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BALANCING BYTES AND BEINGS IN TOURISM: QUALITATIVE PERSPECTIVE FROM TWO MEDITERRANEAN COUNTRIES

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Abstract

Integration of digitalisation and advanced technologies (D&ATs) has reshaped tourism business models, operational landscape, social interaction and behaviour, service delivery and tourist experiences. This qualitative study investigates different acceptance of D&ATs across two generational cohorts and transformative impact of technology on tourism. Based on a dataset of 27 interviews, the research engaged three stakeholder groups (scholars, representatives of public institutions and practitioners) across two geographically and culturally distinct nations: Slovenia and Montenegro. Data analysis was performed using content analysis, incorporating thematic coding and matrix-based techniques. The findings reveal that adoption of D&ATs in tourism is mediated by interplay of geographical context, local mentalities, cultural values, personal skills and motives, which often have more profound influence than mere generational affiliation. In this context, adoption of D&ATs aligns more with age-period-cohort model as with generational cohort theory. The study also points a tension between technological advancements and the preservation of human-centric nature of tourism. Yet, technology, while transformative, cannot replace authentic human interaction, particularly within segments of tourism where essence of tourist experience is linked to emotional engagement. Those insights offer implications for sustainable technological integration that preserves the human element of tourism.

Key words: tourism, digitalisation, advanced technologies, do-it-yourself services, transformation, generational cohorts

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Introduction

Digitalisation and advanced technologies (D&ATs) have been essential part of contemporary tourism for over two decades (Bekele & Raj, 2024). During the COVID-19 pandemic, service providers accelerated the adoption of technological solutions that minimized human presence in the sector (Stankov & Gretzel, 2020). They contributed to a faster digital transformation (Nourung & Rgavan, 2023) and promoted the efficiency, effectiveness, and affordability of technology-based solutions (Zupan Korže & Škabar, 2022). In certain activities, such as reservations and check-ins, 'high-touch' services have gradually been replaced by 'high-tech' ones (McDonnell, 2018). By extensively replacing human interaction with machines and technology, tourists have often been compelled to adapt to new conditions which required 'do-it-yourself' (DIY) services (McGuire, 2015) and 'contactless' interactions (Kim et al., 2021). The rapid pace and broad scope of technological advancement have often outpaced the ability of various tourism stakeholders to adapt mentally, physically, and culturally in ways that benefit them (Stankov & Gretzel, 2020).

For decades, the perception of services has largely been based on the traditional understanding of tourism as a service sector characterized by intensive human contact (Wei, 2020; Tussyadiah et al., 2020). Therefore, the widespread use of technology and the substitution of human labour with machines represent a major shift in the design of tourism services and in the perception of the tourist experience. Nonetheless, technology-based solutions are 'not for everyone's taste and are not suitable for every service environment' (Solomon, 2016, p. 179).

Certain tourist segments, such as younger tourists and business travellers, tend to be more receptive to technology than others, like older generations. To develop effective strategies, destinations must gain a nuanced understanding of technology acceptance across different traveller groups or segments (Sigliano, 2017). In tourism, segmentation commonly follows Kotler et al. (2006, 2017), with demographic variables such as age, life-cycle stage, gender, and income being most frequently used due to their ease of measurement.

This study employs age-based segmentation, also referred to as generational groups or generational cohorts. Specifically, it focuses on two key cohorts identified and profiled in research which are particularly important to tourism: baby boomers and millennials (Santos et al., 2016).

The study addresses two research questions (RQ):

- RQ1: How baby boomers and millennials accept and use D&ATs in tourism?
- RQ2: How D&ATs have changed tourism services and tourist experiences?

Although numerous studies on D&ATs have been published since the emergence of the millennial generation, Osei et al. (2020) highlight a research gap concerning the integration of D&ATs in tourism and hospitality. The extensive discussions on D&ATs at the International Tourism Exchange Convention (ITB Berlin) in March 2025 also underscore the enduring relevance of this topic and the need for further research.

This paper intersects two critical areas: tourism, one of the fastest-growing economic sectors globally (World Travel & Tourism Council, 2024), and D&ATs, which remain a key priority for the sector (OECD, 2022; Bekele & Raj, 2025). Given the growing recognition of the importance of D&ATs in tourism, there is a pressing need for a comprehensive understanding of their adoption's extent and nature (El Archi et al., 2023). This is the first study to explore diverse perspectives from three distinct stakeholder groups across two countries. It contributes to a holistic understanding of the dynamics intrinsic in the sector (Gorenak et al., 2024).

