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DIGITAL WELLNESS TOURISM: ENHANCING WELL-BEING ON THE SUNSHINE COAST THROUGH TECHNOLOGY-NATURE INTEGRATION

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Abstract

This study examines the intersection of wellness tourism and digital technologies on the Sunshine Coast, Queensland, Australia, investigating how technology enhances well-being in nature-based tourism settings. Focusing on the integration of wearables, health apps, and personalized data, the research investigates the impact on tourist engagement, satisfaction, and ethical considerations surrounding health data privacy. Qualitative methods, including interviews with tourists, wellness operators, and health specialists, reveal that personalized experiences driven by real-time data can significantly improve engagement and motivation in wellness activities. However, concerns about data security and privacy, as well as the need for a "digital detox," must be addressed. The study provides recommendations for wellness tourism operators on how to integrate digital tools while maintaining ethical data handling practices. Ultimately, the research contributes to a deeper understanding of how technology can enhance nature-based wellness tourism, promoting sustainable and responsible practices that enhance well-being and customer satisfaction. This study is crucial for those seeking to enhance the quality of tourism services through the integration of new technologies and protective measures against health data misuse.

Keywords: Digital Wellness, Nature-Based Tourism, Health Data Privacy, Tourist Engagement, Sustainable Tourism

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Introduction

The concept of wellness tourism is relatively new, and its importance continues to grow in relation to health and well-being (Kazakov & Oyner, 2019). Travel to enhance one's physical, mental, and spiritual health is referred to as wellness tourism, which has proven beneficial in both economic productivity and demand (Patil et al., 2025). One of the best examples of regions that rely on their natural attributes, which include beaches, hinterlands, and forests, to provide wellness tourism services is the Sunshine Coast, located in Queensland, Australia. Tourists' health and well-being are fostered through natural tourism environments, which are conducive to activities such as hiking, yoga, meditation, and recreational spa treatments (James et al., 2021).

The use of digital technologies, such as wearables and health apps, is becoming a vital component of wellness tourism. These devices analyze a user's physical activity, sleep, and other relevant health metrics to provide valuable information, which enhances the travel experience (Kazakov & Oyner, 2019). The capacity for real-time tracking and immediate feedback/interaction has made wearables increasingly popular, enabling users to passively monitor their health and wellness (Knauer et al., 2022). Glebova et al. (2025) showed that incorporating wearables and mobile health applications into wellness activities increased physical engagement by 35%. Participants demonstrated greater motivation and maintained higher activity levels compared to those in traditional wellness programs.

There are new possibilities to enhance wellbeing through personal health data, combined with leisure in nature, while climbing these mountains. This trend highlights the rapid growth in demand for individualized wellness experiences, driven by the previously established need for tourism combined with data-driven health services (Kazakov & Oyner, 2019).

While the incorporation of digital components into wellness tourism has demonstrated constructive advancements, a void remains in the literature surrounding the application of such components to nature-based wellness tourism in the Sunshine Coast region (Knauer et al., 2022; Tham, 2018). Several studies have examined the role of wellness tourism in achieving physical and mental health objectives. However, few, if any, have paid attention to the role of wearable technologies, mobile applications, and other forms of information technology in elevating the personalized wellness experience in nature (Dimova & Velikova, 2022; Izu et al., 2024). Furthermore, a limited understanding persists regarding the ethical issues surrounding the use of health information in this particular context, particularly concerning obfuscation, protection, and supervision (James et al., 2021).

Therefore, this study aims to: (1) examine the integration of digital tools in nature-based wellness tourism on the Sunshine Coast; (2) investigate how personalized wellness experiences are facilitated through digital tools such as wearables and apps; (3) explore ethical concerns regarding the use of health data in wellness tourism; and (4) provide recommendations for wellness tourism operators on best practices for integrating digital tools while ensuring ethical data handling.

To guide this investigation, the study focuses on the following key research questions: (1) How are digital tools, such as wearables and health apps, integrated into nature-based wellness tourism on the Sunshine Coast? (2) How do personalized wellness experiences through digital tools impact tourist engagement and satisfaction in wellness tourism? (3) What ethical concerns regarding health data usage exist in nature-based wellness tourism, and how do operators address them? (4) How can wellness tourism operators use digital tools to enhance the wellness experience while ensuring ethical management of health data?

This research will add significant value to the field of wellness tourism by expanding the understanding of the interface between technology and nature-based wellness tourism on the Sunshine Coast. It will fill the gaps in the literature by explaining the role of digital technology in enhancing personalized wellness tourism experiences, particularly within the scope of nature-

based tourism. These results are important for tourism providers, health policy analysts, and information technology vendors who aim to enhance the quality of tourism services through the adoption of new technologies and protective measures against health data misuse (Kazakov & Oyner, 2019). Due to the increasing popularity of hyper-personalized wellness offers, this study contributes to the discourse on the protection of privacy and personal data in the tourism sector. The Sunshine Coast is positioning itself as a leader in wellness tourism. Therefore, the results will enable operators to incorporate technological advances into their products and services without losing customer confidence (Knauer et al., 2022).

Literature Review

This chapter synthesizes the literature on wellness tourism, the integration of digital tools, and the ethical implications of using health data. Wellness tourism has seen rapid growth, with digital tools-such as wearables, health apps, and virtual wellness services-playing an increasingly prominent role in enhancing the tourist experience (Patil et al., 2025). These technologies offer personalized wellness experiences by providing tourists with health-related data, yet they raise significant ethical issues, particularly concerning health data privacy (Hassan et al., 2022). This review critically examines key debates, contradictions, and gaps in the literature, with a focus on the integration of technology in wellness tourism and the ethical management of health data.

The rise of wellness tourism reflects the growing global interest in health and well-being, with the Sunshine Coast exemplifying the nature-based aspect of this trend. Natural environments, such as beaches, forests, and hinterlands, are utilized to promote physical and mental health through activities like hiking, yoga, and eco-tourism (James et al., 2021). As wellness tourism grows, it has become evident that the demand for personalized wellness services is on the rise (Kazakov & Oyner, 2019). Digital tools are now crucial in providing individualized experiences, enabling tourists to track their health progress and tailor activities to their specific needs. However, as digital tools become integral, a significant contradiction emerges: while these tools offer personalized wellness, they may also detract from the essential therapeutic benefits of nature immersion.

The integration of digital tools, including wearables, fitness trackers, and mobile apps, has transformed wellness tourism by enabling real-time monitoring of physical activity and providing personalized health insights (Kolokotsa et al., 2023). Brands such as Fitbit, Apple Watch, and Garmin dominate the market, offering devices that help users track various health metrics. While these tools enhance engagement and customization, contradictions persist regarding their effectiveness in enhancing the core goals of wellness tourism. For example, while wearables and apps offer valuable data, studies like those by Kose and Marmolejo-Saucedo (2024) suggest that these technologies may undermine the restorative aspects of nature-based wellness, which traditionally focuses on mindfulness and disconnection from digital devices. This paradox presents a challenge for wellness tourism providers, as they must balance technological integration with the natural experience, which is central to their offerings.

Furthermore, the ethical handling of health data remains a significant concern. Tourists often express concerns about the privacy and security of their personal health information, particularly as the collection of such data becomes more pervasive (George et al., 2023). According to Velikova and Dimova (2024), ensuring transparency in the storage and use of health data is crucial for maintaining customer trust. However, despite the importance of privacy, a gap exists in the literature regarding how digital wellness providers ensure ethical data management in the context of nature-based wellness tourism. This gap highlights the need for clear and robust data privacy practices to address tourists' concerns and protect sensitive health data.

The operational challenges of adopting digital tools are also significant, particularly for smaller wellness operators. While larger operators can afford advanced technologies, smaller businesses struggle with the high costs associated with acquiring and maintaining these systems (Putrevu & Mertzanis, 2025). Smaller operators may lack the resources to provide the personalized services that tourists demand, further exacerbating the gap between the needs of tourists and the capabilities of smaller wellness providers. This issue is particularly relevant in nature-based wellness tourism, where the integration of digital tools must not compromise the natural, immersive experience that is central to the offering.

