

Role of Technology in Rural Tourism Development: A Massive Review of Literature

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Abstract—This review research provides a transformative perspective on the impact of digital technology in rural tourism by scrutinizing how it shapes the landscape of marketing, visitor experience, operational enhancement, community incubation and sustainability. As more rural destinations use digital tools — whether it's social media and peer-to-peer platforms or augmented reality and blockchain — they get exposure and economic prospects like never before on an international stage. But digitization also comes with perils: algorithmic bias, over tourism, cultural commodification, data privacy violations and growing digital divides. Drawing on analysis of 50 academic sources published during 2010–2024, the article demonstrates that digital technologies exacerbate or replicate prevailing socio-economic conditions—increasing inclusion where governance is strong and widening disparities where infrastructure or agency is deficient. Although considerable R&D activity concentrates on wealthy regions, there are crucial gaps in relation to gender, environmental costs, decentralized technologies and the ethical aspects of design in deprived communities. The review makes the case for justice-oriented, participatory digital adoption in rural tourism—focusing on capturing local voices, creating fair value distribution and embedding sustainability at its heart. It ends by suggesting areas of future research, such as digital literacy interventions, algorithmic audits, and community-owned tech cooperatives. As such, this paper is a comprehensive knowledge map and call to action for those scholars, policymakers and practitioners dedicated to creating resilient, inclusive and digitally empowered.

Index Terms—Digital Technology, Rural Tourism, Sustainable Tourism, Community Empowerment, Digital Divide, Tourism Marketing, Visitor Experience, Ethical Digitization Introduction

I. INTRODUCTION

Background

Rural tourism, which refers to tourism activities taking place in the non-urbanised areas – usually having a

low population density and unspoiled natural scenes as well as agricultural tradition and traditional culture — has been recognised as an important component of sustainable regional development. Rural tourism has transformed from a very niche market to one with significant economic potential over the last two decades, especially in emerging economies and geographies thirsting for alternatives beyond agriculture or extraction. It provides income generating, employment opportunity, cultural preservation and environment conservation such prospects to create.

Meanwhile, digital technology has upended nearly every industry in the global economy — including how we travel. From booking sites and social media advertising to virtual reality (VR) experience management and big data analytics, digital is changing the way that travellers discover, plan, experience and review their visits. In the urban environment, this shift has been documented extensively, while in rural tourism settings potentially influenced by it being increasingly frequent.

Digitalisation is particularly promising for rural tourism due to its potential to compensate some of the structural weak points of these areas with inherent handicaps such as geographical isolation, limited infrastructures, lack of visibility and scarce access to global markets. Digital technology has the potential to change all this, by widening the pool of visitation, providing services tailored to individual needs, improving visitor experiences and creating more resilient rural economies. However, the diffusion and impact of digital tourism is uneven in rural areas, influenced by diverse levels of digital literacy, connectivity, investment and policy intervention.

The diverse impact of digital technology on rural tourism is the focus of this literature review and an emphasis is placed on the changes that digital innovations bring about in terms of DMO

management, marketing tactics, traveler behavior and community involvement. It frames this debate against wider arguments on the sustainability, equity and innovative developments of tourism.

Scope & Rationale

The present review emphasizes academic papers, industry reports and case studies that were made available between 2010 to 2024, with some key early works dated back to other decades where appropriate. The geographical coverage is global, but the emphasis lies on comparative results from Europe, Asia and Africa as well as Latin America in order to capture a spectrum of different versions of digitization development versus rural change.

The following studies are identified in this review:

- Digital platforms (e.g., Airbnb, Booking. com, Instagram) also in touting rural destinations.
- Mobile apps and GIS-enabled tools that support wayfinding and discovery in wilderness.
- VRCArts for pre-tour involvement and Story Living in VR/AR.
- Big data and AI-based customization of rural tourism products.
- E-commerce and digital payment solutions for direct sale of local products and services.
- The effect of social media on rural branding and user-generated content.
- Digital local initiatives and Ict-based participatory planning.

Excluded are purely technical papers on software engineering or hardware architecture not applied to tourism impacts, and macroeconomic studies that do not investigate a rural dimension. References to urban tourism literature are only made when they offer useful comparative perspectives and legible conceptual frameworks.

The purpose of this review is predicated on the pressing requirement to better understand how digital technology can be harnessed in a manner that is equitable and sustainable in rural tourism. Even as the future of urban sociality is reimagined on screens, those not living in these cities are at risk of being left behind — or worse, exploited — unless digital tools are thoughtfully integrated into rural areas. Policy-makers, entrepreneurs, scholars and communities need evidence-based direction in order to successfully chart this dynamic terrain.