Theoretical framework

D&ATs in Tourism 4.0

Extensive research on digitalisation and advanced technologies in tourism began with studies on information and communication technology (ICT), focusing initially on e-tourism and later on smart tourism (Buhalis, 2020). Following the technological advancements of Industry 4.0, some researchers (e.g., Starc Peceny et al., 2019) have developed a framework for tourism's D&ATs, termed Tourism 4.0. Stankov and Gretzel (2020) describe Tourism 4.0 as a technology-driven transformation of the sector into a highly interconnected "phygital" system, a fusion of physical and digital environments. Pencarelli et al. (2019) characterize it as a new tourism value ecosystem built upon highly technology-based services underpinned by Industry 4.0 principles (such as interoperability, virtualization, decentralization, real-time data collection and analysis, service orientation, etc.).

Similar to Tourism 4.0, there is no universally agreed definition of the terms 'digitalisation' and 'advanced technologies' (ATs). Perhaps the most intuitive way to represent digitalisation is the shift from analog

to digital technologies (Bloomberg, 2018). Regarding ATs, authors most frequently reference artificial intelligence (AI), which is recently often viewed through the lens of large language models (Mich & Garigliano, 2023; Hyland, 2023), as well as mobile devices, smartphones, and smart wearables (Buhalis, 2020). They include blockchain technologies (Treiblmeier, 2022; Wei, 2022; Mujačević, 2024), virtual reality (VR) (Ahmet & Rifat, 2025), augmented reality (AR) (Neuburger et al., 2018; Nayar et al., 2018; Carreira Loureiro et al., 2020), Internet of Things (IoT), machine learning, big data, robotics, cloud computing, and the metaverse (Buhalis et al., 2023; Go, 2022; Ioannidis & Kontis, 2023). With some exceptions, most studies focus on conceptualizing individual AT, providing technical descriptions, exploring potential applications, or outlining research agendas.

Generational cohorts and D&ATs

Generational cohort theory has inspired academic research across various domains and countries (de Pelsmacker, 2024). The theory is based on categorizing individuals into groups according to their year of birth (Mannheim, 1952; Kim et al., 2022). Members of a generational cohort are exposed to similar historical, political, economic, and social experiences during their formative years, which distinguish one generation from another. Consequently, each generation presents unique challenges due to differing values, expectations, and beliefs (McKercher, 2023; Huyler et al., 2024).

The periodization and classification of generational cohorts are not universally standardized. One important generational group in tourism comprises individuals born between 1946 and 1964, commonly referred to as baby boomers (Santos et al., 2016; Kotler et al., 2017). The subsequent cohort, Gen X, less frequently emphasized in research, includes those born between 1965 and 1979. Following Gen X is Gen Y, or millennials who are defined as individuals born from the early 1980s to the mid-1990s (Kaifi et al., 2012; Santos et al., 2016; Kotler et al., 2017; Soman, 2022; Slack, 2022). Individuals born between 1996 and the early 2010s represent Generation Z.

Baby boomers and millennials are the most relevant generational segments identified and profiled in tourism due to their size and travel interests (Santos et al., 2016; Kotler et al., 2017). Baby boomers are historically significant for their demographic size and socioeconomic influence. With increased life expectancy, they remain physically active and continue to travel, showing preferences

for educational and culturally enriching experiences, as well as country tourism (Li & Hudson, 2013; McKercher, 2023). Early studies characterized them as digital immigrants (Prensky, 2001); however, over time, they have successfully adopted new technologies, though they remain less comfortable with them compared to millennials (Krishen et al., 2016).

Millennials have surpassed baby boomers in size (Kotler et al., 2017). Born during the early information age, they were initially regarded (before Generation Z assumed this identity) as digital natives (Santos et al., 2016). Krishen et al. (2016) describe them as confident, constantly connected, tech-savvy, and well-travelled. For millennials, holidays are an important life aspect. Having grown up with rapid, direct access to information via digital technologies (Jabłonkowska & Stankiewicz, 2020), they tend to have higher expectations than previous generations. Consequently, tourism must cater to them through mobile-first communication, real-time feedback, and digital storytelling (Gorenak et al., 2025). They are considered the most transformative force in contemporary tourism, reshaping how travel is marketed and consumed (Kabalova & Petru, 2021).

Where millennials grew up in an ever-evolving digital landscape, Generation Z has never experienced a world without technology (Slack, 2022; Kim et al., 2022). For this cohort, D&ATs are an integral part of life and identity (Baykal, 2020). However, Generation Z is not yet as significant tourist segment as baby boomers or millennials. Currently, studies on Gen Z are considered essential in modern work environment (Engström et al., 2025).

Although D&ATs have become indispensable in contemporary tourism, Kennedy (2023) argues that the rapid implementation of these technologies is heavily influenced by the promotion of the 'millennial myth,' recently extended to the 'Gen Z myth.' This myth assumes that all young people have grown up with technology and prefer to manage everything independently on their devices rather than interact with humans.

