The impact of sustainability, digital technologies, and employee knowledge on the competitiveness of personalized tourist offer

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Abstract

Purpose – The travel and hotel industry is undergoing significant shifts influenced by the digital revolution, evolving sustainable development practices, and changing tourist demographics. The primary aim of this study is to develop a theoretical framework that explores the interplay between digital technologies, sustainable development, and the customization of travel offers to meet the varied needs of different tourist generations (X, Y, Z). **Methodology** – The methodological approach of this paper involves a comprehensive literature review and theoretical analysis focusing on the impacts of digital technology adoption and sustainable development practices within the travel and hotel industry. **Findings** – The theoretical analysis revealed a significant potential for digital technologies and sustainability initiatives to improve the competitiveness of travel and hotel industry organizations. The findings suggest that a strategic emphasis on digital innovation and environmental responsibility, coupled with a focus on workforce development, can lead to more appealing and customized travel offers for tourists of various age groups. **Implications** – The travel and hotel industry must embrace digital technologies and sustainable development to remain competitive. The proposed theoretical framework lays the foundation for future research aimed at empirically testing these concepts and further understanding of customized travel offers in a digital and sustainable era.

Keywords: sustainable development, digital technologies, knowledge, tourism organizations, hotel industry organizations
JEL classification: D83, L83, Q01

Uticaj održivosti, digitalnih tehnologija i znanja zaposlenih na konkurentnost personalizovane turističke ponude

Sažetak

Svrha – Industrija putovanja i hotelijerstva prolazi kroz značajne promene pod uticajem digitalne revolucije, razvoja prakse održivog razvoja i promene turističke demografije. Primarni cilj ovog rada je da se razvije teorijski okvir koji istražuje međusobnu interakciju

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između digitalnih tehnologija, održivog razvoja i prilagođavanja ponude putovanja kako bi se zadovoljile različite potrebe različitih turističkih generacija (X, Y, Z). **Metodologija** – Metodološki pristup ovog rada obuhvata sveobuhvatan pregled literature i teorijsku analizu sa fokusom na uticaje usvajanja digitalne tehnologije i prakse održivog razvoja u industriji putovanja i hotelijerstva. **Rezultati** – Teorijska analiza je otkrila značajan potencijal za digitalne tehnologije i inicijative za održivost za unapređenje konkurentnosti organizacija putovanja i hotelijerstva. Rezultati indikuju da strateški fokus na digitalnim inovacijama i ekološkoj odgovornosti, zajedno sa fokusom na razvoj radne snage, može dovesti do privlačnije i prilagođenije ponude putovanja za turiste različitih starosnih grupa. **Implikacije** – Industrija putovanja i hotelijerstva mora da prihvati digitalne tehnologije i održivi razvoj kako bi ostala konkurentna. Predloženi teorijski okvir postavlja osnovu za buduća istraživanja koja imaju za cilj empirijsko testiranje ovih koncepata i dalje razumevanje prilagođenih ponuda putovanja u digitalnoj i održivoj eri.

Ključne reči: održivi razvoj, digitalne tehnologije, znanje, turističke organizacije, organizacije hotelijerstva
JEL klasifikacija: D83, L83, Q01

1. Introduction

Business is constantly changing due to technological advances and global market integration. Long-term changes necessitate business organizations to develop behavioral models to adapt and to expect these changes (Đorđević et al., 2016, p. 120). The global epidemic, the global crisis of the economy, challenging political changes, and natural disasters have hurt the global tourism economy in the early 21st century. The global economic crisis had the greatest negative impact on tourism development until 2020 (Peričić et al., 2021).

It will be difficult to rethink a major economic sector. However, it is well underway. The crisis has sparked creativity, while the pandemic has accelerated work transformation, creating challenges and huge opportunities to help more people benefit from tourism's restart. Progress is also being made in making tourism a key driver of the green, blue, and digital economy, ensuring growth without harming people or the planet (UNWTO, 2022a). The tourism industry faced serious challenges with unprecedented job losses. Tourism was one of the first sectors to be significantly affected by the pandemic. Measures across counties to prevent the spread of the virus nearly halted tourism worldwide (OECD, 2020a, p. 3). Sustainability is a top priority across all industries in the new global economy. As a global industry, tourism is important to promoting sustainability and holding unsustainable practices accountable (Sulyok et al., 2022).