Purpose

In conclusion, the literature reviewed emphasizes that digital technology can be a driver for rural tourism by providing it with novel visibility and efficiency of operation opportunities but also (if not carefully implemented) can create risks such as inaccessibility due to poor internet access and related digital divides, cultural commodification, environmental dilution. The ultimate aim is to consolidate understanding, pinpoint key deficiencies and suggest a blueprint for responsible digital transformation within rural tourism.

The thematic structure of the paper follows five foundational key dimensions:

1. Digital marketing and visibility.
2. Visitor experience enhancement.
3. Operational efficiency and business models.
4. Community empowerment and participation
5. Sustainability and ethical issues.

Each section traces the evolution from the early stages to portray contemporary trends in more detail and closes with a comprehensive overview, research gaps identification, and recommendations for future research.

II. BODY

1. Thematic structure Digital marketing and visibility: bridging the rural-urban gap Rural sites have a long history of struggling to achieve visibility, hindered by funding shortfalls to build initial visibility campaigns, limited distribution networks, and a skill gap with marketing techniques. Approaches to local tourism authorities and brochure handing out and the word on the street were often insufficient to reach international markets, and national ones at times too Lawrence, 2018. The beginning of the digital era was a breath of fresh air introduction. Research from the 2010s, like Buhalis and Law's 2008 work, Gretzel et al.'s 2015 research, provides early evidence that websites, email sales, and SEO approaches swiftly leveled the playing field for rural SMEs: they could engage far more successfully with their clients in the city. But the genuine game-changer was the disruption introduced by SM and platform practices. Platforms like Instagram, Facebook, TikTok, or even YouTube made it simpler to visual stories,

allowing rural hosts to immediately convey a lifestyle choice, picturesque landscape, or tradition to billions of potential tourists. Munar & Jacobsen's 2014 work emphasizes how "Instagram ability" influences the city's choice, especially for younger cohorts: the post-millennial demographic, which puts a high emphasis on getting a shareable experience first and foremost. Country-level instances include the viral effect that overwhelmed Bali, Indonesia's countryside, Tuscany, and the Scottish Highlands. Sites like Airbnb and Vrbo, peer-to-peer accommodation platforms, made the availability of rural stays even more democratic. As Guttentag's (2015) points, the platforms decreased reliance on traditional intermediaries and gave homeowners in remote communities a chance to earn money from their spare room or historic family dwelling. Yet, other commentators (Gurran & Phibbs 2017) believe that the document brings a set of problems: gentrification, erosion of housing affordability, and avoidance of regulations.

In recent times, the face of promotional work has been fine-tuned by influencer marketing and micro-targeted ads powered through AI algorithms. For example, Google Ads and Meta's targeting tools enable rural B&Bs to target people based on interests (hiking, farm-to-table dining) instead of just geography. This is a change from mass marketing to personally mean outreach, increasing as the recovery phase of post-COVID (Sigala, 2020).

Despite these advances, disparities persist. According to a 2022 report by UNESCO, in SubSAharan Africa the rate is only between 38 -48 percent for these rural tourism enterprises which are active with internet marketing profiles whereas, it ranges from over 85% in for Western Europe. Barriers include the cost, a lack of skills in some areas, language and unreliable internet access.

Methodologically, the majority of research in this area adopts content analysis of social media posts, surveys from business owners and interviews with digital marketers. Quantitative variables like click through rate, conversion rate, followership growth are used in concert with subjective assessments of brand perception.

2. Digital Tools for Improving the Visitor Experience

Apart from the marketing, digital technologies contribute materially to shaping the real tourist experience in rural areas. And apps such as Google Maps and Komoot make it easier for visitors to navigate an alien landscape, eliminating some of the fear associated with distance from civilization. Offline maps and voice guidance are particularly helpful in poor reception regions.

Augmented and virtual reality are becoming experiential overlays. With VR headsets, city-based travel agencies are able to offer an advanced "preview" of possible rural trails or homestays, or festival attendances -- thereby increasing the confidence level and lessening the chance of cancellations (Tussyadiah et al., 2018). Locative, on-site AR apps superimpose stories of the past over physical locations, adding education value without expensive sign posts nor guided tours. One such example is AR trail apps built for Ireland's Wild Atlantic way that offers stories of local people during their walk on the coastal paths the visitors undertake (O'Connor et al., 2021).

Mobile apps have also made services to be provided more easily. Platforms like Visit A Country or a regional tourism app combine ticketing, reservations, reviews and emergency contacts into an orderly interface. In the mountainous Nagano Prefecture of Japan, a digital application called "Satoyama Navi" links tourists to local farmers for hands-on harvesting experiences, cooking lessons and craft-based workshops – all available at your fingertips. (Sato & Yamada 2020).

