Digital Technologies and Regenerative Tourism Marketing: Towards New Paradigms of Sustainable Value Co-creation

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ABSTRACT

Regenerative tourism emerges as a transformational paradigm aimed at creating net positive impacts on natural and social ecosystems. This article examines the role of digital technologies as catalysts for sustainable value co-creation within the context of regenerative tourism marketing. Through a systematic literature review mobilizing theories of value co-creation, stakeholder engagement, and technology acceptance, we develop an integrative conceptual model proposing four research hypotheses. These hypotheses explore: (H1) the influence of digital technologies on stakeholder engagement, (H2) the mediating role of engagement in sustainable value co-creation, (H3) the direct effect of technologies on value co-creation, and (H4) the impact of co-creation on future participation intention. This research contributes theoretically to the intersection between sustainability marketing, Service-Dominant Logic, and regenerative tourism, while offering strategic managerial implications for destinations and tourism organizations seeking to operationalize an authentic regenerative approach.

Keywords: regenerative tourism, digital technologies, value co-creation, stakeholder engagement, participation intention

INTRODUCTION

The global tourism sector, representing 10.4% of global GDP and employing 330 million people (UNWTO, 2023), is undergoing a period of profound questioning. The negative environmental and social impacts of mass tourism (ecosystem degradation, overtourism, gentrification, economic leakages) have fueled a crisis of legitimacy accentuated by the COVID-19 pandemic (Higgins-Desbiolles, 2021; Ioannides and Gyimóthy, 2020). Simultaneously, consumer expectations are evolving radically: 73% of travelers state they wish to stay in sustainable accommodations (Booking.com, 2021), while 68% of millennials seek transformative travel experiences that contribute positively to destinations (Transformative Travel Council, 2025).

In this context, regenerative tourism emerges as a post-sustainable paradigm that transcends the logic of negative impact minimization to adopt a proactive philosophy of restoration and enhancement of socio-ecological systems (Pollock, 2019). Unlike sustainable tourism, which aims for neutral balance, regenerative tourism aspires to leave destinations in a better state than before tourism intervention, thereby generating a measurable net positive contribution (Bellato et al., 2023).

Simultaneously, the digital revolution is fundamentally transforming the tourism landscape. Digital technologies (artificial intelligence, blockchain, Internet of Things (IoT), augmented/virtual reality, collaborative platforms, social media) are reconfiguring the entire tourism value chain and relationships between actors (Buhalis and Sinarta, 2019; Gretzel et al., 2015). These technologies offer unprecedented potential to facilitate transparency, collective participation, impact measurement, and experience personalization (Neuhofer et al., 2015; Sigala, 2020).

Despite the growing importance of these two phenomena—regenerative tourism and digitalization—their intersection remains largely underexplored in the academic literature. While research has examined

technologies in sustainable tourism (Kontogianni & Alepis, 2020) and value co-creation in conventional tourism (Chathoth et al., 2016), the specific question of how digital technologies can catalyze sustainable value co-creation in a regenerative context remains unexplored.

This gap is problematic for three reasons. First, regenerative tourism fundamentally requires a collaborative approach involving multiple stakeholders: tourists, local communities, operators, destination managers (Bellato et al., 2023), which corresponds precisely to the co-creation logic that digital technologies can facilitate. Second, the credibility of regenerative initiatives depends on tangible proof of impact, which technologies can measure and communicate transparently. Third, without a rigorous conceptual framework, there is a risk that technologies may be mobilized in a conventional extractive logic rather than a genuinely regenerative one (Gössling, 2021).

This article aims to fill this theoretical and empirical void by proposing an integrative conceptual model exploring how digital technologies facilitate sustainable value co-creation in the context of regenerative tourism marketing. Our main research question is: **How and through what mechanisms do digital technologies catalyze stakeholder engagement and sustainable value co-creation in regenerative tourism, thereby influencing future participation intention?**

To address this, we develop a theoretical model structured around four main hypotheses testing the relationships between digital technologies, stakeholder engagement, sustainable value co-creation, and participation intention. Our approach mobilizes three complementary theoretical corpuses: Service-Dominant Logic (S-D Logic) and value co-creation (Vargo and Lusch, 2016), stakeholder engagement theory (Brodie et al., 2011; Hollebeek et al., 2014), and models of technology acceptance and adoption (Venkatesh et al., 2003).