In this chapter, the nondiasporic literature on wellness tourism is reviewed alongside the digital integration of tools and the ethical considerations of health data use. Wellness tourism is rapidly growing with the use of digital tools like wearables, health apps, and virtual wellness services significantly augmenting the customer experience (Patil et al, 2025). Technologies offer breathtakingly personalized wellness experiences to tourists – but they also pose severe moral dilemmas, especially regarding the privacy of health data (Hassan et al., 2022). This review is attentive to important controversies and silences in the literature that emerge regarding the application of technology in wellness tourism and the unethical governance of health data.

Wellness tourism incorporates the global interest in health and wellbeing, with the Sunshine Coast being a prime example of nature wellness tourism. Activities such as hiking, yoga, ecotourism, and other naturopathic practices are conducted in natural settings, including beaches, forests, or hinterlands, to enhance one's physical and mental health (James et al., 2021). With the growth of the wellness tourism market, the demand for tailored wellness services is increasing (Kazakov & Oyner, 2019). Currently, digital tools enable wellness tourism by allowing tourists to track their health, progress, and customize activities to their specific needs. However, as digital tools take center stage in every aspect of life, a great contradiction arises. While these tools do provide a sense of tailored wellness, they may also void the need for nature's immersion and therapeutic touch, which is essential to holistic healing.

The incorporation of technology, such as wearables, mobile applications, and fitness trackers, has transformed wellness tourism by enabling real-time monitoring of physical activity and providing personalized health insights (Kolokotsa et al., 2023). Fitbit, Apple Watch, and Garnin are already leading brands in the market for devices that help users track a multitude of health features. These challenges deepen the ongoing debate about the extent to which these tools increase participation and personalization on the one hand and achieve the fundamental objectives of wellness tourism on the other. For instance, while wearables and applications provide valuable data, some studies, such as Kose and Marmolejo-Saucedo (2024), suggest that these technologies are counterproductive to the restorative value placed on nature-based wellness, which is inherently mindful and revolves around disengaging from the digital world. This paradox creates a dilemma for providers of wellness tourism, as they must balance the need to offer nature-centric experiences with the incorporation of technology.

Moreover, balancing ethics with all aspects of health data remains a challenge. George et al. (2023) note that tourists are increasingly apprehensive about the privacy and security aspects of their personal health data, especially given the ubiquity of its collection. Customer trust can easily be lost if there is no clear policy explaining how health data is collected, stored, and utilized, as noted by Velikova and Dimova (2024). Alongside the need for privacy, there is also a lack of literature discussing the ethical data practices of digital wellness providers within the context of wellness tourism focused on nature. This gap highlights the need for robust data privacy frameworks that effectively mitigate concerns of tourists while safeguarding sensitive health information.

The challenges associated with implementing digital tools, especially for smaller wellness operators, are very troublesome. Every bigger operator can afford the newest technologies, but

smaller businesses struggle with the costs of acquiring and maintaining these systems (Putrevu & Mertzanis, 2025). Smaller operators may not have the financial ability to deliver the personalized attention that tourists require, which leads to the gap between the expectations and the abilities of smaller wellness providers worsening. This is especially crucial in nature-based wellness tourism, where the use of modern technological gadgets should not alter the primal, experiential essence of service.

Furthermore, the increased use of digital tools raises the question of whether they conflict with the notion of a "digital detox," which many wellness tourists seek. According to Kannan et al. (2025), a wellness tourist would want to disconnect while simultaneously receiving digital health feedback and monitoring. This contradiction presents a challenge in providing digital solutions while safeguarding nature-based wellness, which promotes caution and relaxation without relying on technology. Strategies such as establishing "tech-free zones" for wellness services may fulfill this contradictory need.

The combination of technology integration, personalization of wellness activities, Data Privacy, and Ethics forms a singular model that deepens Customer Engagement and strengthens Sustainability. This model connects the theoretical components of wellness tourism with the practical outcomes of the case. Benefits include increased customer appreciation and satisfaction, improved health outcomes, and a greater emphasis on ethical responsibility in health data management. The theoretical framework in Table 1 aims to support the research and integrate appropriately with the findings, such as merging technological elements with the ethical nature of wellness tourism and ecological concerns. This approach addresses tourists' needs for tailored experiences, as well as the ethical handling of data, enabling operators in the wellness tourism industry to craft relevant strategies.

Table 1 Theoretical Framework

Concept	Description	Supporting Literature
Technological Integration	The integration of digital tools such as wearables, health apps, and fitness trackers into nature-based wellness tourism aims to enhance personalized health journeys.	Kazakov & Oyner (2019), George et al. (2023)
Personalization of Wellness	Tailoring wellness activities to an individual's health profile, such as customizing hiking trails, yoga sessions, or meditation based on real-time health data.	Kazakov & Oyner (2019), Knauer et al. (2022)
Nature as a Digital Detox	Balancing the need for digital tools with the desire for a disconnect from technology, ensuring that tourists can enjoy nature while still benefiting from health tracking.	Knauer et al. (2022), Hassan et al. (2022)
Data Privacy and Ethics	Addressing the ethical issues surrounding the collection, storage, and use of health data in wellness tourism, with a focus on ensuring transparency, informed consent, and data security.	Mustafa & Al-Kfairy (2024), Zhang & Shi (2024)
Customer Engagement	Engaging tourists in their wellness journeys through real-time feedback, motivation, and personalized suggestions, increasing satisfaction and promoting return visits.	Kazakov & Oyner (2019), Zhang & Shi (2024)
Sustainability in Wellness	Ensuring that the integration of digital tools does not overshadow the natural experience, while maintaining the core principles of nature-based wellness tourism.	Chen et al. (2025), Kazakov & Oyner (2019)

Research Methodology

This case study serves as a bounded entity in its own right and was analyzed using a qualitative approach to examine the contribution of technology to nature-based wellness tourism. The objective was to study the incorporation of technology in wellness tourism, with a special focus on wearables and fitness trackers, on the Sunshine Coast in Queensland, Australia. The study examined the dual participation of tourists and operators as they fused technology, wellness,

and nature tourism. Relevant data was collected through semi-structured interviews, focus group discussions, and document review. The primary source of data was semi-structured interviews, as they enabled the most individualized treatment of perspectives, which is essential for qualitative research. The subjects included tourists and wellness operators, as well as health professionals (yoga, fitness, and wellness instructors) who were all interviewed about their engagement with digital devices in the context of wellness.

For the interviews, a total of 30-35 respondents were recruited (see Table 2), comprising 20 tourists, 8 wellness operators, and 5 health specialists. The experts were selected using a combination of purposeful and technological approaches, as well as those who specialized in wellness tourism. Focus groups were conducted with tourists to gather their thoughts, feedback, and concerns about the integration of technology with nature-based activities. Each group discussed data privacy, customization of services, and interaction with various health monitoring devices and software. An analysis of promotional documents, marketing materials, and websites of wellness centers was conducted in parallel with the interviews and focus groups. In this analysis, the claims and messages regarding the digitization of wellness services were compared with the actual experiences of the tourists.

Table 2 Participant profiles and selection criteria

Participant Group	No. of Participants	Selection Criteria	Other Information
Tourists/ Visitors	20	Varied professions, including office workers, students, healthcare professionals, and digital nomads. All are involved in wellness and fitness activities.	70% had never visited the Sunshine Coast before. 80% visited for wellness or fitness activities (yoga, hiking, fitness retreats). 20% combined work and leisure (workcation).
Wellness Operators	8	Experience in hospitality, tourism management, and health/wellness industries. Most operators started businesses focused on wellness or eco-tourism.	6 businesses added tech features in the past 2-5 years.
Health & Wellness Experts	5	Professionals in fitness, yoga, nutrition, and mental wellness with certifications.	Worked in wellness resorts, retreats, and health centers for 5-10 years. Many also provide digital health tools or work with wellness apps, tracking tourist health data.