Game-based features—like digital scavenger hunts or achievement badges related to a visit work to attract younger demographics and impel longer visits. A 27% improvement at being still in rural Portugal with a walking tour gamified app introduced (Ferreira et al., 2021).

But there are worries that too much dependence on screens is taking away from the real thing. According to critics, the relentless documentation for social media leads to a lack of presence and mindfulness (Rickly, 2018). In addition, their technology can hiccup in some remote areas — like dead batteries, which delayed visitors this year or last attempting to find a cousin who was hiking at the Grand Canyon — and visitors expect connectivity.

Along the way, tools shifted in focus: First they offered basic information (websites, PDF guides), then they focused on interaction (apps, QR codes), now they're all about immersion and personalization (AI chatbots, adaptive interfaces).

In terms of method, this area is largely dominated by experimental studies testing usability; ethnographic observation of tech uses in situ; and follow-up longitudinal measures of satisfaction scores.

3. Operational Efficiency and Changing Business Models

The development of digital technology has changed the way in which rural tourism enterprises operate. Property management systems (PMS), which in charge of check-ins, housekeeping schedules, inventory management and financial reporting are all automated via cloud-based software—operations that were previously completed manually with an overworked staff. Services like Lodgify, Hostaway and SuperControl allow even one-property owners to function as boutique hotels.

Dynamic pricing structures, inspired by the airline and hotel sectors, mean that even those small rural accommodations can change prices based on spending predictions, competitor costs and seasonal demand. This agility is very beneficial, but one has to understand the data and in some cases employ third-party consultancies that many smaller operators cannot afford (Li et al., 2020).

E-commerce websites range from booking to the sale of artisanal goods, farm produce, and digital souvenirs (and let's not forget NFTs of local art). Etsy, Shopify and their local versions have enabled rural artisans to circumvent middlemen and keep more of the profits. Amid the pandemic, many rural lodges switched to selling DIY kits (for cheese-making, embroidery and herbal tea blends) that can be shipped across the country — a fusion of physical hospitality with digitalized commerce (Richards, 2021).

The digitalization of payments through mobile wallets (M-Pesa in Kenya, Paytm in India) and contactless cards increases convenience and security, especially where cash is not readily available. In Switzerland and Estonia blockchain pilots allow to discuss a clear royalty dispersion that may result from local parties when digital content (images, video) of their land or culture is commercialized elsewhere (Hjalager, 2022).

Yet challenges remain. A lot of legacy systems can't integrate with modern APIs leading to data silos. Cybersecurity risks are significant, especially for companies without IT professionals. And monthly subscription costs for premium SaaS tools can eat away at tight profit margins that often come with rural tourism.

Synthesis: While digital activities are enabling productivity and scale, they also require constant upskilling and investment of capital. The best adopters use automation and live human touchpoints – retaining a warmth amidst the efficiency.

4. Community Empowerment and Participatory Governance

One of the most revolutionary -- and least understood -- aspects of digital technology in rural tourism is its ability to empower communities. In the past, tourism planning from above had often simply ignored local people, who in turn felt resentful and unplanned-for. The internet provides new ways of participation, co-creation and value ownership."

Crowdsourcing instruments like Ushahidi, or participatory GIS (Geographic Information Systems), allow residents to collectively map assets, hazards and preferences. In Nepal's Annapurna, village leaders used open-source mapping software to mark eco-sensitive areas as out of bounds for trekkers and the maps then influenced where official trails were re-routed (Nepal et al., 2019).

WhatsApp groups and Telegram channels have become informal governance spaces where locals coordinate responses to overtourism, exchange safety alerts or organize boycotts of exploitative operators. In the Sacred Valley of Peru, for example, members of the Quechua community established a Whatsapp group to bargain collectively with tour companies over their wage — labor organizing via digital means that had been previously unthinkable (García 2021).

Funded by NGOs or universities, digital storytelling projects train youth to capture oral histories, rituals and ecological knowledge through video blogs or podcasts. Such archives do not merely conserve intangible heritage, but represent communities as knowledgeable authors rather than objects to be seen (Pink & Salazar, 2020).

Cooperatives that leverage the blockchain are exploring decentralized profit-sharing systems. In

Catalonia (Spain) a blockchain platform is used to automatically redistribute profits from agritourism bookings among the participating families using established rules, in order to avoid administrative slippage (Puig et al., 2023).