This research contributes theoretically to three academic fields. It enriches the literature on regenerative tourism by proposing the first systematic conceptual framework for the technological role. It extends value co-creation theory to the specific context of regenerative sustainability. It contributes to tourism technology studies by demonstrating how to orient technological innovation toward regenerative rather than extractive purposes.

LITERATURE REVIEW

Regenerative Tourism: Foundations and Principles

Paradigm Evolution: From Sustainability to Regeneration

The concept of sustainable tourism, formalized by the World Tourism Organization (UNWTO, 2013), aims for balance between economic, environmental, and social dimensions, minimizing negative impacts while maximizing benefits for host communities. However, this paradigm faces growing criticism: defensive rather than proactive orientation, difficulty of effective implementation, persistence of "business as usual" under the guise of sustainability, and inability to reverse accumulated degradation (Higgins-Desbiolles, 2021).

Regenerative tourism represents a paradigmatic rupture by adopting a proactive stance of active restoration (Pollock, 2019; Ateljevic, 2020). This concept posits that tourism activities must not only minimize their harm but actively contribute to improving the health of natural ecosystems and the well-being of local communities, thereby generating a measurable net positive impact.

Five fundamental principles characterize regenerative tourism (Bellato et al., 2023; Pollock, 2019):

1. Net Positive Contribution: Tourism activities must leave destinations in a better state than before, with measurable ecological and social indicators of improvement.
2. Systemic and Holistic Approach: Recognition of the deep interconnection between ecological, social, cultural, and economic systems, requiring integrated rather than sectoral interventions.
3. Co-creation with Local Communities: Residents are not merely beneficiaries or employees but active co-designers and co-managers of tourism development, ensuring alignment with local aspirations (Cheer et al., 2019).

4. Regeneration of Regenerative Capacities: The ultimate objective is to restore and strengthen the intrinsic capacity of socio-ecological systems to regenerate themselves autonomously and resiliently (Mang & Reed, 2012).
5. Individual and Collective Transformation: Regenerative tourism aims for a transformation of consciousness among tourists and stakeholders, cultivating a relationship of reciprocity and care toward places and communities (Ateljevic, 2020).

Regenerative Tourism Marketing: Specific Challenges

Regenerative tourism marketing presents unique challenges compared to conventional tourism marketing. First, it requires communicating about largely intangible and temporally deferred benefits (ecosystem restoration, community resilience), whereas consumer behavior research demonstrates that individuals prioritize tangible and immediate benefits (White et al., 2019)

Second, widespread greenwashing in the tourism sector has created deep skepticism toward environmental communications making it difficult to build credibility even for authentic initiatives. Consumers struggle to distinguish sincere commitments from superficial declarations (Chen and Chang, 2013).

Third, regenerative tourism necessarily involves active participation by the tourist, who becomes a co-creator and co-regenerator rather than a passive consumer. This transformation of the tourist's role requires new marketing approaches centered on engagement, participation, and co-creation (Prahalad and Ramaswamy, 2004).

Value Co-creation: From S-D Logic to Sustainable Value

Theoretical Foundations of Value Co-creation

Service-Dominant Logic (S-D Logic), developed by Vargo and Lusch (2016), represents a fundamental paradigmatic shift in understanding value creation. Unlike Goods-Dominant Logic, where value is created by the producer and then exchanged, S-D Logic posits that value is co-created interactively and contextually between multiple actors, and is only realized through use (value-in-use) rather than exchange (value-in-exchange).