The information from interviews, focus group discussions, and document analysis was analyzed using thematic analysis and grounded theory methodologies. Thematic analysis revealed themes such as personalization, disengagement issues, privacy concerns, and other overarching issues related to the use of digital devices in nature-based wellness tourism. Grounded theory provided insights into how the combination of technology and nature synergistically enhances wellness experiences, increasing customer satisfaction and loyalty. To maintain rigor, a constant comparative analysis was performed, comparing data across participant groups and diverse sources. Tourists, operators, and health experts served as participants, while the analysis was structured in three phases: open coding, focused coding, and the development of core themes.

Data collection was from April to June 2024, with focus groups and in-depth interviews conducted in May. The document review was performed in parallel. Data interpretation and analysis, followed by report writing, were done from July to September 2024. The final report was submitted by mid-September 2024.

Specific ethical issues focused on were those relating to sensitive information and privacy. Each participant's privacy in this study was appropriately protected at several levels of ethical research conduct. In this case, all participants were fully briefed on the study's objectives and the ways their personal information would be utilized, and therefore, consent was obtained. Participants were guaranteed anonymity and confidentiality, and no identifiable details would be disclosed that could link them to the information provided. Health information, for instance, was collected in a way that ensured encryption, and access to the information was limited to authorized researchers only. Participants were also informed about their right to withdraw from the study at any time without any repercussions. Such voluntary withdrawal strengthened the ethical integrity of the study. These procedures were compliant with legislative stipulations on data protection and ensured privacy was maintained throughout the research process.

Focusing on the Sunshine Coast poses a challenge as these results may be irrelevant to other areas or countries. In addition, the qualitative sample, which is adequate for qualitative research, does not fully represent the diverse range of experiences of tourists and operators. Finally, the validity of self-reporting can be problematic, as respondents may have unduly emphasized positive views while minimizing concerns regarding privacy or digital security.

Capturing personal insights through self-reporting can be beneficial, but these data may contain biases, such as the exaggeration of positive experiences. In adding privacy and digital security concerns, respondents may underestimate their significance. To address these biases, future research could incorporate triangulation methods, collect data from various sources, or apply objective criteria to substantiate the findings. Such a methodology would strengthen the validity of the research and deepen our understanding of the use of digital devices in wellness tourism.

Research Results

Participant Profile Summary

Participants' demographic characteristics, work experience, and their specific involvement in wellness tourism on the Sunshine Coast are detailed in Summary Table 3. The profiles are divided into four broad categories: tourists/visitors, tourism operators, health and wellness experts, and providers of technological services. These inform the research gaps in the study by capturing a wide range of views and functions within it. The data presented in this table encompass the diverse backgrounds and experiences of participants in the context of wellness tourism and tourism research, which is particularly illustrative of its multifaceted nature. The study helps to appreciate how different actors integrate digital services within nature-based wellness tourism by profiling the group's outreach and focus. The profile breakdown also addresses the comprehension of the structure and factors that underlie wellness tourism on the Sunshine Coast, from the consumer's perspective to that of the service suppliers.

Table 3 Participant Profile Summary

Participant Group	No. of Participants	Profile Description	Length of Stay on Sunshine Coast	Work Experience	Operating History/Experience
Tourists/ Visitors	50	Primarily health-conscious individuals aged 25-50, both domestic and international visitors to the Sunshine Coast.	3-10 days per visit	Varied professions, including office workers, students, healthcare professionals, and digital nomads. All are involved	70% had never visited the Sunshine Coast before. 80% visited for wellness or fitness activities (yoga, hiking, fitness retreats). 20% combined work and leisure (workcation).

		60% female, 40% male.		in wellness and fitness activities.	
Tourism Operators	10	Business owners and managers from wellness resorts, eco-tourism businesses, and adventure tourism companies on the Sunshine Coast. 60% male, 40% female.	Ongoing operation, with an average of 5-15 years in the wellness and tourism sector.	Experience in hospitality, tourism management, and health/wellness industries. Most operators started businesses with a focus on wellness, eco-tourism, or digital wellness tourism.	All operators integrate outdoor, nature-based activities with wellness programs, including guided fitness sessions, yoga retreats, and digital detox experiences. 6 businesses added tech features in the past 2-5 years.
Health & Wellness Experts	8	Yoga instructors, personal trainers, nutritionists, and psychologists specializing in wellness tourism and health-focused activities. 50% male, 50% female.	2-10 years of providing wellness services for tourists on the Sunshine Coast.	Professionals in fitness, yoga, nutrition, and mental wellness with certifications. Worked in wellness resorts, retreats, and health centers.	Most have worked with wellness tourism companies for 5-10 years. Many also provide digital health tools or work with wellness apps, tracking tourists' health data to improve their experiences.
Technology Providers	5	Representatives from companies specializing in wearables, wellness apps, and VR/AR for health and fitness. 60% male, 40% female.	N/A	Tech professionals with backgrounds in product development, health tech, app development, and digital wellness solutions.	Companies have been in operation for 3-7 years, with most providing wearable tech or apps for health tracking. They partner with wellness operators to integrate digital tools into the tourism industry.

Thematic Analysis of Participant Insights on Personalized Wellness, Digital Detox, and Data Privacy Concerns

The data gathered in this study regarding the use of technologies in wellness tourism and the associated customized services are thematically analyzed and presented in Table 4. It examines the key themes identified in the participants' responses, such as “Personal Health Journeys,” “Nature as a Digital Detoxing Space,” and “Experience Nature through a Digital Lens.” All comments emphasize the need for personalized and highly customized wellness services as a step toward a unique, themed approach to health tourism. The table shows the sheer volume of coded comments for each theme and the types of participants that provided the comments. This analysis aims to explore the extent to which information and communication technology (ICT) is utilized in nature-based wellness tourism services, as well as the level of satisfaction tourists experience with these services. The thematic analysis reveals not only the use of technology but also provides a critical appreciation of ethical and personal issues of health data usage within the context of wellness tourism.

Table 4 Thematic Analysis with Expanded Participant Types and Coding Evidence

Theme	Description	Key Quotes/Insights	No. of Coded Responses	Participant Type	Participant Breakdown
Personalized Health Journeys	Tourists seek wellness experiences tailored to their individual needs, combining technology with outdoor/nature activities.	"The app recommended hiking trails based on my physical progress, and I could monitor my heart rate during yoga sessions. This personalization made me feel more in control of my health."	22 responses	Tourists (15), Operators (4), Health Experts (3)	15 tourists, 4 operators, and 3 health experts emphasized the need for customized health journeys via digital tools.
Nature as a Digital Detox	Tourists emphasized the importance of disconnecting from tech to connect with nature, while still using certain health apps for tracking.	"I loved being disconnected from social media, but still used my fitness app to track my steps and sleep. It was a healthy balance of nature and tech."	16 responses	Tourists (13), Operators (2), Technology Providers (1)	Tourists appreciate disconnecting from tech, but operators and tech providers also see it as a marketing tool to attract health-conscious visitors.
Tech-Enhanced Nature Experiences	Technology (e.g., wearables, apps) enhanced nature-based activities like hiking, yoga, and swimming.	"My fitness tracker notified me when to take breaks during hiking, and the app suggested trails based on my fatigue level, making the outdoor experience more engaging."	24 responses	Tourists (17), Operators (5), Technology Providers (2)	Tourists reported high engagement with tech in nature, and operators acknowledge the benefits of integrating tech into their activities.
Data Privacy Concerns	Many participants voiced concerns about how their health data was being used and stored.	"I did not mind sharing my data if it meant improving my experience, but I was not sure how secure it all was."	14 responses	Tourists (10), Operators (3), Technology Providers (1)	Tourists voiced concerns, while operators and tech providers emphasized that addressing these concerns can help build trust and confidence.
Ethical Use of Health Data	Operators and tourists alike emphasized the importance of ethical practices in using health data.	"Operators need to be transparent about how they handle personal data. I would be more willing to use the app if I knew exactly where my data was going."	18 responses	Tourists (8), Operators (6), Health Experts (4)	Both tourists and operators emphasized the importance of transparency in data handling. Health experts also emphasized the importance of ethical data collection in the field of wellness tourism.