While generational cohort theory offers relevant insights, recent research suggests it is insufficient to rely on generational stereotypes. Asbury (2016) contends that generational differences more often reflect individuals' goal-directed behaviour, education, social status, and the developmental context of their country, rather than solely their generation or age. Kennedy (2023) further argues that tourists' expectations are more situational than generational. Regarding baby boomers' acceptance of D&ATs, it is important to recognize that this

cohort has also adapted to technology over time, learning to navigate it long before it became intuitive or 'plug and play.'

An alternative framework explaining generational differences is the age-period-cohort model (Fosse & Winship, 2019). This model posits that change over time results from a combination of age effects, period effects (changes due to events), and cohort effects (generational replacement). It is grounded in the concept of lifespan development (Staudinger & Lindenberger, 2003) and considers the influence of internal and external environmental factors on individual development.

Changes in tourism services and in tourists' experiences due to D&ATs

Tourism and hospitality settings have traditionally been characterized by intensive human contact (Carter, 2023; Tussyadiah et al., 2020). They are grounded in personal relationships and interactions (Zsarnoczky, 2018). Prior to the advent of ICT, travel trends and travellers' decisions were primarily shaped by a limited number of large international tourism and travel companies which offered mostly pre-designed tourism packages (ibid.). As the precursor to D&ATs, ICT expanded opportunities for many smaller tourism service providers and empowered tech-savvy travellers to design their own tailor-made experiences. This was a beginning of significant changes in tourism. Today, tourism markets and their actors, such as providers, stakeholders, intermediaries, and tourists, shape and are shaped by technology (Sigala, 2018).

Although D&ATs have introduced several positive advancements in tourism, Zarte et al. (2020) caution that an excessive emphasis on human-machine symbiosis can be problematic. Given the hedonic nature of tourism experiences, efficiency and effectiveness are less critical than in other service sectors. Rusu et al. (2020) argue that the hedonic dimension should complement the pragmatic use of D&ATs, often outweighing their functional utility. Due to the hedonic motivations and experiential subjectivity inherent in tourism, service design and experience evaluation must place greater emphasis on emotional and subjective facets (Tussyadiah, 2014). Since hospitality is fundamentally based on human interaction, the nature and frequency of these interactions reflect the level of service expected, which is often related to the price paid (Carter, 2023).

The human factor holds particular significance for customers involved in service production processes, especially in experience-based services like tourism (Bilgili, 2019). This creates a paradox: while

human-touch services rely on relational engagement, delivering services through technology that limits or eliminates human contact renders the experience transactional (Solnet et al., 2019). Kennedy (2023) expresses concern that tourism businesses' promotion of technologies as enabling more personalized services may, in reality, be primarily motivated by cost-cutting measures and reducing human contact rather than enhancing service quality.

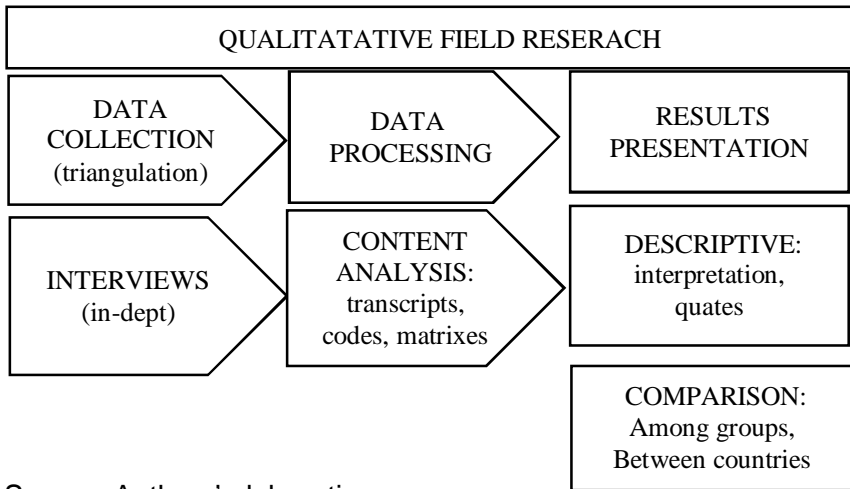
The shift away from human touch is particularly pronounced in hospitality, where personal interaction was formerly regarded as a key competitive advantage. Tussyadiah et al. (2020) warn that replacing employees with machines, intelligent agents, or robots alters the nature of the service experience and may provoke changes in tourists' attitudes and behaviours. While technology can deliver tourist services, genuine hospitality can only be provided by humans (Kennedy, 2023). Some researchers, such as Sigala (2018), fear that emerging tourist profiles may become physically and socially empowered, cognitively augmented, and psychologically affected by technology to such an extent that they evolve into 'techno-humans'.