Ten foundational premises structure S-D Logic (Vargo and Lusch, 2016), the most relevant for our study being:

- FP1: Service (application of competencies and knowledge) is the fundamental basis of exchange
- FP6: Value is co-created by multiple actors, always including the beneficiary
- FP9: All social and economic actors are resource integrators
- FP10: Value is always unique, phenomenological, and determined by the beneficiary

In the tourism context, this perspective has profoundly renewed understanding of the tourism experience. Rather than a prefabricated product consumed passively, the tourism experience is conceptualized as an active co-creation process where the tourist mobilizes their own resources (knowledge, skills, imagination) to create their own experiential value (Chathoth et al., 2016).

Prahalad and Ramaswamy (2004) identify four fundamental dimensions of co-creation: dialogue (interaction and mutual learning), access (to resources and information), risk-benefit assessment, and transparency. In tourism, these dimensions translate into collaborative platforms, customizable experiences, and active tourist participation in the design and production of their experience (Neuhofer et al., 2012).

Extension to Sustainable Value Co-creation

While the literature on value co-creation in tourism is abundant, its specific extension to sustainable value creation remains limited. Nevertheless, some pioneering works are emerging. Buonincontri et al. (2017) explore how co-creation can facilitate sustainable tourism experiences. Grissemann and Stokburger-Sauer (2012) examine the effects of co-creation on satisfaction in the context of sustainable tourism.

We define sustainable value co-creation as a collaborative and participatory process whereby multiple stakeholders (tourists, local communities, operators, destination managers) mobilize and integrate their respective resources to jointly generate value that simultaneously benefits economic, social, environmental, and experiential dimensions, with a long-term perspective and regeneration of the regenerative capacities of socio-ecological systems.

This definition extends the traditional conceptualization of co-creation by explicitly integrating:

- Multidimensionality of value (beyond individual experiential value alone)
- Long-term temporal perspective (intergenerational impacts)
- Active regeneration (net positive contribution)
- Multiplicity of beneficiaries (not just the tourist but the entire ecosystem)

In the regenerative context, sustainable value co-creation implies that tourists actively participate in ecological restoration activities (reforestation, river cleaning, species protection), community projects (education, health, infrastructure), and cultural initiatives (preservation of traditional knowledge), thereby creating value that transcends their individual experience to contribute to collective well-being (Bellato et al., 2023).

Stakeholder Engagement: Conceptualization and Dimensions

Engagement Theory

Engagement is conceptualized as a multidimensional psychological state characterized by specific levels of cognitive, emotional, and behavioral activity in interactions with a focal object (Brodie et al., 2011; Hollebeek et al., 2014). In the marketing context, this object can be a brand, organization, community, or cause.

Hollebeek et al. (2014) identify three fundamental dimensions of engagement:

1. Cognitive Engagement: Level of mental elaboration and cognitive processing of the focal object. In the regenerative context, this includes reflection on environmental and social impacts, understanding sustainability issues, and learning about local ecosystems.
2. Emotional Engagement: Degree of positive emotional activation toward the focal object. For regenerative tourism, this encompasses place attachment, empathy toward local communities, sense of significant contribution, and pride in acting positively.
3. Behavioral Engagement: Level of effort, energy, and time invested in interactions with the focal object beyond purchase. This translates into effective participation in regenerative activities, experience sharing, word-of-mouth, and content co-creation.

In our context, we conceptualize stakeholder engagement as a multidimensional psychological state (cognitive, emotional, behavioral) characterizing the active and participatory relationship between different stakeholders (tourists, residents, operators, managers) and the regenerative tourism initiative, manifested by their involvement in co-design, co-production, and co-evaluation processes of sustainable value.

Engagement and Co-creation: Theoretical Relationships

The literature establishes close conceptual links between engagement and value co-creation. Brodie et al. (2011) position engagement as a central concept of S-D Logic, constituting the psychological mechanism through which actors become involved in co-creation processes. Vivek et al. (2012) empirically demonstrate that engagement facilitates value co-creation in the service context.

In tourism specifically, Neuhofer et al. (2012) propose a model showing how tourist engagement facilitates the co-creation of enriched experiences. So et al. (2016) establish that engagement with the destination positively influences the co-creation of memorable experiences.