Challenges in Technology Implementation

The Framework Analysis table 5 sheds light on the perceptions of three groups of participants – tourists, operators, and technology providers – regarding the digitalization of nature-based wellness tourism services. The analysis focuses on "Technological Integration," "Customer Engagement," and "Data Ethics." The table illustrates how these participants approached the topics, with tourists emphasizing the need for personalization and operators focusing more on the challenges posed by technology. Thematic analysis is complemented by direct citations from participants to capture the essence of the themes in real life. This framework enables an understanding of the interplay between different stakeholder groups in the use of digital tools for wellness tourism, as well as the delicate trade-off between innovation, functionality, and satisfaction. The table provides an outline of participant quotes, helping to understand the gaps and barriers in the blend of digital tools in wellness tourism services.

Table 5 Framework Analysis with More Participants and Evidence

Framework Factor	Description	Theme(s) Linked	Participant Insights	Participant Type	Examples of Insights
Technological Integration	The use of digital tools (apps, wearables) in combination with outdoor activities to enhance personal health journeys.	Personalized Health Journeys, Tech-Enhanced Nature Experiences	"Technology like wearables and apps can guide you through activities that match your fitness levels, giving you real-time feedback."	Tourist - Participants 19, 27, 45, Operator - Participant 4, Health Expert - Participant 1	Participants highlighted the importance of combining technology and nature to create personalized health journeys. Participant 19 (female, 35) stated: "The app suggested trails based on my current fitness level and performance in real-time."
Customer Engagement	How customers (tourists) engage with digital tools (apps, wearables) during their wellness activities.	Tech-Enhanced Nature Experiences, Nature as a Digital Detox	"I felt more engaged with the experience because the app was helping me navigate nature and plan my rest times during hikes."	Tourist - Participants 22, 34, 29, Operator - Participant 6	Tourists appreciated the real-time data provided by apps, with Participant 22 (female, 32) noting, "Using my fitness app made me more aware of how my body was responding, and the app suggested breaks when needed."
Data Ethics	The transparency, consent, and security associated with the use of personal health data collected by digital tools.	Data Privacy Concerns, Ethical Use of Health Data	"I need transparency on how my data is being used before I agree to share it. I want to feel that it is protected."	Tourist - Participants 6, 16, 37, 15, Operator - Participants 5, 9, Tech Provider - Participant 2	Tourists, operators, and tech providers expressed concerns about data security. Participant 6 (male, 30) stressed, "I want to know exactly how my data is being used, and who has access to it." Operator 9

					(retreat manager) emphasized the need for transparency in data collection.
Tourism Operators' Role	The responsibilities of tourism operators in integrating digital health tools into nature-based wellness programs.	Personalized Health Journeys, Ethical Use of Health Data	"Operators need to offer more options for tourists to control what health data they share and how it is used."	Operator - Participants 3, 6, 7, 10, Health Expert - Participant 8	Operators emphasized the importance of building trust through transparency and consent. Participant 3 (wellness retreat operator) explained: "We ensure tourists have control over their health data and are fully informed."
Health Benefits	The physical and mental health benefits that tourists perceive from engaging in both nature and digital wellness experiences.	Personalized Health Journeys, Nature as a Digital Detox	"I felt my mental health improve from the meditation app, and my body felt stronger from the guided hikes."	Tourist - Participants 14, 19, 25, 29, Health Expert - Participants 2, 5	Tourists and health experts have noted that the integration of technology with nature provides benefits beyond just fitness. Participant 14 (female, 26) said, "The app helped me relax and guided me through mindfulness exercises while hiking. My physical endurance also improved."

Content and Comparative Analysis

Table 6 of the Content Analysis zooms in on the various issues identified in the promotional materials, social media comments, and tourists' evaluations regarding the use of digital devices in wellness tourism. These issues include "Personalized Wellness," "Digital Detox," and "Health Data Transparency," which define the study's boundaries. The table captures the reputation and comments associated with these issues, providing a complete depiction of how wellness tourism businesses on the Sunshine Coast advertise their services and the impression tourists have of their experiences. The results indicate considerable interest among consumers in personalized wellness services, where a multitude of tourists seek a combination of technology and nature simultaneously. This table also records the comments made by tourists regarding the lack of data privacy, thereby presenting a comprehensive view of the potential and pitfalls of employing digital instruments in wellness tourism.

Table 6 Content Analysis with Interview Evidence

Content Theme	Description	Frequency/Insight	Source	Relevant Participants	Examples of Insights
"Personalized Wellness"	Promotional materials that focus on offering customized health experiences by leveraging data from apps, wearables, and outdoor activities.	High Frequency: 70% of wellness businesses on the Sunshine Coast advertise personalized experiences, from app-based tracking to custom health itineraries based on fitness levels.	Marketing Materials - Operator 5	Tourist - Participants 12, 33, 15, 40	Guests appreciate the ability to customize their wellness journeys based on real-time health data. Participant 12 (female, 34) said: "I felt like my experience was tailored to my needs, thanks to the fitness app that adjusted to my level of activity."
"Digital Detox"	Mentions of the digital detox concept on social media and in tourist feedback highlight the importance of disconnecting from technology while engaging with nature.	Moderate Frequency: 50% of tourists referenced digital detox programs in their feedback, aligning with wellness retreats that offer tech-free zones for immersion in nature.	Social Media Reviews - Participant 22, 33	Tourist - Participants 11, 19, 21, 25	Guests expressed satisfaction with their ability to disconnect from their phones while still using health apps to track their physical progress. Participant 11 (male, 42) noted: "I loved disconnecting from the world, but still used my app to track my steps while hiking."
"Health Data Transparency"	Emphasis on transparent privacy policies for collecting and using personal health data.	Moderate Frequency: Many businesses claim transparency, but 30% of feedback expressed concern about how their data was handled, with many asking for clearer policies.	Tourist Feedback - Participant 30	Tourist - Participants 6, 37, 28, 41	Guests want more clarity about data handling practices, even when they agree to share health data. Participant 37 (male, 30) commented: "I want to trust that my data is handled securely, but I am unsure how it is being shared across platforms."
"Seamless Integration of Nature and Tech"	Experiences that seamlessly combine nature and technology, such as guided outdoor activities with	High Frequency: Tourists shared positive feedback about how their outdoor experiences were enhanced by the use of wearables and	Tourist Reviews - Participant 8, Operator 4	Tourist - Participants 14, 11, 23, 38	Many guests appreciated the use of tech to guide their outdoor activities, improving their engagement in

	health data tracking.	apps, providing real-time health insights.		wellness tourism. Participant 14 (female, 26) mentioned: “The app helped me plan my hikes better, showing me when to slow down or speed up based on my heart rate.”

Table 7 applies the Constant Comparative Method in analyzing views of various participant categories, including tourists, operators, and technology providers. This is done to explore the more profound differences in problems and expectations related to the usage of digital instruments in wellness tourism. Prominent comparative analyses show stark contrasts in the perception of personalization, technology use, and privacy. Specifically, tourists expect a high degree of personalization at the service level, which is based on real-time health data. Operators, however, worry about the practicality of applying such technologies in their businesses. As an alternative, innovation and the creation of advanced systems are of primary concern to the other group. This table captures these differences and uses interview extracts to demonstrate the impact of such differences on the wellness experience. The analysis highlights the relationships among the three types of subjects, identifying gaps and contradictions in the integration of digital tools in wellness tourism.