Tussyadiah (2020) predicts that in the foreseeable future, ATs will increasingly dominate tourism. They will further reduce the need for face-to-face interaction between tourists and employees, as well as between tourists and residents, beyond current levels. In the researcher's most pessimistic scenario, this lack of socialization could lead to the erosion of shared values necessary for organized social life, diminishing concern for others and for the environment.

Research design and methodology

We determined that a qualitative research design would provide the most relevant answers to the RQ. Over the past two decades, qualitative approaches have gained attraction within tourism studies and their use is continuing to increase (Jabłonkowska & Stankiewicz, 2020; Frost and Frost, 2021; Pachlevan-Scarif et al., 2020; Airey, 2013). Corresponding methods and techniques were selected for each stage of the empirical research process, including data collection, data analysis, and result presentation (see Figure 1).

Figure 1: Methods and techniques for data collection, data processing and results presentation



Source: Authors' elaboration

Data were collected during field research in 2022 through interviews with participants from three distinct groups of tourism stakeholders (triangulation) in two countries, Slovenia and Montenegro (comparison).

The interview method was chosen as the most appropriate for data collection for three reasons (Hillman, 2022; Picken, 2017). First, in-person interactions in tourism provide the most effective means of obtaining relevant data. Second, qualitative research allows the researcher to understand data within its specific context, enabling interpretation that captures local meanings, an important consideration given the study's focus on two different countries. Third, the knowledge generated through this approach was expected to contribute to broader theoretical understandings of the phenomenon.

A triangulation approach strengthens the credibility of findings and is a fundamental criterion for assessing trustworthiness in qualitative research (Bans-Aukney and Tiimub, 2021; Decrop, 1999). One common triangulation technique involves conducting in-depth interviews with different stakeholder groups (Bhandari, 2022). To explore possible similarities and differences in responses to the research questions, three groups were selected: (a) tourism service providers (practitioners), (b) representatives of the tourism public sector, and (c) tourism scholars.

Each of these stakeholder groups contributes directly or indirectly to the tourism supply side. Scholars were included because they are responsible for educating tourism students to 'think with technology' and train them on techniques, issues, and methods related to the Tourism 4.0 framework (Billota et al., 2021). Public sector representatives play a role in designing and implementing tourism strategies at the destination level, while service providers design, deliver, and execute services in practice. Tourists will be the focus of subsequent research.

It was assumed that the three stakeholder groups might hold different perspectives on the topic due to their distinct positions in tourism, as well as their theoretical knowledge and practical experience. The selection of two countries aimed to investigate whether and to what extent perceptions differed across participants due to varying external environments. Slovenia and Montenegro, both relatively small geographically and situated near each other, differ in their state economic models and political approaches, socio-cultural contexts, and types of tourism offered.

Convenience sampling was used to recruit potential participants. Each invitee received a written invitation via email, detailing the research purpose, main interview themes, expected duration, the option to respond in writing as an alternative to in-person or video-conference interviews, and assurances of anonymity. All communications and interviews were conducted in participants' native languages.

The invitation was sent to ten representatives from each stakeholder group in each country. Anticipating that not all invitees would be available or willing to participate, a total of 27 interviews were completed: 15 in Slovenia and 12 in Montenegro. Of these, 18 interviews were conducted in person, three via videoconference, and seven participants submitted written responses by email.

Two open-ended questions, corresponding to the research questions, guided the interviews or written responses. All interviews were conducted by the first researcher, who possessed thorough knowledge of the research topics, extensive experience in interview facilitation, and adequate linguistic and personal competencies. Interviews lasted on average 20 minutes. Responses were recorded through detailed researcher notes and audio recordings; transcripts were prepared following each interview.

Transcripts and written answers were analysed using content analysis, a method commonly applied to explore various forms of human communication, including written documents, photographs,

and audio-visual media (Berg, 2009). Content analysis has seen exponential growth in tourism research since the early 2000s (Comprubí & Coromina, 2016). Coding followed guidelines by Miles et al. (2014). Given the number of interviews and the nature of responses, manual coding and matrix techniques were employed for further text analysis, conducted in several consecutive steps.

Based on the core themes of each research question, two thematic codes were constructed. In the first step, researchers individually reviewed transcripts and identified essential meanings related to each code. After reaching consensus on these interpretations, initial matrixes were created for each country. Codes were placed along the top horizontal axis, with stakeholder groups listed vertically; individual participants were represented by their initials within each group.

Next, condensed text segments corresponding to each code were transferred into these initial matrixes according to participant and theme. All researchers reviewed, discussed, and revised the matrixes as necessary. In a second step, the condensed texts were further distilled into phrases capturing their core meaning.

The findings are presented descriptively, primarily through interpretative analysis. Selected quotations highlighting unique or dissenting participant perspectives were included to emphasize nuances in the data. Comparative methods were applied in the discussion to synthesize insights.