Nevertheless, these works generally limit themselves to co-creation of individual experiential value, without considering the collective and sustainable dimension of value. Our contribution consists of extending this relationship to the specific context of sustainable value co-creation in regenerative tourism.

Digital Technologies in Tourism: State of the Art

Overview of Technologies and Tourism Applications

Digital technologies are profoundly transforming the contemporary tourism industry. Gretzel et al. (2015) conceptualize "smart tourism" as an integrated technological ecosystem based on the interconnection of advanced technologies to improve efficiency, sustainability, and the tourism experience.

The main technologies relevant to our study include:

Artificial Intelligence and Big Data: Personalized recommendation algorithms, chatbots for real-time assistance, predictive behavior analysis, tourism flow optimization (Davenport et al.).

Internet of Things (IoT): Environmental sensors for real-time impact measurement (air quality, water consumption, biodiversity), connected devices for activity tracking, smart infrastructures (Gretzel et al., 2015).

Blockchain: Transparent traceability of tourism supply chains, verifiable certifications, smart contracts for automatic value redistribution, decentralized reputation systems (Sigala, 2020)

Augmented/Virtual Reality (AR/VR): Immersive destination visualization, environmental impact simulation, experiential education on ecosystems, preview of regenerative experiences (Tussyadiah et al., 2018).

Collaborative Platforms and Social Media: Content co-creation (user-generated content), online communities, peer-to-peer experience sharing, crowdfunding for local projects, civic participation platforms (Sigala, 2020).

Mobile Applications: Personal impact tracking applications, gamification of sustainable behaviors, interactive guides, platforms connecting with local projects (Kontogianni and Alepis, 2020).

Technologies and Tourism Sustainability: Critical Review

Several studies have explored the links between technologies and sustainable tourism. Kontogianni and Alepis (2020) demonstrate that mobile applications can promote pro-environmental behaviors among tourists. Gössling (2021) examines how digital technologies can reduce tourism's environmental impacts. Sigala (2020) analyzes blockchain's potential for transparency and traceability of sustainable practices.

However, this literature presents three major limitations. First, it focuses primarily on efficiency and minimizing negative impacts (sustainability logic) rather than active regeneration and creating positive impacts. Second, it generally adopts a techno-centric perspective, examining technological capabilities per se rather than the psychological and social mechanisms through which technologies influence behaviors. Third, it rarely addresses sustainable value co-creation as a key mediating variable.

Technologies and Co-creation: Theoretical Foundations

Several works establish conceptual links between technologies and value co-creation. Prahalad and Ramaswamy (2004) position digital technologies as essential facilitators of co-creation by enabling dialogue, access to information, and transparency.

In tourism, Neuhofer et al. (2015) develop a theoretical model of "Technology Enhanced Tourism Experiences" (TETE) showing how technologies facilitate the co-creation of enriched experiences through four mechanisms: connectivity (access to information and actors), interactivity (bidirectional exchanges), personalization (adaptation to individual preferences), and contextualization (adaptation to spatio-temporal context).

Buhalis and Sinarta (2019) conceptualize technologies as "operant resources" in the sense of S-D Logic—that is, active resources that act on other resources to create value. Technologies facilitate resource integration between actors, a central element of co-creation according to Vargo and Lusch (2016).

Nevertheless, this literature generally limits itself to co-creation of individual experiences without considering the collective and sustainable dimension. Our contribution consists of extending these conceptualizations to the specific context of regenerative tourism and sustainable value co-creation.

Research Hypotheses

This study empirically tests four hypotheses examining the relationships between digital technologies, stakeholder engagement, sustainable value co-creation, and participation intention in regenerative tourism. Specifically, the analysis assesses the effect of digital technologies on stakeholder engagement (H1), the role of stakeholder engagement in facilitating sustainable value co-creation (H2), and the direct effect of digital technologies on sustainable value co-creation (H3). Finally, it evaluates the influence of sustainable value co-creation on tourists' intention to participate in regenerative tourism initiatives (H4). These hypotheses are tested using structural equation modeling to assess the explanatory power of the proposed model.