The digital revolution is the most significant business trend of our time, challenging traditional work and communication methods. ICT is widely used in the hospitality industry, with solutions for sales, marketing, communication, forecasting, planning, procurement, and inventory control (Milovanović et al., 2022). The advent of digital platforms enabling travelers to organize, reserve, and exchange tips has introduced fresh obstacles for those in charge of destination management and promotion. Today, travelers who possess data, along with the platforms themselves, wield significant influence. At any stage–pre-trip, during, or post-trip–travelers have the capability to broadcast their experiences to an international community, thereby impacting the decisions of prospective travelers. Similarly, the entities that manage these platforms gain improved authority through this modern means of communication (World Bank Group, 2018a, p. 7).

This paper presents a theoretical model of how sustainable development, digital technologies, and employee knowledge affect personalized tourism offerings. The theoretical

section will examine the model's elements influencing personalized tourism offers: tourism and digital technologies, sustainable tourism development, new tourism employee knowledge, and hotel and tourism user experience personalization.

These are the research questions:

- How aware are tourism and hotel organizations of sustainable development?
- Do tourism and hotel organizations understand the key impact of digital technology implementation?
- In the tourism and hotel industry, how quickly do organizations adopt new knowledge and encourage employees to use it?
- How much do tourism and hotel organizations value personalized customer experience?

2. Literature review background

The pandemic has sharply reduced tourism, revealing flaws in tourism development models and the broader economy. Key recovery focuses include rebuilding consumer trust, reinstating business operations, ensuring safe travel, and securing financial support. Addressing workforce shortages and sector investment is crucial (OECD, 2022, p. 37). The sector must adapt to new consumer behaviors, such as demands for health measures, booking flexibility, and preferences for domestic and nature-based tourism (Dias et al., 2023). Innovation and digital transformation are vital. Tourism businesses should adopt digital tools to enhance customer experiences, improve efficiency, and provide timely information. This includes AI for personalized services, VR for pre-travel experiences, and data analytics for demand forecasting (Ratna et al., 2024). Public-private collaboration is essential for a resilient, sustainable tourism industry. Governments should provide strategic guidance and infrastructure investment, while private enterprises must innovate and adapt to be more flexible and customer-centric (Musleh et al., 2023). The UNWTO emphasizes that short-term recovery should not compromise long-term goals for a fairer sector, promoting ethical tourism during travel bans (UNWTO, 2022b, p. 19). The tourism industry, heavily impacted by COVID-19, affects economies, livelihoods, public services, and global opportunities. Revitalizing tourism is a chance to improve communities and businesses through innovation, digitalization, sustainability, and collaboration (UN, 2020, p. 2). The pandemic highlighted tourism's role in generating wealth through consumption, exports, and jobs (UNWTO, 2021, p. 21).

The sector suffered \$4.5 trillion in GDP losses and 62 million job losses in 2020. Governments and businesses took precautions, but consumer travel habits have changed, with concerns about costs and hygiene protocols (WTTC et al., 2021, p. 2). National lockdowns and travel limitations have positioned tourism as a highly affected industry (UNWTO, 2020, p. 4). Leveraging technology and digitalization can enhance tourism experiences, from contactless payments and digital health passports to virtual tours and personalized itineraries. Improved public transportation, like electric buses and bike-sharing, can offer green travel alternatives (Shafiee et al., 2024). Workforce development must integrate digital skills training, familiarizing staff with digital tools and platforms and offering ongoing professional development. Public-private partnerships can pool resources and expertise for innovative solutions and large-scale projects, creating digital platforms and supporting sustainable practices (Rajkamal et al., 2023).

Big data and analytics can provide insights into tourist behaviors for targeted marketing and personalized services. AR can enhance visitor experiences with interactive guides, and VR can offer virtual tours. AI can improve customer service with chatbots and virtual assistants, while machine learning predicts travel trends for optimized pricing. Blockchain can enhance

transaction security and transparency (Samaddar et al., 2024). Sustainability initiatives should include energy-efficient systems, waste reduction, water conservation, and supporting local economies (UNWTO, 2021, p. 21).

In 2023, high inflation and oil prices raised transportation and accommodation costs, hindering international tourism recovery (UNWTO, 2023, p. 4). Tourists are expected to seek value and travel closer to home due to rising prices and economic uncertainty. By 2022, many countries had long-term tourism strategies aiming for milestones in 2027 or 2030. For example, the US National Travel and Tourism Strategy 2022 emphasizes diversity, economic growth, job creation, conservation, and sustainability. Other nations like Australia, France, and Greece also introduced long-term tourism frameworks focusing on adaptability. The UK's post-pandemic goal was to return to 2019 tourism levels and improve regional distribution, business events, resilience, accessibility, and sustainability. Hungary updated its Tourism 2.0 Strategy in 2021 to respond to COVID-19, setting the stage for the National Tourism Development Strategy 2030. This global shift highlights a strategic pivot towards recovery, sustainability, and resilience in the tourism sector (OECD, 2022, p. 34). To address COVID-19's impact, the UNWTO identified priorities: ensure liquidity and jobs, restore safety and security confidence, public-private cooperation for quick reopening, responsible open borders, synchronized protocols, improved jobs with new tech, and focus on innovation and sustainability (UNWTO, 2020, p. 3). Economic, health, and geopolitical shocks may hinder tourism recovery in 2023. High inflation, interest rates, oil and food prices, and fears of a global recession are significant risks. The tourism and aviation sectors faced significant workforce reductions, disrupting air traffic (UNWTO, 2023, p. 2).