Findings

Results are presented in three subsections: (a) demographic statistics, (b) analysis of interviews from Slovenia, and (c) analysis of interviews from Montenegro. The interview analysis follows thematic codes corresponding to the two research questions. The analysis begins with the scholars' group, continues with public sector representatives, and concludes with practitioners.

Demographic statistics

Demographic information about participants from Slovenia and Montenegro is presented in Table 1. Gender distribution in both countries is nearly balanced. More than half of the participants are between 30 and 50 years old. All scholar participants possess the highest academic qualifications, while the majority of other participants from both countries hold higher education or university-level degrees.

Table 1: Gender, age group and education level of participants from Slovenia (SLO) and Montenegro (MNT)

| Criteria Triangulation group | Gender | | Age group | | Education | | | | |
|------------------------------------|--------|--------------|-----------|--------------|-----------|--------------|-------------|----|----|
| | | N SLO MNT | | N SLO MNT | | N SLO MNT | | | |
| Scholars | M | 2 | 4 | > 30 y | 0 | 1 | vocational | 0 | 1 |
| | F | 3 | 0 | 30 – 50 | 3 | 0 | high/uni | 0 | 0 |
| | | | | < 50 | 2 | 4 | master, Phd | 5 | 4 |
| Public sector | M | 0 | 0 | > 30 y | 0 | 0 | vocational | 0 | 1 |
| | F | 4 | 3 | 30 – 50 | 3 | 3 | high/uni | 3 | 2 |
| | | | | < 50 | 1 | 0 | master, Phd | 1 | 0 |
| Practitioners | M | 5 | 1 | > 30 y | 0 | 2 | vocational | 1 | 3 |
| | F | 1 | 4 | 30 – 50 | 5 | 3 | high/uni | 5 | 2 |
| | | | | < 50 | 1 | 0 | master, Phd | 0 | 0 |
| TOTAL | | 15 | 12 | | 15 | 12 | | 15 | 12 |

Source: Authors' elaboration

Analysis of interviewees from Slovenia **Generational cohorts in tourism and D&ATs**

Scholars can be divided into two groups based on their perceptions of D&ATs across different tourism cohorts or generations. One group of interviewees argues that younger generations are more technologically skilled than older ones. They contend that younger individuals understand technology better, are quick adopters, and place greater trust in it. According to this view, younger people are "bored with services that involve human contact," whereas older generations prefer such interactions. The other group maintains that the difference is not age-related but rather depends on individuals' exposure to technology. They emphasize the importance of considering the social context that shapes generational values. For example, "baby boomers are nostalgic, they cherish the world they know and respect the past," whereas younger generations lack similar emotional ties. One interviewee questioned, "What will happen in the future with museums?". Additionally, some noted that when discussing D&ATs, "geography matters more than demography". Tourists from Asia and Japan tend to be more enthusiastic about technology than Europeans.

Representatives of tourism public institutions describe the younger generation as one that "lives with advanced technologies," "demands

increasingly sophisticated technology,” and “has a different perception of socializing” compared to older generations. Baby boomers are viewed as “less skilled with technology but able to cope,” often with “some assistance.” Emerging technological concepts such as the metaverse and digital footprints “frighten” them. Conversely, some interviewees argue that “demographic cohorts matter less than individuals’ skills.”

Most practitioners perceive D&ATs as the “domain of the younger generation, primarily those under 35.” They acknowledge a generational gap in use of ATs. Baby boomers tend to grasp technology mainly for personal communication purposes. Interestingly, one practitioner highlighted that “different tourist segments have different technology needs,” noting that “business travellers are more tech-savvy than leisure travellers.” The existence of “different trends in different parts of the world” was also emphasized. Furthermore, attitudes toward D&AT adoption depend on how advanced the technology solutions are; practical, user-friendly, and simple technologies tend to be more widely accepted than complex ones.

Changes in tourism services and tourist experiences due to D&ATs

From the scholars’ perspective on the change of services and experiences, “tourism services are evolving” due to D&ATs, and “different destinations may adopt different approaches” toward them. Tourists might “be served by robots,” stay in new types of accommodations, such as capsules, and “human presence is not always necessary.” Evidence of these changes includes the emergence of new professions, for example, the “instagram concierge,” and new tourist profiles, such as “SO.LO.MO. (social-local-mobile)” travellers. Services are greatly “enriched with additional information,” with increased emphasis on the “individualization of the tourist experience.” Perhaps the most visible changes have occurred in promotion and sales. D&ATs provide tourism businesses with opportunities to develop “new business models” and foster greater cooperation among suppliers. There is a growing focus on DIY services, which are not always detrimental; for instance, when “a human is reduced to data in a computer, the guest may be neglected.” Changes in tourism services due to D&AT implementation are inevitable but must be “systematic.” A “hybrid version of services should be available” in case tourists prefer not to engage with DIY solutions. Perceptions of service vary globally: “it

may be acceptable for a robot to serve coffee in China, but robots do not fit well with the culture of 'slow food' meals."