However, digital divide is still an inhibiting factor. Elderly, women in patriarchal society to girls and indigenous with low level of formal education may also be hard or feel shy to communicate digitally. Technology can perpetuate existing power imbalances if there are no explicit inclusion strategies.

Critique There are positive features, but many communities level digital efforts are pilot or donor funded. If we are going to scale this up, make it sustainable, and really devolve powers of decision-making then institutional commitment has to go further.

5. Sustainability and Ethical Considerations

As digital technology broadens rural tourism's reach, questions of sustainability and ethics become more urgent. On the other, digitization increases environmental impacts: paperless only works in combination with IT equipment, boats and flights continue to operate 24/7, we take virtual trips that leave trails of CO₂ just like the actual flight (Hall 2021).

From the other end, however, becomes overtourism. Infectious sites of rural splendor — from Iceland's Fjaðrárgljúfur canyon to Thailand's Pai Valley — have seen the wear and tear of erosion, littering and cultural dilution after achieving viral renown. Algorithms which value engagement above stewardship compound this by magnifying sensational or visually arresting content irrespective of any carrying capacity (Dredge, 2020).

Data privacy is another concern. Voyaging into the countryside, tourists often agree to location tracking, face recognition or behavioral profiling without realizing the consequences. Small local businesses that collect guest data may not have GDPR compliant protections in place for guests, and can then be breached (Cunningham – 2022)

The how and the why of cultural appropriation on social media. Ceremonies, clothing or crafts can easily

become what's marketed to tourists as an "Instagram moment" — a piece of cultural identity that is removed from its original context and commoditized for someone else. Researchers also demand an ethical framework for digital representation of rural cultures (Ateljevic, 2021).

The carbon that infrastructure (data centers, device manufacturing and network transmission) emits is not typically included in the "green tourism" calculation. A 2023 paper found that streaming a 360-degree VR tour of a Moroccan village results in more CO₂ emissions than taking a short car trip to the village—challenging expectations of carbon-neutrality from virtual tourism (Belkhir & Elmeligi, 2023).

Synthesis: Digital technology is not intrinsically sustainable or unethical but reflects the values and governance regimes of its users. Implementing this responsibly requires interdisciplinary work between the technologists, ecologists, anthropologists and ethicists involved.

Chronological Organization

The evolution of digital technology used in rural tourism is developed according to several identifiable phases:

Pre-2010: Analog dominance. Rural tourism was using guidebooks, travel agencies and static site. Limited evaluation of digital impact.

2010–2015: Emergence of Web 2.0. Social media enters mainstream use. Initial academic studies on e-tourism in rural areas (e.g., Díaz López et al., 2012). Focus on website performance and seo.

2016–2020: Platform capitalism ascendant. Rise of Airbnb, Instagram, TripAdvisor. Scholarship moves in the direction of gig economy dynamics, authenticity controversies and algorithmic bias. Pandemic drives digitization (virtual tours, contactless payments).

2021–Present: Immersive and intelligent technologies. VR/AR, AI personalization, and blockchain traceability go mainstream. Ethical, sustainable and decolonial turn. Emphasis on resilient, inclusive values post-COVID.

Each phase builds upon prior capabilities while introducing new complexities. The field moves from descriptive accounts ("what technologies exist?") to analytical critiques ("who benefits? At what cost?").

Literature Review Summary Table: Digital Technology in Rural Tourism

Author(s), Year	Theme Focus	Geographic Context	Methodology	Key Findings	Limitations / Gaps Identified
Ferreira et al. (2021)	Gamification & Dwell Time	Portugal (rural villages)	Field experiment + visitor tracking	Gamified walking tours increased average stay duration by 27%.	Short-term effects only; novelty may wear off.
Richards (2021)	Pandemic Pivot & Hybrid Models	Global (multi-case)	Thematic analysis of industry reports	Rural operators shifted to e-commerce (DIY kits, virtual workshops) during lockdowns.	Temporary adaptations; long-term viability unclear.
García (2021)	Digital Labor Organizing	Peru (Sacred Valley)	Ethnography + WhatsApp discourse analysis	Quechua communities used WhatsApp to collectively negotiate fair wages with tour operators.	Informal structure; no legal recognition or scalability.
Hjalager (2022)	Blockchain for Value Distribution	Switzerland, Estonia	Pilot project evaluation	Transparent revenue-sharing via blockchain increased trust and reduced leakage in agritourism cooperatives.	Technically complex; requires high digital literacy.
Dredge (2020)	Algorithmic Amplification & Overtourism	Iceland, Thailand, Bali	Media analysis + carrying capacity study	Viral content algorithms ignore ecological limits, triggering overtourism in fragile rural zones.	Lack of platform accountability mechanisms.
Ateljevic (2021)	Cultural Ethics & Digital Representation	Global Indigenous contexts	Critical theory + discourse analysis	Digital commodification strips cultural practices of meaning; calls for ethical storytelling frameworks.	Few practical implementation models proposed.
Belkhir & Elmeligi (2023)	Environmental Cost of Digital Tourism	Morocco (case) + global calc	Lifecycle assessment + carbon modeling	Streaming VR tours emits more CO ₂ than short physical visits—undermining “green tech” narratives.	Understudied area; lacks standardized metrics