The current crisis underscores tourism's vulnerability without ongoing government assistance, presenting a pivotal opportunity for reevaluation. Governments should embrace digital advancements, transition to a low-carbon economy, and foster structural changes for a more robust, sustainable, and resilient tourism sector (OECD, 2020b, p. 5). The OECD's "Tourism Trends and Policies 2022" advocates for a shift towards a competitive, sustainable, digitally advanced, inclusive, and resilient tourism model. This approach emphasizes digital transformation, diversification, environmental sustainability, and data-driven policymaking (OECD, 2022, pp. 45–49). As society becomes more interconnected, customers' travel habits are changing, with a focus on family time, flexible travel, and safety. Last-minute bookings due to changing restrictions challenge demand planning. Building a workforce with digital and interpersonal skills and adopting technology can improve customer experiences and address staff shortages (Masiga, 2022). New trends identified by McKinsey & Company include personalized guest experiences, sustainability, and digital technologies and AI in business (McKinsey & Company, 2023, pp. 1, 5, 6). Hotels must focus on data to create unique guest experiences, sustainability, and improve employee working conditions. Initiatives may include alternative energy sources and encouraging sustainable travel through eco-certifications (Green Globe, Green Key). Digital technologies enable hotels to personalize services and improve customer experience, with generative AI enhancing booking and cancellation processes (Shin et al., 2023, p. 279). Adopting the latest innovations, like blockchain for transactions and AI for customer service, is crucial for the tourism sector's future (Rane et al., 2023). Sustainability remains a cornerstone, with renewable energy systems, smart waste management, and water-saving devices minimizing the environmental footprint. Data analytics plays a critical role in transforming the industry, enabling deeper insights into customer behaviors, optimizing pricing, and improving resource allocation (Kumar & Vohra, 2023).

3. Methodology

The review process included a qualitative analysis of literature in the domain of tourism and digital technologies, sustainable development in tourism, new knowledge of employees in tourism, customer experience personalization in travel, and hospitality. Credible journals were addressed through databases such as JSTOR, WOS, DOAJ, Xplore and KoBSON. The review process provided qualitative results. These results were used to develop a theoretical model for improving the Serbian tourism sector. The qualitative results are from credible journals. The review process protocol is presented on Figure 1.

Figure 1: Review process protocol
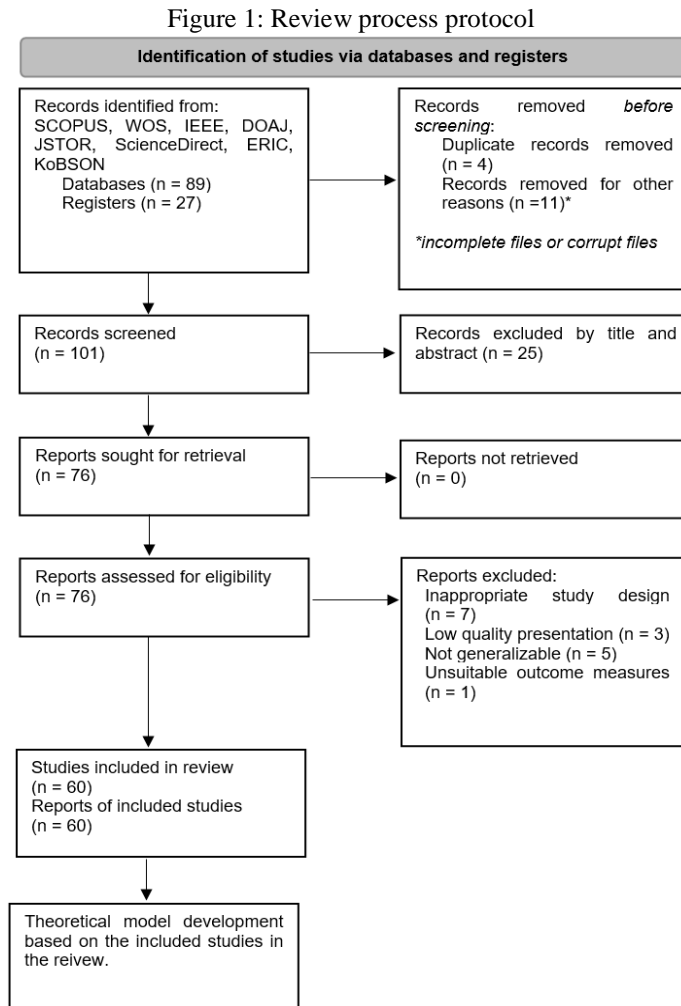
Source: Developed by authors