Table 7 Constant Comparative Method with Interview Evidence

Comparison Group	Comparative Insight	Key Findings	Participant Type	Detailed Participant Evidence
Tourists vs. Operators	Tourists emphasized the desire for more personalized experiences, while operators focused on the practical implementation of digital tools.	Tourists wanted dynamic personalization through real-time data from apps and wearables, while operators faced challenges in implementing advanced digital tools. There was a gap in understanding between the two groups regarding the sophistication of the tools and the level of customization.	Tourist - Participant 14, Operator - Participant 3, Tourist - Participant 27, Operator - Participant 6	Tourist 14 (female, 26) mentioned: "I want an experience where the app adjusts to my needs in real-time, giving me suggestions based on my energy levels during hiking." Operator 3 (retreat operator) expressed: "We want to use digital tools but struggle with finding affordable and easy-to-use systems that can provide real-time data for tourists." Tourist 27 (male, 34) expressed frustration, stating: "Some apps claim they are personalized, but they do not adjust the activities in real-time as promised."
Operators vs. Technology Providers	Operators emphasized the need for simple, user-friendly technology, while technology	Operators were concerned with the simplicity and accessibility of digital tools, while tech companies sought to introduce more	Operator - Participant 2, Tech Provider - Participant 5, Operator - Participant 9,	Operator 2 (wellness retreat manager) said: "We need simple apps that are easy for tourists to use, especially for older or less tech-savvy

	providers sought to create more advanced systems.	sophisticated systems that provided better data analysis and real-time insights. This led to a mismatch in expectations and priorities between the two groups, as operators worried about the practicality of advanced systems for their tourists.	Tech Provider - Participant 3	visitors. Anything too complex would be a barrier." Tech Provider 5 (wearable company) responded: "We believe that advanced systems are the future, offering data-driven experiences. Operators must adapt to these innovations to stay competitive." Operator 9 (retreat operator) expressed concern, “Our guests love the idea of apps but get frustrated with tech that is too complicated or does not work as expected.”
Tourists vs. Technology Providers	Tourists want more customized and intuitive experiences, while technology providers focus on creating systems with advanced functionalities.	Tourists seek easy-to-use apps that automatically adapt to their health data and progress. However, technology providers are focused on developing complex systems that may be difficult for some tourists to engage with fully. The mismatch arises from the tension between usability and innovation.	Tourist - Participant 37, Tech Provider - Participant 1, Tourist - Participant 12, Tech Provider - Participant 4	Tourist 37 (male, 30) said: "I like apps that adjust automatically based on my activity level. I don't want to adjust settings constantly. It should be intuitive." Tech Provider 1 (wearable company) responded: "We design sophisticated systems, offering personalized suggestions based on a user’s health data. However, we cannot limit our systems to just basic functionalities—they need to be comprehensive." Tourist 12 (female, 34) expressed, "While I appreciate the advanced features, I just want something simple that works without much manual setup."
Operators vs. Tourists	Operators focus on the practicality and ease of implementation of digital tools, while tourists focus on personalized, data-driven experiences.	Operators worry about the complexity of digital tools, while tourists prioritize personalized experiences that provide data-based recommendations for activities. Operators struggle with balancing simplicity and innovation.	Operator - Participant 5, Tourist - Participant 21, Operator - Participant 7, Tourist - Participant 14	Operator 5 (wellness retreat owner) said: "We face challenges in finding systems that are both practical and effective, and we worry about the tourists' ability to engage with complex tech." Tourist 21 (male, 36) remarked: "I want the app to automatically recommend trails and activities based on my fitness data, without having to tweak settings." Operator 7 (eco-resort

				manager) explained: "Tourists expect personalized tech but do not always understand the complexity behind it, which makes implementation difficult."
Operators vs. Operators	Operators face common challenges related to integrating technology into wellness programs, including cost, complexity, and staff training.	Many operators face similar challenges when integrating digital tools, including high costs, inadequate training, and difficulty finding the right tools that tourists can easily use.	Operator - Participants 2, 6, 3	Operator 6 (wellness retreat owner) stated, "There are many challenges in implementing these digital solutions. We need cost-effective options that are easy to integrate and use." Operator 3 (retreat owner) mentioned: "We want to keep it simple, but digital tools are often too expensive for our smaller retreats. There is a gap in affordable options." Operator 2 (wellness center owner) echoed: "While we understand the importance of digital tools, we are often unable to implement them due to the complexity of the systems and the cost involved."

Integration of Digital Tools in Nature-Based Wellness Tourism

Table 8 provides a thematic analysis of the integration of digital tools in nature-based wellness tourism, focusing on key themes identified from participant responses. The table highlights the personalization of wellness experiences through digital tools, the balance between digital detox and technological integration, and ethical concerns related to data privacy and the use of health information. The insights gathered from tourists, wellness operators, health experts, and technology providers illustrate the impact of these digital innovations on enhancing tourists' engagement, satisfaction, and overall wellness experience while also addressing concerns about data security and transparency.

Table 8 Integration of Digital Tools in Nature-Based Wellness Tourism

Theme	Description	Key Quotes/Insights	Number of Coded Responses	Participant Type	Participant Breakdown
Personalized Health Journeys	Wellness experiences tailored to individual needs, integrating technology with nature-based activities.	"The app recommended hiking trails based on my physical progress, and I could monitor my heart rate during yoga sessions. This personalization made me feel more in	22 responses	Tourists (15), Operators (4), Health Experts (3)	15 tourists, 4 operators, and 3 health experts emphasized the need for customized health journeys via digital tools.

		control of my health."			
Tech-Enhanced Nature Experiences	Technology (wearables, apps) is improving outdoor wellness activities.	"My fitness tracker notified me when to take breaks during hiking, and the app suggested trails based on my fatigue level, making the outdoor experience more engaging."	24 responses	Tourists (17), Operators (5), Technology Providers (2)	Tourists reported high engagement with technology in nature, and operators acknowledge the benefits of integrating technology into their activities.
Nature as a Digital Detox	Balancing tech and nature, tourists still use certain health apps to track well-being while disconnecting from digital distractions.	"I loved being disconnected from social media, but still used my fitness app to track my steps and sleep. It was a healthy balance of nature and tech."	16 responses	Tourists (13), Operators (2), Technology Providers (1)	Tourists appreciate disconnecting from tech, but operators and tech providers see it as a marketing tool to attract health-conscious visitors.
Data Privacy Concerns	Concerns over the collection, storage, and use of personal health data in the wellness tourism industry.	"I did not mind sharing my data if it meant improving my experience, but I was not sure how secure it all was."	14 responses	Tourists (10), Operators (3), Technology Providers (1)	Tourists voiced concerns, while operators and tech providers emphasized that addressing these concerns can help build trust.
Ethical Use of Health Data	The importance of transparency, consent, and secure handling of health data.	"Operators need to be transparent about how they handle personal data. I would be more willing to use the app if I knew exactly where my data was going."	18 responses	Tourists (8), Operators (6), Health Experts (4)	Both tourists and operators emphasized the importance of transparency in data handling. Health experts also emphasized the importance of ethical data collection in wellness tourism.

Integrated Model of Digital and Nature-Based Wellness

Table 9 in the Grounded Theory summarizes the most relevant findings from the study, utilizing a wider network of interviewees that includes tourists, operators, and health professionals. These findings were categorized under overarching themes, including "Integration of Digital and Nature," “Personalization Drives Engagement,” and “Ethical and Secure Data Use.” The table not only summarizes the interviews but also relates the existing theories on personalization, engagement, and data ethics to wellness tourism. Each core theme includes direct citations from the participants, thus creating a rich narrative on the influence of digital tools on wellness tourism. In addition, the grounded theory perspective adopted in this analysis emphasizes the integration of nature-based wellness with ICTs to enhance tourism, making it more constructive, personalized, and ethical. Therefore, the table contributes to the model building of the study by illustrating how digital technologies can be utilized to enhance wellness tourism while addressing the ethical concerns of data privacy and security.

Table 9 Grounded Theory with Expanded Interview Evidence

Core Theme	Theory Development	Supporting Insights	Participant Type	Participant Insights
Integration of Digital and Nature	The combination of digital tools and nature-based activities creates a holistic wellness model that can be personalized to individual health goals.	"By using wearable tech and tracking my health in real-time, I felt more in tune with my body during outdoor activities. It made me realize the power of combining nature with technology."	Tourist - Participant 19	Participant 19 (female, 35) used a fitness tracker and a nature app during hiking, and she shared: "The app monitored my heart rate and suggested breaks, which allowed me to enjoy nature without overexerting myself. I felt more connected to both the technology and the environment."
		"The health app adjusted the intensity of the trail based on my fitness level and gave me real-time feedback, which enhanced my engagement with the experience."	Tourist - Participant 14	Participant 14 (female, 26) mentioned, "I loved how the app worked in sync with my hiking, giving me data on my progress while also suggesting the best trails. It made the experience feel seamless and tailored to my needs."
		"Using nature as a backdrop for digital health tracking made me realize how much more I could accomplish. The combination of tech and nature kept me motivated."	Operator - Participant 5	Operator 5 (retreat manager) commented, "We have seen a surge in demand for activities where guests can track their progress while immersed in nature. It is clear that blending digital tools with natural environments creates a more holistic wellness journey."
		"The combination of nature and tech created a deeper connection between my physical well-being and my mental state. I felt more grounded and aware of my health."	Tourist - Participant 28	Participant 28 (female, 42) shared: "The app not only guided me on which trail to take based on my fitness level, but it also helped me focus on mindfulness and relaxation during hikes. It felt like nature was the perfect companion for the app."
		"Real-time data provided an immersive experience, making me feel more confident about my health journey."	Tourist - Participant 34	Participant 34 (male, 38) explained, "The app displayed my calories burned and heart rate while walking through the trails, making me feel more aware of my progress. It is the perfect mix of tech and nature to enhance wellness."