Interviewees from the public sector stressed that D&AT-based services in tourism are not suitable in all contexts. Given "a mix of people, services must remain mixed as well." While "some services do not require human presence, but artificial intelligence is inappropriate when tourists seek in-depth experiences." Robots may be "entertaining," but the majority of travellers "still desire human interaction." Emerging technologies such as the metaverse (including VR, AR, cryptocurrency, blockchain, and NFTs) will bring further changes, yet "due to our social instincts, we will not lose human contact." Current use of D&ATs has created a form of high-tech tourism service, but a parallel human-centred approach must exist to bridge gaps when tourists cannot or choose not to engage with technology.

Practitioners appear to be the strongest advocates for traditional human-to-human tourism services. They acknowledge that tourism "services have changed," but as "personal relationships diminish", tourists increasingly perceive an "absence of hospitality" in tourism. While hospitality is one of the "most conservative" subsectors, the human factor remains and will continue to be very important in services such as accommodation and food and beverage. It seems that traditional hospitality with a "human touch" will persist primarily in luxury segments, whereas budget and midscale services are evolving to incorporate selected technological solutions. Tourism should adopt D&ATs, but "with prudence," ensuring that service quality is not compromised. A hybrid approach is desirable, at least during a transitional period.

Analysis of interviewees from Montenegro **Generational cohorts in tourism and D&ATs**

Scholars unanimously agree that younger individuals are more active in the digital realm than older generations. While there may be differences in technical skills between generational cohorts, baby boomers have also embraced the advantages of digitalisation and advanced technologies (D&ATs), keep up with technological trends, and "are prepared to overcome tech barriers when they travel." Each generational cohort seeks different tourism experiences: "Younger tourists prefer adventures, whereas baby boomers seek cultural heritage and nature." It appears that younger generations rely more on technological solutions but tend to "avoid direct contact," not

revealing their true selves but rather presenting an idealized version on social media.

Public sector interviewees similarly emphasized that "the greatest differences in technology use stem from tourists' interests and skills, not their age." Echoing scholars, they noted that "younger people show little desire to converse; they use screens instead," often behaving mechanically. Younger tourists "embrace technological changes," while baby boomers have gradually adapted. Millennials consistently "seek entertainment and fun" and use different social media platforms (e.g., Instagram, TikTok) than baby boomers, an important consideration for tourism promotion.

Practitioners observed that baby boomers still prefer a "romantic and traditional approach to the tourism experience," such as manually reviewing menus rather than using QR codes. When traveling, baby boomers "use social media far less", while in contrast, younger travellers have a "strong need to share their experiences with others" through apps and social media. However, even among baby boomers, "in-person communication is decreasing," though not to the extent expressed by one younger interviewee who stated, "we don't want to use our brains, only our apps."

Changes in tourism services and tourist experiences due to D&ATs
Scholars identify three major factors driving the change of tourism services: the COVID-19 pandemic, staff shortages, and evolving consumer expectations often described as 'spoiled' behaviour. Tourists have become 'spoiled' in the sense that they "expect constant entertainment, which technology can provide." However, this does not imply that "robots can fully replace human interaction, particularly in hospitality," nor that personal contact will disappear. The pandemic has profoundly altered people's mindsets, with widespread adaptation to online formats. Staff shortages have compelled tourism service providers to increasingly adopt technology and introduce more DIY. An interviewee underscored that D&ATs have transformed perceptions of tourism services. The most significant change is the "reduction of in-person contacts and communication." Additionally, concerns were expressed about the rapid pace at which D&ATs are being implemented and is considered "too quick."

Public sector interviewees noted that "tourist experiences are primarily changing among younger demographics." Others perceived technology as potentially "interesting but only for a limited time." Representatives of public organizations further emphasized that

D&ATs have diminished “direct human contact” and contributed to “guest alienation.” They concurred with scholars that the pandemic catalysed both an increased technological trend in tourism and a reduction in human participation. Moreover, the pandemic serves as a salient example of human adaptability, while simultaneously highlighting that “suppliers, rather than tourists, are the primary drivers of these trends.” However, there remains a prevalent “mental preference among local populations for ‘old-tech’, being served by people rather than machines.” This preference manifests in the emergence of a “reverse trend: digital detox.” Importantly, destinations with hospitality deeply embedded “in their cultural identity will find it more challenging to replace human interaction with technology.”