Methodological Organization

Research methodologies mirror technological progression:

Early (Surveys & Interviews): Predominated self-reported from businesspeople and tourists. Good for measuring awareness and satisfaction but subject to bias.

Mid-Stage (Content and Network Analysis): Extracting patterns of visibility and sentiment using data from social media feeds, review text streams, and hyperlink structures. More objective but lacks depth.

Current Stage (Mixed Methods + Experiments): Integrates big-data/qualitative fieldwork (such as, geotagged photos/booking logs and participant observation/focus groups). Experimental interventions (e.g., AR vs. brochure guides) are tested in these experiments.

New approaches include digital ethnography (the study of online communities), action research (doing tech design with locals) and simulation modeling (forecasting tech adoption curves).

Challenges remain: sampling bias toward digitally active populations, difficulty in measurement of long-term impact and ethical dilemma between surveillance and consent.

Synthesis

This last point is my favourite because it also emerges within the themes: digital technology compounds what already exists. In countries with sound governance, good infrastructure and active communities, digitization is delivering inclusive growth. Technology creates deeper divides where inequalities exist.

Strengths in the literature The most substantial strengths I want to explore are the deeply detailed cases, new methodological hybrids and increasing attention to Global South contexts. The lack of development is in the area of theory (lightly grounded), longitudinal data and no challenge to corporate domination in digital ecologies.

Relatively few cross-sectional, comparative studies across regions, standardized measurements of levels of digital maturity for rural tourism and strong policy evaluations of the effectiveness regulatory measures are missing.

Gaps

Several critical gaps warrant attention:

Digital Literacy Interventions: There is very limited research on interventions to train rural actors on digital literacy.

Gender and Intersectionality: Evidently, there is insufficient research on gender perspective on how digital tools influences women, ethnic minorities and differently abled people in rural tourism.

Environmental Accountancy: Very few life-cycle evaluations for digital devices and rural tourism infrastructure have been carried out.

Decentralized Technologies: They haven't had a chance to fully understand the potential of decentralized technologies like Web3, DAOs (decentralized autonomous organizations), and token economies in moving tourism value back towards local.

Metrics of Resilience: The lack of indicators to measure how digital readiness helps rural destinations withstand shocks (climate, pandemics, political instability).

Algorithmic Justice: No audits of whether recommendation engines prefer certain rurality typologies (maybe scenic vs. distressed).

III. CONCLUSION

This review has revealed that digital technology influences, absorbs and supplements rural tourism in a multifaceted way. It boosts marketing with social media and P2P platforms, enriches the visitor experience with AR/VR and mobile apps, optimizes business operations through cloud-based tools and dynamic pricing models, enables community engagement via participatory digital governance and raises grave ethical questions on sustainability and equity.

Early scholarship hailed technological determinism — the belief that technology is an inevitable driver of better results — but newer studies have taken a more skeptical, critical approach. Success is a matter not of the tools themselves but contextual factors: governance quality, digital readiness, cultural sensitivity and distributive justice.

Evaluation of the Literature

On the whole, the literature is lively and growing, if patchy. In the empirical literature, high-income countries predominate while large parts of the world

remain overrepresented. Theoretical contributions are running behind practical developments, leading to thin conceptual patterns. There is a still-nascent, yet potentially significant role for interdisciplinary cooperation — particularly with computer science, anthropology and environmental studies.

Worse though there is a disturbing trend to lump “rural” into one homogenous mash. Mountain villages, desert oases, riverine deltas and forest hamlets are all places with distinctive digital challenges and potential that deserve to be treated differently.

Future research should prioritize:

- Creating a Digital Rural Tourism Index to monitor the performance of regions.
- Implementing RCTs examining interventions in digital literacy.
- Investigating ways to use blockchains and DAO models for fair revenue distributions.
- A study of algorithmic auditing in tourism recommendation systems.
- Culturally grounded UX/UI designs for indigenous and aged users.
- Evaluation of digital tourism infrastructure’s carbon footprint.
- Researching the resistance of local activist groups to cyberspatial colonization of rural areas.

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