The review process began with identifying multiple eligible sources to ensure a comprehensive foundation. A detailed keyword search was conducted using terms like sustainable tourism, tourism development, ICT in tourism, digital tourism, and travel personalization. Relevant literature was saved for in-depth analysis, ensuring the research was based on a robust selection of scholarly works. An eligibility analysis determined which articles to include, considering source, date, study type, methodology, location, and

publisher. This rigorous evaluation ensured only pertinent and reliable studies were considered. Next, the relevancy and credibility of the studies were evaluated, excluding those lacking necessary criteria to maintain review integrity. Eligible studies were documented for further analysis. A qualitative analysis followed, where included papers were thoroughly examined, and results were recorded and organized into coherent paragraphs. The review process culminated in developing a theoretical model, encapsulating the relationships and dynamics identified in the literature, providing a framework to advance understanding in the field.

4. Results of the qualitative literature analysis

4.1. Tourism and digital technologies

The results are in the form of concise paragraphs that highlight the main finding or significant information from the study or in some cases multiple studies which are complementary when it comes to the findings. Each finding is labeled (TOU-01, TOU-02 etc.) so they can be presented on the theoretical model which will be developed. Qualitative results obtained in the domain of tourism and digital technologies are presented below:

- The evolution of technology has consistently been a companion to changes within the tourism sector. Numerous research studies indicate that the progression of Information and Communication Technology (ICT) can improve the appeal of destinations and cultural sites (Cuomo et al., 2021, p. 2). **Label: TOU-01**
- Current global tourism trends are inextricably linked to information technology and tourism sector digitization and transformation. Every global tourism market activity focuses on developing digital tourism services and products (Zvaigzne et al., 2023, p. 1). **Label: TOU-02**
- Digital and various other technologies are being widely adopted by a range of entities in the tourism industry, including destinations, travel agencies, tour operators, hospitality businesses, theme parks, museums, event planners, and other related organizations. These technologies are primarily employed to refine operational efficiency, improve engagement in the marketplace, boost competitiveness, and increase revenue streams. (Hadjielias et al., 2022, p. 4). **Label: TOU-03**
- The landscape of competition within the tourism industry has been significantly altered by the advent and evolution of Information and Communication Technologies (ICT). One of the most notable impacts of the Internet has been the direct marketing capabilities it provides to destinations, hotels, airlines, and other stakeholders (Buhalis et al., 2023a, p. 1). **Label: TOU-04**
- The "sharing economy" has increased homestays and accommodation options. Although homestays have existed since people began traveling, technological advances allow people to offer rooms to a global market. This innovation has shaken up the tourism and hospitality industry and added complexity to an already complex sector (World Bank Group, 2018a, p. 7). **Label: TOU-05**
- Digital media has streamlined access to information, thereby improving travel mobility. With just a few taps on a smartphone or clicks on a computer, global travel arrangements can be made effortlessly through online travel agencies (OTAs) such as Booking.com and Trivago, or through peer-to-peer booking platforms like Airbnb. These digital services allow travelers to effortlessly discover package deals, reserve flights, trains, and ferries, explore local attractions, monitor weather forecasts, and stay updated with local news (van Nuenen et al., 2021, pp. 120–121). **Label: TOU-06**