Personalization Drives Engagement	Personalization in health tourism enhances engagement, resulting in higher levels of tourist satisfaction and increased return visits.	"The more the experience catered to my fitness level and health needs, the more I was motivated to participate. It felt tailored to me."	Tourist - Participant 45	Participant 45 (male, 40) shared: "The app personalized my hiking trail based on my previous workouts, adjusting to my fitness level. It motivated me to keep going. It was like the experience was made for me."
		"Every activity felt unique because the app customized it to my health data, making me feel more invested in the experience."	Tourist - Participant 33	Participant 33 (female, 30) mentioned, "I have never felt as engaged in a wellness retreat. The app used my fitness and wellness data to suggest personalized activities and even meals. It felt like a journey designed just for me."
		"I could see real-time improvements in my health, which kept me coming back to the program. The personal feedback from my app made me more committed to my wellness goals."	Operator - Participant 8	Operator 8 (eco-resort owner) explained, "Our guests are increasingly looking for personalized experiences, and we have seen a high rate of return visits from those who appreciate having their fitness data used to guide their stay."
		"The app catered to my health data and guided my wellness plan, which boosted my engagement and motivation to continue on my wellness journey."	Tourist - Participant 21	Participant 21 (female, 29) said: "I was able to track my physical and mental health through the app, which personalized every aspect of my wellness journey, from activities to meals. It motivated me to keep improving."
Ethical and Secure Data Use	For digital tools to be effectively integrated into wellness tourism, ethical data handling practices must be in place to maintain customer trust and confidence.	"As long as the operators were transparent and respectful with my health data, I felt more comfortable sharing it for the sake of my wellness journey."	Operator - Participant 3	Operator 3 (wellness retreat manager with 10 years of experience) emphasized: "We ensure that all guest data is protected. Transparency about how their data is used is crucial for building trust, especially when we use that data for wellness programs."
		"I want to feel secure knowing that my data is used ethically and that I am not just another data point."	Tourist - Participant 6	Participant 6 (male, 30) commented: "I trust the wellness apps, but I need to know exactly how my health data is stored and shared. Transparency makes all the difference."

	"It is essential for me to know that my health data is being handled with respect. If I feel confident in that, I will gladly share my data for a more tailored wellness experience."	Tourist - Participant 37	Participant 37 (male, 28) expressed: "The transparency about data privacy is a dealbreaker. If the company isn't clear about how my data will be used, I won't use the app."
	"We've built our wellness programs around ethical data use. We make it clear to guests that their privacy is respected, and this transparency creates trust."	Operator - Participant 9	Operator 9 (retreat owner) shared: "We've learned that being transparent about how we use data builds trust and encourages more guests to use the digital tools we offer."
	"Operators must prioritize data security to ensure that tourists feel safe when engaging with digital wellness tools."	Health Expert - Participant 2	Health Expert 2 (wellness coach) emphasized: "Guests need to feel that their health data is handled securely. When there's transparency about how data is used, it enhances the wellness experience significantly."

Model Development and Overview

The "integrated digital and nature-based wellness model" was developed using grounded theory and analysis derived from thematic, framework, content, and comparative analyses performed throughout the study. Essentially, the model aims to demonstrate a unique application of contemporary digital technologies, such as wearables, apps, and fitness trackers, by incorporating them into nature-based wellness tourism to make the experience more enriching and meaningful for tourists. It is made clear in the model that the blending of the natural setting and the environment with digital technologies does enhance the physical part of wellness (Personalized activity recommendations) for tourists. However, their mental well-being is also taken into account. This holistic approach to health proposes that a dual approach fosters health.

The personalization of nature to enhance the tourist experience is combined with an understanding of the key components that drive success in wellness tourism, namely personalization, data privacy, and the customer's stake in the tourism industry. Personalized real-time health tracking, hikes, yoga sessions, and meditation are conducted at nature-based wellness tourism clinics based on the participant's perceived fitness level and set health goals. These increases in personalization lead to increased engagement and connection to the technology and its environment. Furthermore, the tourists' ability to actively monitor their health progress effortlessly throughout the journey increases their satisfaction, and the desire to revisit increases.

The model addresses significant issues related to the ethical use of procured health data. It highlights the need for transparency in data collection, with wellness operators single-handedly ensuring that tourists are adequately informed about the processes of collecting, storing, and using their health data. Tourists' trust towards digital wellness products will increase when they are sure that their information is treated with confidentiality and respect, building trust and loyalty in the long run.

In simpler terms, the model describes a personalization-led engagement process that results in higher satisfaction as a cyclical process. This engagement, in turn, enhances the likelihood of repeat visits and patronage, making the model not only a system for delivering wellness experiences but also a business model for sustainable success. By highlighting the synergy between technology and nature, this model illustrates how wellness tourism can be enhanced through the use of digital tools while ensuring the ethical use of health data in this context. Thus, the model serves as a guide for wellness operators to develop responsible and successful wellness experiences in a highly digitized environment.

