opportunity for greater control over my travel plans significantly influences my intention to use collaboration platforms	5.29	1.46	0.819	20.836	0.000
The prospect of discovering unique and local experiences is important to use collaboration platforms	6.18	1.32	0.947	123.377	0.000
Engaging with other tourists strongly motivates my intention to use collaboration platforms	5.88	1.34	0.687	17.352	0.000
The potential for improved satisfaction with my travel experiences motivates me to use collaboration platforms	5.65	1.38	0.918	71.197	0.000
Co-creation value (Roy et al., 2023; Sweeney & Soutar, 2001)					
I feel that my collaboration with others (travellers, tourism companies or bureaus) enhances my travel experience	6.18	1.32			Excluded
The features offered by tourism websites or apps provide me with a high degree of personalisation	5.43	1.41	0.938	62.731	0.000
I believe that my collaboration efforts contribute to my overall satisfaction with my travel experience	5.75	1.33	0.949	111.648	0.000
Sustainability importance (Buerke et al., 2017b)					
Avoid products that cause environmental damage	6.61	0.83	0.921	85.064	0.000
Buy environment-friendly products (e.g. with an organic label)	6.59	0.86	0.883	39.293	0.000
Consider ecological aspects when choosing between similar products	6.70	0.81	0.927	93.404	0.000
Buy fairly traded products (e.g. with a fair-trade label)	6.74	0.79	0.845	41.109	0.000
Avoid purchasing from companies that are known for bad working conditions	6.44	1.07	0.891	42.924	0.000
Buy products from companies considered to be socially responsible	6.69	0.83	0.917	71.876	0.000
Purchase products from companies that seek a balance between sustainability and profit	6.72	0.81	0.911	55.155	0.000
Not buy products from companies that treat their customers unfairly	6.72	0.83	0.903	58.753	0.000
Consider whether the company treats other market participants (e.g. competitors, suppliers) fairly when making a purchase	6.74	0.80	0.889	54.327	0.000

Buy products from companies involved in developing communities	6.51	0.97	0.867	39.657	0.000
Technology importance (Goo et al., 2022b; Shen et al., 2020b)					
Provide access to other users' comments	6.60	0.86	0.925	63.855	0.000
Give the possibility of sharing information	5.83	1.57	0.893	37.863	0.000
Be highly responsive to users	6.66	0.82	0.950	93.143	0.000
Provide helpful information about the destination(s) and the trip	6.77	0.71	0.956	97.783	0.000
Help you evaluate the destination(s) and the trip	6.59	0.94	0.727	13.706	0.000
Enable you to complete your travel with detailed information	6.59	0.90	0.943	82.326	0.000
Provide the possibility of being used anytime and anywhere	6.73	0.79	0.943	61.035	0.000
Be easy to use	6.25	1.25	0.857	22.117	0.000
Be easy to find on internet	6.65	0.83	0.937	43.228	0.000
Allow you to interact and receive personalised information	5.90	1.33	0.839	28.389	0.000
Help make short-term decisions	6.53	0.82	0.911	45.941	0.000
Allow to record and store memories for others	6.54	0.78			Excluded

Source: Own elaboration