H1: Digital technologies positively influence stakeholder engagement

H2: Stakeholder engagement facilitates sustainable value co-creation

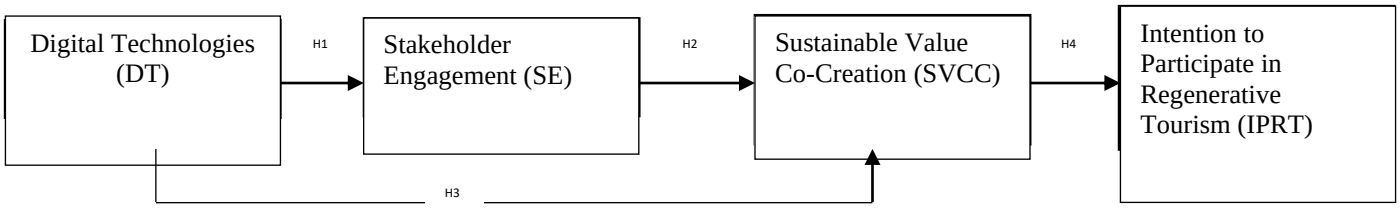
H3: Digital technologies have a direct effect on sustainable value co-creation

H4: Sustainable value co-creation positively influences participation intention

Conceptual Model

Based on this literature review, we propose an integrative conceptual model (Figure 1) positioning digital technologies as an antecedent of stakeholder engagement, which itself facilitates sustainable value co-creation, ultimately influencing future participation intention.

Figure 1: Conceptual Research Model



RESEARCH METHODOLOGY

Research Design

This study adopts a quantitative, explanatory, and cross-sectional research design, aimed at analyzing causal relationships between digital technologies, stakeholder engagement, sustainable value co-creation, and participation intention in the context of regenerative tourism. This methodological choice is justified by the objective of testing a theory-based conceptual model using Structural Equation Modeling (SEM), allowing simultaneous estimation of relationships between latent variables (Hair et al., 2019).

Measurement scale

Table 1 : Measurement scale

Variables	Measurement scale	Authors
Digital Technologies	**DT1:** Digital platforms (websites, applications, social media) facilitate access to information on sustainable tourism practices. **DT2:** Digital technologies improve the transparency of environmental and social impacts of tourism activities. **DT3:** Digital tools promote interaction among tourists,	Gretzel et al. (2015) Sigala (2020) Buhalis and Amaranggana (2015)

(DT)	local communities, and service providers. **DT4:** Digital technologies contribute to better coordination among actors in regenerative tourism. **DT5:** The use of digital technologies makes the tourist experience more responsible and conscious.	
Stakeholder Engagement (SE)	**SE1:** I feel involved in tourism initiatives aimed at territorial sustainability. **SE2:** I actively participate in exchanges and interactions related to regenerative tourism. **SE3:** I feel emotionally attached to tourism projects that respect local communities. **SE4:** I am motivated to contribute to the proposed sustainable tourism initiatives. **SE5:** I believe my involvement can have a positive impact on the visited territory.	Brodie et al. (2011) Hollebeek et al. (2014) Vivek et al. (2012)
Sustainable Value Co-Creation (SVCC)	**SVCC1:** Tourism activities allow me to contribute positively to the local environment. **SVCC2:** Regenerative tourism creates shared value between tourists and local communities. **SVCC3:** I perceive tourism experiences as beneficial to the territory in the long term. **SVCC4:** Interactions with local actors enrich the overall value of the tourism experience. **SVCC5:** Observed tourism practices promote social and environmental regeneration.	Vargo and Lusch (2016) Chathoth et al. (2016) Campos et al. (2018)
Intention to Participate in Regenerative Tourism (IPRT)	**IPRT1:** I intend to participate again in regenerative tourism experiences. **IPRT2:** I would recommend regenerative tourism to others. **IPRT3:** I will prioritize destinations engaged in regenerative tourism practices. **IPRT4:** I am willing to get more involved in sustainable tourism initiatives in the future	Ajzen (1991) Chen and Rahman (2018)

Data Collection Method

Data were collected using a self-administered questionnaire, distributed primarily through digital platforms (social networks, responsible traveler communities, tourism platforms) in order to target individuals with experience or interest in sustainable or regenerative forms of tourism. This collection method is consistent with the research object, insofar as digital technologies constitute a central variable in the studied model.