Practitioners observe changes across the full spectrum of tourism services, “from transportation to accommodation.” A prominent example is the shift from on-site travel agents to online travel agencies (OTAs). A core concern among practitioners is the perceived “loss of hospitality.” The necessity of D&ATs and DIY services is attributed to the “short high season and staff shortages.” While D&ATs and DIY services may enhance “business efficiency,” they are “not always suitable for the tourism sector.” Interviewees reject solutions that prioritize cost savings through reduced employment, emphasizing that the “key component of tourism service, personal contact, must be preserved.” Maintaining hospitality as “a unique selling proposition of certain destinations” is considered essential. One interviewee highlighted that in tourism, “effectiveness and efficiency are often in conflict: although more can be done, the quality of services may decline.

Discussion

The analysis reveals substantial overlaps and some distinctions among participant groups in both countries on two research themes: how D&ATs are accepted and used across two main generational cohorts, and how D&ATs contribute to changes in tourism services and tourist experiences.

All participant groups in Slovenia and Montenegro perceive older generations, such as baby boomers, as less tech-savvy than younger generations but acknowledge their capacity for rapid adoption. Beyond age, participants emphasized other factors influencing technology use: individuals’ overall exposure to technology, technological skills, motivation, social contexts shaping his/her values, the geographic origins of tourists and the nature of

destination. Montenegrin scholars, more than their Slovenian counterparts, link different acceptance and use of technology to the distinct tourism experiences of generational cohorts (e.g., adventure and social media sharing versus nature, romanticism, and traditional face-to-face interactions). Slovene practitioners specifically associate technology use with tourist segments, noting, for example, that business travellers require more technological solutions than leisure tourists.

Comparison of empirical findings with existing literature reveals an evolution from the former belief that older generations are less tech-savvy and less prepared to adopt technology than younger people. The findings strongly support Asbury's (2016) assertion that generational differences in D&AT use largely result from individuals' goal-oriented behaviour, education, social status, national development, and situational contexts rather than generational identity per se (Kennedy, 2023). The standpoint of Montenegrin that younger generation avoids direct human contact can be aligned with Sigala's (2018) theoretical concept of techno-humans.

There is broad consensus, with some variation across groups and countries, regarding tourism service and experience changes driven by D&ATs. Most participants' views align with existing research indicating that tourism services and tourist experiences are now embedded in technology-dependent environments (Stankov & Gretzel, 2020). However, scholars adopt a more systematic and evolutionary perspective than other groups, with Slovene scholars also emphasizing that the pace of change varies by destination (e.g. China and Japan versus Europe) and by the nature of tourism services (e.g., DIY coffee versus slow food meals). Slovene public sector representatives emphasised that technology is not always an appropriate solution, especially when tourists seek in-depth experiences. While machines, such as service robots, can serve as alternatives in some contexts, people generally prefer to be served by humans.

All participants welcome new services, novel delivery methods, innovative business models, and the marketing contributions of D&ATs. They acknowledge their role in tourism transformation. Changes for tourists are especially evident in increasingly personalized experiences made possible by technology. Technologies may create authentic tourist experiences for specific segments, and in contexts where technology is rapidly adopted to meet the needs of both providers and tourists (Wart et al., 2018).

For most participants, the diminishing human engagement in tourism services is less concerning than the perception that the shift toward more DIY and technology-driven services is too rapid and unsystematic. This finding is aligned with Kennedy's (2020) observation that tourism is becoming technology-obsessed. Consequently, it is difficult for tourists to access live human assistance, when they need it.

Contrary to Slovenes, who view D&ATs in tourism primarily as a consequence of broader technological development, Montenegrins attribute changes in tourism services largely to the COVID-19 pandemic, staff shortages, and shifts in contemporary tourists' mindsets, including demands for instant service. They believe that technology suppliers, rather than tourism service providers or tourists, drive the D&ATs trend. Nevertheless, they firmly assert that human contact in tourism, especially in hospitality, must not disappear. Thus, Solnet et al.'s (2019) concern that hospitableness might be eliminated from tourism services may be overstated.

Practitioners in both countries are among the strongest advocates for human-to-human contact in tourism, as noted by Zsarnoczky (2018). Existing literature highlights that while reduced human interaction can increase efficiency and lower costs, it may undermine customer value if hospitableness is lost (Solnet et al., 2019). Practitioners in particular perceive major changes in the decline of personal relationships within tourism services, a loss of hospitality, and growing alienation. Slovene practitioners assume that traditional hospitality will remain predominantly in the luxury tourism segment, whereas it has nearly vanished in the economy and budget sectors.