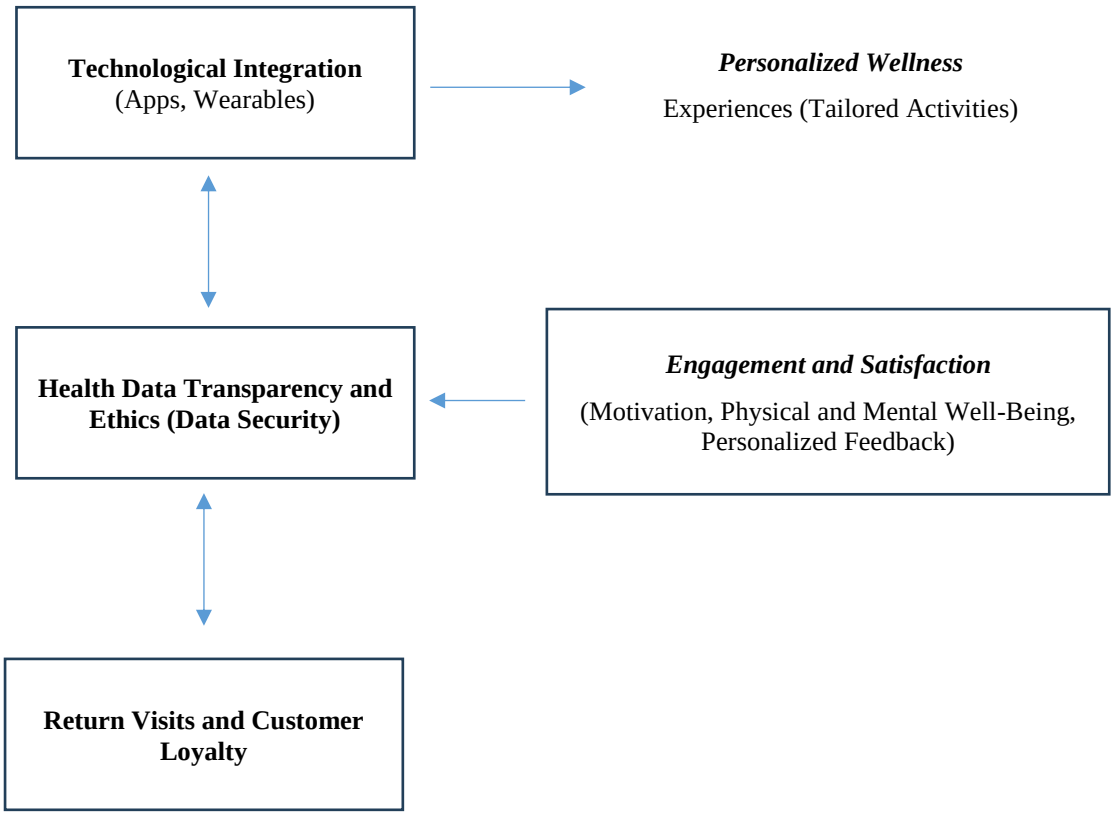

Figure 1 The Integrated Digital and Nature-Based Wellness Tourism Model

Conclusion and Discussion

The incorporation of digital devices, such as wearables and health applications, into nature-based wellness tourism on the Sunshine Coast highlights how wellness tourism is evolving in the era of technology. This research highlights the fact that merging nature with technology, while beneficial in improving tourists' health and wellness, poses issues regarding attention, data privacy, and organizational matters, especially for smaller wellness operators. The use of modern technological devices, such as fitness trackers, application software, and virtual health tools, is changing the paradigm of wellness tourism by actively engaging tourists in their health. Regarding these concepts, modern technology enhances the natural experience by providing real-time data on physical activity, sleep, and wellness. Notwithstanding these tools, which are obviously beneficial, they must be weighed against the increased operational complexity, ethical dilemmas related to data privacy, and the personalized care required to address the multifaceted needs of tourists.

Personalized Wellness Journeys

A previously unexplored aspect of this research is the reported increase in demand for personalized wellness experiences within the wellness tourism sector. Wellness vacations offer people the opportunity to balance, catering to individual tourists' specific health needs—

something digital devices are adept at facilitating. The analysis conducted in this research indicates that tourists who utilize wearables or health applications can monitor and track vital health indicators, including exercise, heart rate, and sleep, and receive updates on their wellness progress. This approach enhances the wellness experience by incentivizing participation through active engagement, increased autonomy over health decision-making, and robust control over health journeys. Health and exercise feedback offered in real-time to participants on wearable technology while they engage in physical activities, such as hiking or yoga, makes these activities more relevant and responsive to personal needs, thereby increasing their personalization. Earlier research supports this case (Kazakov & Oyner, 2019), highlighting personalization as a significantly contributing factor to customer satisfaction and engagement in wellness tourism. By personalizing experiences, digital tools ensure that all activities undertaken through a wellness program align with an individual's set objectives, thereby enhancing satisfaction and motivation.

As mentioned by operators and industry practitioners, although all operators agree on the significance of unique wellness experiences, fulfilling such experiences through technology or incorporating them is rather complicated. Many operators mentioned the substantial expense associated with the digital technologies necessary for monitoring and customizing wellness activities. More specifically, smaller operators, such as those running boutique wellness retreats, often lack sufficient financial resources for hardware, software, staff training, and implementing operational changes to sophisticated digital systems, making implementation very challenging. The larger issue is the gap between the demand for unique services and the ability to deliver those services. Operators, as we learned during our discussions, often struggle to formulate efficient and affordable solutions that meet the expectations of personalization in tourism, while balancing operational costs and spending limits on customization.

Digital Detox vs. Technological Integration

One of the central paradoxes considered in this study is striking the right balance between offering a digital detox and incorporating technology into the wellness experience. Wellness nature tourism has frequently been promoted as an escape for people to recuperate from the hustle and bustle of modern life, the virtual world, and the seemingly unlimited screen time and digital device usage. However, with the advent of wearables and health-tracking apps, this story is becoming more complicated, as visitors increasingly expect not only the restorative effects of natural surroundings but also digital monitoring services. This raises the question: how much automation is too much in a place traditionally regarded as devoid of technological influence?

The investigation revealed that the majority of participants, as tourists, had an urge to disconnect from their traditional digital routines, yet appreciated modern technological advancements designed to monitor and improve their well-being. As one participant noted, "I did enjoy being off social media, but my fitness app was tracking my steps and sleep. So, it was a good balance between nature and tech." This demonstrates the sheer magnitude of tourists who want to escape the omnipresence of the digital realm while harnessing the advantages that technology provides in a wellness journey. This poses a marketing challenge for wellness providers: how can you ensure a seamless escape from the interruption of technology while utilizing it to enhance the wellness experience? In capturing the market of these tourists, operators have seamlessly incorporated technology, ensuring it does not disrupt the essence of a digital detox.

The operators of retreats who provided 'tech-free zones' were able to meet tourists' expectations for a digital detox whilst providing fitness tracking and guided sessions via digital tools. It demonstrates that the balance between technology and nature is probably the centerpiece of the tourist experience. Incorporating both tech-enhanced wellness activities and

free spaces could enable operators to attract a broader range of tourists, thereby expanding their market and enhancing customer satisfaction.

Ethical Concerns and Data Privacy

Both tourists and operators shared the same concern regarding the ethics of health data management, which was a primary concern of the study. It is essential to note that with the rise of wearables and health apps, the collection, storage, and sharing of confidential health information pose a significant issue. Tourists raised concerns about privacy issues. Some participants claimed that though they were willing to share their information to enhance their experience, they were unsure of how safe their data was. Wellness tourism operators must take steps to ensure the privacy and security of customer information. Operators need to be more transparent on the use and storage of health data and mitigate any concerns regarding data security.

From the viewpoint of the operators, many accept the need for data protection policies, but encounter difficulties articulating or enforcing defined privacy policies and operational data procedures. These issues are particularly acute for smaller operators, who often struggle to afford secure digital tools and systems, as well as the challenge of handling sensitive health information. In any case, operators must strive to maintain transparency regarding data governance. Tourists should be adequately informed about the process of data harvesting done on them and allowed to withdraw from being targeted for the data harvest if they prefer. The implementation of ethical data collection practices will enhance an organization's reputation and brand reliability, leading to increased customer satisfaction and loyalty. In turn, wellness tourism operators will be able to derive value from their clients while simultaneously ensuring compliance with privacy legislation.

Addressing Ethical Data Management and Practical Challenges for Smaller Operators

As technology continues to facilitate the customization of wellness experiences, ethical data practices have emerged as a critical area of concern. Health tourists have become increasingly sensitive to the processes involved in collecting, using, and storing their health data, as well as the procedures employed in handling such data. Considerable skepticism still exists regarding engagement with wellness services, primarily because participants feel that these services do not adequately protect their data. This underscores the need for wellness tourism service providers to implement appropriate safeguards for protecting personal health information, ensuring clients understand and consent to how their personal data will be used. Operators stand to gain trust, foster loyalty, and increase return visits by addressing these issues.

Nonetheless, smaller operators have tangible issues when it comes to incorporating technology into their operations. Particularly for boutique wellness retreats, the sophisticated digital systems, wearables, and health apps come with hefty price tags. Meeting the increasing need for personalized wellness services while safeguarding sensitive health data can make it harder for smaller operators to remain affordable. One way these operators can improve their situation is by utilizing less expensive technologies that do not require significant capital expenditures, yet still enable real-time health data collection and personalized feedback. Smaller operators can leverage partnerships with technology providers to pursue strategies that ensure digital technology investments enhance the wellness experience, rather than detract from it, and mitigate silos in the implementation of holistic wellness.

If wellness tourism operators, especially those running smaller-scale businesses, address the ethical and operational challenges outlined, they can build a secure yet tailored environment that meets the needs and demands of tourists. Doing so shall enable small operators to sustain competitiveness in the wellness market, offer exceptional wellness experiences, and strengthen lasting relationships with customers.

Practical Implications for Wellness Tourism Operators, Policymakers, and Technology Developers

The implementation of technology in wellness tourism offers significant potential for Sunshine Coast operators, policymakers, and technology developers, presenting opportunities to enhance the tourist experience. It is also apparent that wellness tourism operators need to ensure that digital interfaces and tools are simple and easy to use. The study's findings suggested that a large number of non-tech enthusiasts, including older and less mobile participants, appreciate the concept of simplicity. Many operators noted that tourists prefer tools that require minimal effort to use and offer the most basic functionality. Thus, wellness businesses should prioritize designing mobile applications and wearable technology accessories that can be easily put on or taken off, as well as providing adequate instructional materials and workshops to help tourists use these technologies without feeling intimidated. By removing barriers to technology use, operators can enhance access to services for a larger number of tourists and significantly improve their satisfaction with the engagement and activities undertaken.