The questionnaire was developed from validated measurement scales in the literature, then adapted to the specific context of regenerative tourism. Before final distribution, a pre-test was conducted with a small sample of respondents to verify item clarity, statement comprehension, and questionnaire completion time.

Sample and Sampling Procedure

The target population of this study consists of tourists, visitors, and potential participants who have already taken part in sustainable tourism experiences or demonstrate interest in responsible and regenerative tourism practices. Given the absence of an exhaustive sampling frame for this type of population, non-probabilistic convenience sampling was adopted, in accordance with common practices in tourism and sustainable marketing research (Dolnicar et al., 2008).

The survey yielded 208 usable questionnaires. This sample size is deemed adequate for estimating a structural equation model, in accordance with Hair et al. (2019) recommendations, which suggest a minimum of 200 observations for models comprising several latent variables and indicators.

Factor Analysis of the Measurement Scales

Table 2 presents the results relating to the reliability and convergent validity of the measurement scales used in this study. The standardized factor loadings of all items exceed the recommended threshold of 0.70, attesting to a satisfactory contribution of each item to its latent construct. Cronbach's alpha coefficients and composite reliability (CR) indices exceed the threshold value of 0.70 for all variables, indicating good internal consistency of the scales. Furthermore, the Average Variance Extracted (AVE) values are above 0.50, confirming the existence of adequate convergent validity (Fornell and Larcker, 1981). These results demonstrate that the measurement instruments employed are reliable and valid for structural equation model analysis.

Table 2: Reliability and Convergent Validity of Measurement Scales

Variable	Items	Factor Loadings (λ)	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)
Digital Technologies (DT)	DT1	0.78			
	DT2	0.81			
	DT3	0.84	0.87	0.89	0.62
	DT4	0.79			
	DT5	0.76			
Stakeholder Engagement (SE)	SE1	0.82			
	SE2	0.85			
	SE3	0.80	0.88	0.90	0.64
	SE4	0.83			
	SE5	0.79			
Sustainable Value Co-Creation (SVCC)	SVCC1	0.81			
	SVCC2	0.84			
	SVCC3	0.86	0.90	0.92	0.69
	SVCC4	0.82			
	SVCC5	0.85			
Intention to Participate (IPRT)	IPRT1	0.83			
	IPRT2	0.87			
	IPRT3	0.85	0.86	0.89	0.67
	IPRT4	0.81			

RESULTS AND DISCUSSION

Structural Model

Model estimation was conducted using Amos 31.0 software. This structural equation modeling software provides goodness-of-fit indicators used to assess model quality. This method offers advantages over other

analytical techniques such as simple or multiple regression, as it allows for error estimation, simultaneous processing of linear equations, and evaluation of model fit quality in both cross-sectional and longitudinal analyses (Roussel et al., 2002). The fit indices are summarized in Table 3.

Table 3: Model Fit Indices

Fit Index	Recommended threshold	Observed Value
Chi²/df	< 3	2,45
GFI (Goodness of Fit Index)	> 0,9	0,92
AGFI (Adjusted GFI)	≥ 0,9	0,91
CFI (Comparative Fit Index	≥ 0,9	0,93
RMSEA (Root Mean Square Error of Approximation	<0,08	0,065
SRMR (Standardized Root Mean Square Residual)	<0,08	0,058

RESULTS

Table 4 presents the hypothesis testing results from the structural equation analysis. The results indicate that all proposed hypotheses are empirically validated, thereby confirming the robustness of the conceptual model and the relevance of the postulated causal relationships between digital technologies, stakeholder engagement, sustainable value co-creation, and participation intention in regenerative tourism.