Although D&ATs within Tourism 4.0 hold significant potential to enhance tourism services and tourist experiences (Buhalis, 2020), participants warn that they may also reduce service quality or threaten the essence of the tourist experience, similarly as Ivanov (2020) does. In subsectors such as accommodation and food and beverage, it remains questionable whether technologically mediated services can fulfil tourists' expectations for human-delivered hospitality (Solnet et al., 2019). Since tourism and hospitality are fundamentally based on emotional connections, kindness, welcoming, and respect (qualities found only in human interactions) a lack of personal engagement may lead to decreased tourist satisfaction.

There is broad consensus among participants that the future of tourism will neither be fully digitalized nor entirely traditional. Instead, it will require a balanced integration of technological efficiency,

human authenticity, and respect for geographical and cultural specificities.

Conclusion

Comparative analysis of interviews with scholars, public sector representatives, and practitioners in Slovenia and Montenegro provides valuable insight in two research themes. The first one is how two main generational cohorts in tourism, baby boomers and millennials, accept and use D&ATs (RQ1), and how D&ATs transform tourism services and tourist experiences (RQ2). Following McKercher's (2023) assertion that the nature of tourism evolves as successive generations mature and become dominant consumer groups, this study also intertwines generational cohorts and changes in tourism.

The findings partially confirm the assumption that members of different generational cohorts exhibit distinct behaviours, preferences and engagement levels with D&ATs in tourism. However, they also highlight the need for tourism studies to move beyond simplistic generational distinctions. Individual factors, such as digital skills, motives, and preferences, and contextual factors at the social (e.g., social status, country) and broader environmental levels (e.g., general trends, national development) are even more influential in determining technology acceptance than mere generational membership. The study emphasise that technology adoption in tourism is shaped not only by demographic factors but also by geography, local mentalities, technological skills of individuals, people's values, their travel interest which play a significant mediating role (answering RQ1). This aligns more with age-period-cohort model as with generational cohort theory per se. Therefore, a more critical and nuanced lens is required when examining inter- and intra-generational differences (McKercher, 2023).

Contemporary tourism services and tourist experiences are embedded in a technology-dependent environment and continuously evolve alongside D&AT development. However, the role of D&ATs is destination-specific and influenced by cultural identity, tourist expectations, and workforce realities. Nonetheless, D&ATs should not replace human contact in tourism services where authenticity and emotional connection constitute the core of the tourist experience (answering RQ2).

Those findings mostly align with existing literature that utilizing D&ATs is essential for tourism to adapt to a changing business environment (Noung & Ragan, 2023). Yet, human-to-machine

interactions challenge the traditional human-to-human channels that underpin tourism and hospitality. Therefore, serving tourists today and in the future requires balancing streamlined, technology-enhanced services with genuine human-to-human hospitality where interpersonal interaction makes a meaningful difference (Solomon, 2016). Thus, tourism and hospitality providers face the dilemma of optimizing a balance between tourists' expectations for relational, human touch and their desire for speed, cost-efficiency, and convenience offered by technology (Solnet et al., 2019).

Theoretically, this study contributes to the intersection of generational cohorts and D&ATs by empirically confirming widely cited yet previously under-validated findings in the literature. It also emphasizes the stronger need for interplay of demographic, cultural, and experiential factors in shaping tourists' engagement with technology. Furthermore, it underscores the importance of balanced hybrid service delivery models. These findings enrich the existing body of knowledge on the subject.

Several practical implications arise from this research. Since D&ATs implementation is often a strategic objective at the state level, policymakers should consider destination characteristics, key tourist segments, and overall service quality when determining the pace and scope of technology integration. Service managers should recognize that while technological solutions may improve operational efficiency, they may not appeal equally to all tourists.

This study has some limitations. First, the scope was constrained by human, financial, and time resources, which may have affected the diversity and size of the sample. Although a larger set of interviewees might have yielded different results, the quality of responses appears to outweigh quantity when compared with existing literature. Second, as a qualitative study, findings might differ if a quantitative approach were employed. Third, the subjectivity in qualitative data collection and interpretation was mitigated through careful methodological procedures, including consistent researcher involvement, independent data analysis followed by consensus, and expert knowledge in D&ATs in tourism. Fourth, respondent honesty may vary based on geographic and temporal context; findings might differ in other countries or destinations. Notably, fieldwork occurred just before the emergence of generative AI technologies (such as large language models including ChatGPT, Gemini, Copilot, etc.) and growing interest in the metaverse, which may influence future responses as D&ATs continue to evolve.

These limitations provide opportunities for future research. A follow-up study employing a similar thematic focus but potentially different methodology could target tourists in Slovenia and Montenegro to explore their acceptance of D&ATs and perceptions of how these technologies alter their experiences. Further research could extend to other destinations with distinctive tourism types or focus on specific tourist segments. Given the dynamic nature of D&ATs, longitudinal empirical studies would offer valuable insights into the ongoing impacts of emerging technological tools on sector.

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