- The digital evolution in the tourism sector has given rise to new forms such as e-tourism, digital tourism, smart tourism, and virtual tourism, all of which are fundamentally rooted in the application of Information and Communication Technologies (ICT) in the realm of tourism (Verma et al., 2022, p. 2). **Label: TOU-07**
- Digital technology promotes tourism industry integration. It expands the tourism industry chain and it adds value to tourism services (Ye et al., 2022, p. 3). **Label: TOU-08**
- Most hotels have integrated their local and digital offerings thanks to technology. WiFi, preferably broadband, has become the norm in hotels, allowing guests to connect through multiple devices and apps for personalized room and hotel experiences. Tourist experiences are becoming more personalized, accessible, and omnipresent, replacing hotel-based ones (Gomes et al., 2023, p. 2). **Label: TOU-09**
- Technological advancement changes consumer behavior and how tourism and hospitality organizations (THOs) communicate with travelers. Technology is fueling business disruption as tourism and hospitality companies can use innovative solutions to reach potential customers and improve service and convenience (Yallop et al., 2023, p. 1). **Label: TOU-10**
- Recent discussions surrounding the digital transformation in tourism have highlighted significant shifts that have captivated the sector. These include evolving dynamics between demand and supply as well as innovative approaches to co-creating value (Massari et al., 2022, p. 1). **Label: TOU-11**
- The European Union's tourism transition pathway calls for digitization, AI, and data-driven decision-making (Litavniece et al., 2023, p. 1). **Label: TOU-12**
- Nine digital technologies that have disrupted hospitality and tourism business processes in the past and future can help meet new needs and are expected to remain influential (Cheng et al., 2023, p. 1947): collaborative robots, AI solutions, Big Data Analytics, Cloud-based solutions, Blockchain integration, VR/AR, IoT, Wireless communication with short range technologies. **Label: TOU-13**
- Robots can clean, disinfect, and assist workers. Hotels can improve customer service and stay competitive with AI and robotics (Cheng et al., 2023, p. 1947). **Label: TOU-14**
- However, alongside technological advancements, a key part in the adoption of social robots in tourism is how customers perceive them (Callarisa-Fiol et al., 2023, p. 3). **Label: TOU-15**
- Big data analytics improves hospitality business analysis and decision support by increasing data availability. Hotel operations, revenue, costs, and competitiveness can be optimized with big data analytics. Data-driven digital technologies include AI, cloud computing, IoT, and others (Cheng et al., 2023, p. 1947). **Label: TOU-1**
- Web search data, or "Big Data", provides time-series consumer and business data. This has enabled precise decision-making by registering the relative frequency of a search term, specifying geographic settings, and improving data granularity (Guedes et al., 2022, p. 4). **Label: TOU-17**
- Big data is transforming tourism organisations by providing insights into consumer behaviour, transparency, corporate value, and a competitive edge (Yang et al., 2023, p. 2). **Label: TOU-18**
- No time or boundary limits apply to hotel cloud-based big data. It collects hotel and tourism statistics and activity context. Cloud computing allows hotel big data analysis due to unique data integration compliance standards (Cheng et al., 2023, p. 1947). **Label: TOU-19**

- Blockchain technology lets travelers book tickets without paying intermediaries. Peer-to-peer transfers eliminate the need for a central server and give customers all the information they need for their trip (Kathuria et al., 2023, pp. 1–2). **Label: TOU-20**
- During the COVID-19 pandemic, the application of blockchain technology in tracking the food supply chain played an important role in improving the transparency of food safety (Cheng et al., 2023, p. 1947). **Label: TOU-21**
- There has been a noticeable uptick in the use of Virtual Reality (VR) within the tourism and hospitality sectors, aimed at presenting destinations in an immersive way and enriching the overall experience for tourists (Bogićevic et al., 2021, p. 1). **Label: TOU-22**
- Virtual Reality (VR) is transforming the tourism industry. The immersive and realistic environments created by VR enable travelers to preview and compare destinations before visiting, aiding in more informed decision-making and reducing hesitation towards unfamiliar attractions (Liu et al., 2023, p. 153). **Label: TOU-23**
- Some apps are tailored to offer an initial overview of a destination, while others focus on detailing attractions or improving the overall user experience. The most popular among these are apps that deliver real-time information about on-site amenities such as accommodation, transport, dining options, and recreational activities (Palos-Sanchez et al., 2021, p. 2). **Label: TOU-24**
- The hotel industry can improve customer loyalty and cut costs with IoT. Due to IoT and Internet 2.0 advancements, more people can express their opinions and give feedback about anything online, especially companies and administration (Rajesh et al., 2022, p. 2). **Label: TOU-25**
- Software-defined radio technology can provide ubiquitous connections and real-time synchronization for non-contact payment services via radio frequency identification (RFID) and NFC (Cheng et al., 2023, p. 1948). **Label: TOU-26**
- Technology and collaborative systems can improve the hospitality industry's internal and remote collaboration through mobile communication, online group chats, and video or text-based e-meetings, aiding in contactless operations and it can also improve hotel management efficiency (Cheng et al., 2023, p. 1948). **Label: TOU-27**