Table 4: Hypothesis Testing Results

Hypotheses	Standardized β	t-value	p-value	Hypotheses confirmation
H1- Digital Technologies → Stakeholder Engagement	0.62	8.12	< 0.001	Supported
H2- Stakeholder Engagement → Sustainable Value Co-Creation	0.57	7.45	< 0.001	Supported
H3- Digital Technologies → Sustainable Value Co-Creation	0.31	3.92	< 0.001	Supported (partial mediation)
H4- Sustainable Value Co-Creation → Intention to Participate	0.68	9.23	< 0.001	Supported

DISCUSSION

Regarding the first hypothesis, the analysis indicates a positive and significant effect of digital technologies on stakeholder engagement ($\beta = 0.62$, $p < 0.001$). This result is consistent with prior research demonstrating that digital platforms, applications, and social networks enhance information access, transparency, and interactive participation of tourists and local communities (Gretzel et al., 2015; Sigala, 2020). From a practical standpoint, technologies such as interactive applications in South Tyrol or mobile engagement platforms in New Zealand illustrate that digital tools can actively foster emotional and cognitive engagement with sustainable tourism initiatives (Duxbury et al.,2021). These findings underscore that digital infrastructures are not merely informational tools but also facilitators of participatory governance within regenerative tourism ecosystems.

For the second hypothesis, results demonstrated that stakeholder engagement significantly predicts sustainable value co-creation ($\beta = 0.57$, $p < 0.001$). This aligns with the Service-Dominant Logic framework (Vargo and Lusch, 2016), which posits that value emerges from actor interactions. Our findings suggest that engaged stakeholders—tourists and local communities—actively co-produce shared social, environmental, and economic benefits. Concrete examples include Living Labs in Scandinavia and community-based tourism platforms in Latin America, where active stakeholder participation generates measurable value for destinations (Chathoth et al., 2016). This demonstrates that engagement constitutes a crucial mediator for realizing tourism's regenerative potential.

Results from the third hypothesis confirm that digital technologies also exert a direct and significant effect on sustainable value co-creation ($\beta = 0.31$, $p < 0.001$), indicating partial mediation through stakeholder engagement. This suggests that technologies can contribute to value creation not only through engagement but also via structural mechanisms such as data transparency, impact tracking, and coordination of actions among tourism actors (Buhalis and Amaranggana, 2015). Examples such as Fairbnb.coop, the ethical and sustainable alternative to Airbnb, demonstrate that digital platforms can redistribute value toward local regeneration projects (50% of commissions are redirected to resident-selected projects), demonstrating that digital technologies possess an intrinsic capacity to enhance sustainable outcomes, independent of engagement.

Finally, regarding the fourth hypothesis, sustainable value co-creation strongly predicts tourists' participation intention ($\beta = 0.68$, $p < 0.001$). This corroborates research showing that perceived value and positive societal impact influence behavioral intentions in sustainable tourism (Chen and Rahman, 2018). Tourists are increasingly motivated by experiences contributing to environmental regeneration, cultural preservation, and community development. For instance, regenerative tourism programs in Costa Rica enable tourists to participate in ecosystem restoration while creating sustainable value for local communities, thereby reinforcing the practical relevance of co-created value as a driver of future participation (UNWTO, 2023).

Overall, the SEM results confirm the theoretical model linking digital technologies, stakeholder engagement, sustainable value co-creation, and participation intention. Both direct and indirect effects are significant, demonstrating a multi-level mechanism where technologies facilitate engagement, which then amplifies value co-creation and ultimately influences tourists' behavioral intentions. These findings provide both a theoretical contribution by integrating digital technologies into regenerative tourism frameworks and practical insights for destination managers seeking to leverage technology to foster sustainable participation.

GENERAL CONCLUSION

This research has examined the role of digital technologies in regenerative tourism development, highlighting the mechanisms through which they foster stakeholder engagement, sustainable value co-creation, and ultimately, participation intention. While traditional sustainable tourism approaches focus primarily on limiting negative impacts, regenerative tourism operates within a more transformative logic aimed at ecosystem restoration, local community strengthening, and long-term value creation (Bellato et al., 2023). In this context, digital technologies appear not merely as operational tools but as genuine socio-technical infrastructures enabling a reconceptualization of tourism practices.