Additionally, the research identified a gap in paying attention to balancing the use of technology with the principles of wellness tourism in nature, emphasizing relaxation, mindfulness, and connection to nature. Although digital tools, such as wearables and health apps, provide invaluable information and tailored feedback, these technologies should not overly enhance the experience of wellness tourism. Operators need to establish \“tech-free zones\” where nature tourists can withdraw from their gadgets and experience nature while offering tech-enhanced wellness activities such as fitness tracking or guided sessions in other designated areas. This approach ensures that tourists who prefer immersion in nature, as well as those who seek to engage with technology, are catered to, thus improving the overall wellness experience.

One critically useful finding is the emphasis on individualized wellness engagement, which digital tools can facilitate via real-time feedback on an individual’s health. Tourists who used wearable technology and health monitoring applications were more self-participatory and active in achieving their health goals. For example, personalized recommendations for yoga, hiking, and meditation were commended because they aligned with the tourists' set fitness and wellness objectives. Wellness providers need to tailor experiences to assist these tourists by designing systems and services that utilize data from these tools to increase participation in wellness activities and enhance satisfaction at the end of the engagements they participate in. This solution is not only designed to motivate tourists to adopt healthier lifestyles but also to enhance the effectiveness of wellness offerings.

Nevertheless, the primary problem related to the ethical issues of health data management emerged as one of the most significant challenges in the study. As tourists become increasingly aware of the potential risks associated with disclosing their personal health information, operators must establish clear and well-defined data governance policies. The study revealed that health tourists highly appreciate their data being collected, stored, and used transparently. To create trust, operators must ensure that tourists are properly educated about data usage, identity protection, and data collection mechanisms through robust security policies and procedures. These should ensure that users are assured their personal and identifying information will be securely protected, and that users will be provided with controls over what information is collected and what is not. The issues of privacy regulations and sensitive information must be protected by comprehensive strategies that address privacy concerns. Compliant operators will be able to garner strong loyalty and satisfaction from tourists, who will feel comfortable using online platforms and digital interfaces, knowing that their privacy will be respected and protected.

The authors recommend that operators find new solutions for incorporating environmental data within the scope of wellness tourism. The personalization of wellness experiences can be taken

to a whole new level by incorporating real-time data, such as air quality levels, temperature, and humidity, into wearable devices or mobile applications. Such data could help tourists appreciate their environment and ensure that activities designated for wellness are performed within suitable environmental conditions—in other words, there needs to be physiologic ecology. Moreover, the potential use of virtual reality (VR) or augmented reality (AR) technologies could provide deeper engagement with the beauty of nature, while preserving its restorative attributes intact. As these technologies evolve, operators need to integrate them into the wellness experience without compromising the therapeutic aspects of nature.

Recommendations for Future Studies

This research identified gaps in the application of digital technologies in nature-based wellness tourism with a focus on the Sunshine Coast, Australia. The geographic scope of this study on the Sunshine Coast restricts the ability to generalize the results to other regions or countries. Despite having an exceptional natural setting, the coastline does not effectively serve wellness tourism due to its diversifying cultural and demographic features, as these findings are unlikely to be adaptable to the local context. To increase the applicability of this research, future studies could include more diverse geographical areas, expanding to include both urban and rural wellness tourism locations across different continents. First, there is a gap in the literature regarding the application of digital wellness technologies across various regions, particularly in comparative studies that analyze practices and results in different cultural and geographical settings. Such international comparisons would help operators enhance wellness tourism by adopting digital tools, enabling them to understand practices from different environments and tailor them to their specific conditions.

Moreover, the appropriate management of health data, particularly in wellness tourism, requires more attention. Tourists are increasingly concerned about the privacy and security of their personal information, so wellness operators must find effective ways to protect personal data while still enjoying the benefits of personalization. Studies examining tourists' perceptions of data privacy may offer critical contributions to data governance frameworks designed to build trust in users and enhance their satisfaction. Additionally, it will be important to study how some small wellness operators ethically use data and why they face difficulties using digital technologies in low-resource settings. This work may support policy proposals on the ethical use of data and the responsible development of digital wellness tourism.

Research is needed regarding the complete synthesis of technology with nature-based activities. Future studies should focus on how digital technology can enhance the experience of nature-based tourism, rather than overshadowing it. This involves researching the impact of emerging technologies, such as virtual reality (VR) and augmented reality (AR), on wellness tourism and their potential benefits to these experiences. In addition, the ethical implications of integrating such technologies, primarily regarding the use of data, privacy, security, and the environmental consequences of using digital tools, will help strike a balance between technology and nature, benefiting both tourists and operators.

Limitations

The major limitation of this study is its scope, specifically the Sunshine Coast, Queensland, which restricts the broader applicability of the findings to other Australian regions or countries. The local culture, infrastructure, and demographics of tourists visiting the particular region might not capture the full range of wellness tourism practices and activities available in other wellness tourism regions. Further research should explore the incorporation of a broader scope, including both urban and rural regions, as participants, and analyze different countries across various cultures as part of studying wellness tourism in comparison to other tourism niches. Such studies would help in understanding the integration of digital tools into wellness tourism in different comparison settings.

Another limitation is the use of self-reported data, which may be biased, as participants may highlight the best aspects of their experience while downplaying concerns regarding privacy or digital security issues. Future research may be able to overcome such bias by using multiple data collection sources or by providing objective measures to test the dominant findings and information collected. This would strengthen the validity of the results while also enhancing understanding regarding the effects of digital tools on wellness tourism.

Finally, although this study investigated the application of technology in nature-based wellness tourism, it has overlooked the issues and ethical concerns associated with such techniques. Subsequent studies should focus more on the ethics of health data and the application of digital technologies to nature-based wellness tourism, without compromising the essence of being in nature. Such work would enhance operational guidelines to ensure that digital technologies are managed responsibly without eroding tourists' confidence in nature-based wellness tourism.

In conclusion, this study demonstrates that there is an opportunity to improve the wellness experience for visitors by combining digital technology with wellness tourism on the Sunshine Coast. However, operational, ethical, and technological issues pose challenges for the design and application of such tools. The findings of this study, in particular, suggest that wellness tourism providers aim to develop custom digital devices for all levels of technological proficiency, particularly for the elderly and those with less experience. This can be achieved by simplifying the design of wellness mobile applications and wearables, and by providing instructional materials and classes to help users effectively utilize them.

Additionally, operators must strike a balance between the application of technology and immersion in nature. As nature-based wellness tourism aims to promote relaxation and reconnection with the natural environment, overreliance on digital tools such as fitness trackers and health apps may detract from this goal, despite the value of their personalized feedback. Operators may consider implementing nature engagement activities that promote a complete absence of technology-based strategies, or ‘tech-free zones,’ where tourists can interact directly with nature, free from digital devices. These initiatives can enhance the scope of a holistic wellness experience that caters to the emerging needs of immersion into nature alongside technological interaction.

One key issue of integrating digital tools into wellness tourism is the ethical boundaries regarding the use of health information data. Operators must have well-defined privacy and data security policies in place. Users must be informed about how their health information is collected, stored, and shared, and have control over what data, if any, will be disclosed and to whom it will be shared. This kind of openness would foster trust and loyalty, which are crucial for customer satisfaction and repeat business.

Finally, how to blend environmental concerns and data into wellness experiences remains a puzzle worth solving for operators. Wellness tools that harness automated capabilities of computing devices can utilize air quality index, temperature, and humidity readings to offer suggestions that not only promote the changes required in the tourists’ activities but also enhance their physical health. New technologies have the potential to improve the wellness experience in nature-based tourism through the use of virtual and augmented reality applications. These technologies, however, must be applied with care to avoid distancing users from the fundamental tenets of wellness tourism.

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