The enhancement of destinations and cultural sites through ICT (TOU-01) is part of the broader tourism digitization trend (TOU-02), moving towards an interconnected digital global market. This shift is supported by the adoption of various technologies to improve operational efficiency and customer experiences (TOU-03). Historically, ICT's impact began with Global Distribution Systems in the 1980s, evolving with the internet and mobile technologies (TOU-04). The sharing economy's impact on accommodations (TOU-05) shows technology diversifying the tourism market, while digital platforms now ease travel planning and booking (TOU-06). New tourism forms like e-tourism and smart tourism (TOU-07), along with tech-driven hotel experiences (TOU-09), illustrate a data-driven, personalized sector. Technological advancements influence consumer behavior (TOU-10), leading to innovative solutions that disrupt traditional models (TOU-11). The EU's push for digitization and data-driven decision-making (TOU-12) emphasizes a tech-centric industry. Digital technologies like AI, Big Data, and IoT (TOU-13 to TOU-16) have significantly impacted operational models and strategic directions, as seen in the food supply chain during COVID-19 (TOU-21). VR and AR (TOU-22, TOU-23) transform destination marketing and experiences, while mobile apps (TOU-24) and IoT (TOU-25) enhance customer service and loyalty programs. Technology also enables contactless transactions (TOU-26) and improves internal and remote collaboration (TOU-27), reflecting a trend towards operational efficiency and digital engagement.

4.2. Sustainability in tourism

Next, the qualitative results from the studies in the domain of sustainability in tourism are presented:

- Tourism, one of the world's largest industries, can reduce poverty, unemployment, and provide local businesses with sales opportunities (Vrontis et al., 2021, pp. 846–847). **Label: TOU-28**
- Sustainable tourism manages negative impacts on a destination's economic, environmental, and social elements to achieve sustainable development goals. Sustainable tourism development focuses on balancing the economic, social, and environmental impacts in both the present and future, while catering to the needs of visitors, the industry, the environment, and local communities (Nguyen et al., 2023, pp. 1, 3; WTO, 2022). **Label: TOU-29**
- Table 1 presents transformation of the term "sustainable tourism" into "sustainable tourism development". Regardless of the terminology used, all these interpretations equally emphasize the importance of demonstrating economic, social, and environmental balance in various areas over an unrestricted period of time.
- Sustainable development and tourism are linked. Sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Alternative tourism aims to reduce mass tourism and make it more sustainable (Alamineh et al., 2023, p. 2). **Label: TOU-30**
- Since tourism is one of the biggest resource consumers, this rapid adoption of sustainability measures may be the industry's response to global concerns about the trade-offs between tourism's positive and negative impacts on destinations (Tiago et al., 2021, p. 28). **Label: TOU-31**
- Sustainable tourism involves activities, management, and development practices that uphold the integrity of the natural environment, economy, and social structures. It aims for community welfare, economic progress, and public health. It benefits both locals and tourists, striving to improve residents' quality of life and protect their cultural heritage from both economic and socio-cultural standpoints (Li et al., 2023, p. 3). **Label: TOU-32**
- The capacity of the travel and tourism industry to draw foreign currency and generate employment opportunities has sometimes resulted in over-tourism. This excessive influx of tourists can detrimentally affect the local community, natural environment, and traditional cultures due to the unsustainable usage of resources (Mahendru et al., 2023, p. 3). **Label: TOU-33**
- The ongoing issues of global warming and climate change pose significant threats to our planet, impacting weather patterns and leading to extreme conditions like heatwaves, floods, tsunamis, and hurricanes. As a result, the tourism industry faces challenges such as reduced visitor numbers, increased instability, and potential business failures (Senbeto et al., 2023, p. 1). **Label: TOU-34**
- Tourism contributes to and is vulnerable to climate change. It's essential to speed up climate-responsive measures in the tourism sector to improve its resilience. To improve competitiveness and resilience, the tourism sector must go green for the planet and tourism (UNWTO, 2022b, p. 48). **Label: TOU-35**
- The UNWTO introduced the Glasgow Declaration on Climate Action in Tourism during COP26, representing the tourism industry's stance. This Declaration urges the tourism industry to reduce its emissions by 50% in the upcoming ten years and achieve net-zero emissions by 2050. Titled "The Glasgow Declaration: A Commitment to a Decade of Climate Action in Tourism", it presents a unified and clear strategy for

addressing climate change within the tourism industry over the next ten years, in line with scientific recommendations and the pressing need for immediate action (UNWTO, 2022b, p. 49). **Label: TOU-36**