Conceptually, this article has proposed and empirically tested an integrative model linking digital technologies, stakeholder engagement, sustainable value co-creation, and participation intention. The structural equation modeling results confirm all formulated hypotheses and illuminate several key insights. Particularly, digital technologies exert a direct and significant effect on stakeholder engagement, confirming their central role in facilitating interactions, transparency, and collective participation, as suggested by research on smart tourism and connected destinations (Gretzel et al., 2015; Sigala, 2020).

These results find concrete resonance in operational initiatives. For example, the South Tyrol (Italy) destination employs participatory digital platforms enabling visitors to co-design their tourism experiences while contributing to local environmental preservation projects. Similarly, in New Zealand, several regenerative tourism initiatives rely on mobile applications and digital tools to sensitize visitors to kaitiakitanga values (land stewardship) while fostering direct interaction with local communities (Duxbury et al.,2021 These examples illustrate that digital technologies already constitute concrete levers for engagement and transformation of tourism practices.

Results also demonstrate that stakeholder engagement plays a determining role in sustainable value co-creation. This observation fully aligns with Service-Dominant Logic, according to which value emerges from interactions and resource integration among actors (Vargo and Lusch, 2016). Within regenerative tourism, this co-creation extends beyond visitor experience to include long-term social, cultural, and environmental dimensions. Initiatives such as tourism Living Labs in Scandinavia or digital community-based tourism projects in Latin America demonstrate that active stakeholder involvement, facilitated by digital means, can generate sustainable benefits for territories (Chathoth et al., 2016).

Moreover, the study reveals partial mediation of engagement in the relationship between digital technologies and sustainable value co-creation. This result suggests that technologies can produce sustainable value not only through direct actor engagement but also through structural mechanisms such as transparent information dissemination, impact traceability, or collective action coordination. As an example, platforms like Fairbnb.coop utilize digital tools to redistribute a portion of tourism value toward local community projects, thus illustrating regenerative and structuring use of digital means beyond simple tourism interaction.

Finally, sustainable value co-creation emerges as the principal determinant of participation intention, confirming that tourists are increasingly sensitive to perceiving positive and tangible impacts from their experiences (Chen and Rahman, 2018). This trend is observable in the rising prominence of destinations and tourism offerings highlighting narratives of regeneration, authenticity, and contribution to the common good, often relayed and amplified by digital technologies (UNWTO, 2023).

Theoretically, this research contributes to enriching the emerging literature on regenerative tourism by proposing an integrative empirical framework linking digital technologies, engagement, and sustainable value co-creation. It transcends a technocentric vision of smart tourism to adopt a socio-technical approach wherein technology acts as a facilitator of relational and regenerative processes. It also extends Service-Dominant Logic by inscribing it within a territorial and sustainable perspective, where value is co-produced at the tourism ecosystem scale.

From a managerial perspective, results underscore the importance for destination managers and public decision-makers to design digital strategies oriented toward participation, transparency, and co-creation. Digital technologies must be envisioned as dialogue and governance platforms capable of strengthening linkages among tourists, local communities, and institutional actors. Examples observed in pioneering destinations demonstrate that these practices are already successfully implemented and constitute transferable sources of inspiration for other contexts.

Despite its contributions, this research presents certain limitations worth noting. First, reliance on non-probabilistic convenience sampling may limit the generalizability of results to all tourist populations. A second limitation is that data rely on self-reported measures, susceptible to social desirability bias.

Future research could integrate additional moderating or mediating variables, such as digital trust, perceived authenticity, or territorial governance, to refine understanding of the studied mechanisms. Finally, qualitative or mixed-method approaches could complement quantitative findings by exploring more deeply the lived experiences of stakeholders and local regeneration dynamics.

In conclusion, this research demonstrates that regenerative tourism, supported by digital technologies, is no longer a conceptual utopia but an emerging reality already observable in numerous territories. By articulating engagement, sustainable value co-creation, and digital innovation, it paves the way for profound renewal of tourism practices capable of addressing contemporary challenges of territorial sustainability and resilience.

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