- The One Planet Vision for the Responsible Revival of the Tourism Sector is founded on the UNWTO Global Guidelines for Restarting Tourism, which were published by the Global Tourism Crisis Committee on May 28, 2020, as a response to the COVID-19 pandemic. This vision outlines six key action areas to bolster the UNWTO Guidelines for Restarting Tourism, aiming to steer the tourism sector towards a recovery that benefits people, the planet, and prosperity alike. These areas are: 1. Public health, 2. Social inclusion, 3. Conservation of biodiversity, 4. Climate action, 5. Circular economy, and 6. Governance and finance. (One Planet Sustainable Tourism Programme, 2020, p. 6). **Label: TOU-37**
- One Planet Sustainable Tourism Programme accelerates sustainable consumption and production (SCP) in tourism policies and practices to combat pollution, biodiversity loss, and climate change. Three main intervention areas form the One Planet Sustainable Tourism Programme strategy: 1) Circularizing tourism plastics; 2) Integrating SCP into food value chains; 3) Accelerating climate action in tourism (Sustainable Tourism Programme). **Label: TOU-38**
- Many hotels have adopted sustainability initiatives, but some may have done so to gain a competitive edge. Due to tourist demand for environmentally responsible hospitality, hotels are trying to improve their reputations and customer loyalty (Singh, 2023, p. 4). **Label: TOU-39**

Tourism has significant economic impacts, including reducing poverty and unemployment (TOU-28). Sustainable tourism balances economic growth with environmental and social well-being (TOU-29). The shift from 'sustainable tourism' to 'sustainable tourism development' (TOU-30) addresses economic, social, and environmental needs. The industry's adoption of sustainability measures (TOU-31) aims to mitigate tourism's negative impacts on local destinations (TOU-32). Over-tourism (TOU-33) depletes resources and erodes cultures, highlighting the need for sustainable practices. Climate change (TOU-34) challenges the tourism industry, which must adopt climate-responsive measures (TOU-35). The Glasgow Declaration on Climate Action in Tourism (TOU-36) sets goals for emissions reduction and net-zero targets, emphasizing the industry's role in global climate initiatives. The One Planet Vision and Sustainable Tourism Programme (TOU-37, TOU-38) supports sustainable development goals, linking sustainable tourism to community, economic, and ecosystem health. Hotels adopting sustainability initiatives (TOU-39) respond to consumer demand for environmentally responsible practices.

4.3. New employee knowledge in tourism

In order to understand the connection between knowledge and tourism, studies in this domain were analyzed and the qualitative results are presented below:

- Knowledge is a key asset for tourism and hospitality companies, helping them gain a competitive edge and expand internationally (Abdollahi et al., 2023, p. 13). Authors (Ul Hameed et al., 2022, pp. 746–747; Chaudhuri et al., 2023, p. 283; Huang et al., 2021, p. 4230) point out a lack of knowledge in the field of ICT and digital technologies among employees, which enables the hospitality industry to more easily adapt to new customer demands. Also, Huang et al. (2021, p. 4230) identifies a lack of soft skills that are vital for hospitality organizations. By improving the knowledge of employees in the field of digital technologies, the hospitality industry is enabled to accelerate digital transformation and improve service quality. **Label: TOU-40**

- Employees in the hospitality sector encounter numerous obstacles and can err in managing customers and situations. Even with improved training programs, the hotel industry continues to experience a shortage of skilled workers. (Lan et al., 2023, p. 426). **Label: TOU-41**
- Staff shortages are a major issue for travel and tourism. Businesses and governments must implement and maintain labor mobility policies to prevent long-term shortages. Make work decent and offer competitive benefits. Develop and retain skilled workers. Promote sector opportunities. Improve cross-level cooperation. Use technology and digital solutions (WTTC., 2022, p. 10). **Label: TOU-42**
- Workers in the hospitality and tourism industry encounter substantial hurdles in career advancement. Professionals within the sector must develop more business-centric skills and competencies (Huang et al., 2021, p. 368). **Label: TOU-43**
- Analyzing and managing the workforce in the tourism sector emphasizes the importance of foundational skills and competencies at the entry level, important for understanding labor market dynamics and effective personnel management (Derco, 2023, p. 1). **Label: TOU-44**
- In today's digital era, it's essential for both organizations and their employees to possess a diverse set of knowledge and skills (Bubanja et al., 2022, p. 37). Bubanja et al. (2023, p. 49) argue that in the face of rapid changes and challenges, the competencies of staff are vital for companies aiming for agility and adaptability. **Label: TOU-45**
- As technology increasingly integrates into various job aspects, technological fluency becomes indispensable. Employees are expected to continually update their technical skills to keep pace with new digital tools and innovations (Hunag et al., 2021, p. 4216). **Label: TOU-46**
- Digital literacy, defined as the capacity for digital innovation, including proactive upskilling and reactive reskilling, is important for adapting to digital transformations. Improving employees' digital competencies is key to optimizing their use of digital technologies (Chaudhuri et al., 2023, p. 280). **Label: TOU-47**
- The pandemic-induced rapid virtualization of jobs has widened the digital skills gap, highlighting the necessity for internal digital training and pre-employment digital skill improvement (Carlisle et al., 2021, p. 1). **Label: TOU-48**
- The hotel sector's evolution towards incorporating advanced technology and smart services, like facial recognition and AI-driven solutions, signifies a shift towards labor-saving and improved management practices, revolutionizing traditional roles and cost structures (Tian, 2023, pp. 1–2). **Label: TOU-49**

The qualitative results pertaining to the knowledge domain in tourism form a narrative around the central theme of the importance of Information and Communication Technology (ICT) knowledge within the industry. This narrative is built upon the premise that knowledge acts as an important asset for tourism and hospitality companies, enabling them to compete on an international scale and adapt to customer demands (TOU-40).

The results show a correlation between ICT proficiency and the industry's capacity for innovation and service quality improvement. However, a notable gap in employees' ICT knowledge and soft skills has been identified, suggesting that these deficiencies could hinder the ability of hospitality organizations to keep pace with rapid market changes (TOU-40). This is compounded by the broader issue of staff shortages and the challenge of attracting and retaining skilled workers (TOU-41). There is a clear causal relationship between staff knowledge and the potential for growth within the tourism sector. The ability of employees to use digital tools effectively is directly linked to the operational efficiency and service

quality of hospitality businesses (TOU-40). Furthermore, staff shortages (TOU-41) and the need for more business-centric skills (TOU-43) suggest that professional development is not only a response to market demands but a strategic necessity for industry sustainability.

Professional advancement within the sector appears to be hampered by a lack of foundational skills and competencies among workers (TOU-44), indicating a disconnect between current employee skillsets and the evolving demands of the tourism labor market. The results also point to the need for agility and adaptability among staff, suggesting that the rapid changes and challenges faced by the industry require a workforce that is equipped with a broad spectrum of competencies (TOU-45). Technological fluency is highlighted as a critical skill in the digital era (TOU-46), and digital literacy is emphasized as essential for both current job performance and career progression (TOU-47). The COVID-19 pandemic has accelerated the transition towards digital operations and emphasized the digital skills gap, underlining the importance of digital training programs for employee development (TOU-48). The integration of advanced technology in the hotel sector, such as AI and smart services, is transforming traditional roles and necessitating new labor-saving and management-improving practices (TOU-49). This transformation indicates a causality wherein technological integration necessitates a workforce that is proficient in digital skills, thereby impacting traditional employment and management practices.

4.4. Customer experience personalization in travel and hospitality

Finally, customer experience and personalization in travel and hospitality was addressed. Several studies were analyzed and the qualitative findings are presented below:

- In the travel and hospitality domain, customizing customer experiences to align with individual preferences for transport, activities, and attractions at minimal costs is paramount. This necessitates a cohesive Tourism Supply Chain (TSC) that integrates service providers effectively (Piya et al., 2023, p. 2). **Label: TOU-50**
- Leveraging big data allows tourism and hotel businesses to tailor services, improving convenience and securing a competitive edge (Yallop et al., 2023, p. 4). **Label: TOU-51**
- Technology plays an important role in improving customer experiences, with hotels and hospitality businesses using social media and AI to personalize services based on detailed customer insights (Buhalis et al., 2023b, p. 702). **Label: TOU-52**
- A strategic approach to personalization involves engaging content, data collection, data unification, and detailed user analysis for segmentation, emphasizing the importance of feedback loops **Label: TOU-53**
- Digital advancements streamline customer interactions across sectors, eliminating inefficiencies in traditional service models, such as car rentals and hotel check-ins (Binggeli et al., 2023). **Label: TOU-54**
- Sharing information across digital platforms before, during, and after visits enriches the customer experience and facilitates user-generated content (UGC) and electronic word-of-mouth (eWOM) (Buhalis et al., 2023b, p. 708). **Label: TOU-55**
- UGC has become an invaluable travel research and brand marketing tool due to many factors and trends. The most influential are: Increased smartphone use; Increase in social media; Consumers distrust brand content; Content creation and publishing are simpler; UGC is led by millennials. Visual content growth and presentation. Increased UGC quality. Data in real time (World Bank Group, 2018b, pp. 18–19). **Label: TOU-56**

- The metaverse introduces a new dimension of value co-creation in virtual spaces, improving physical experiences through ambient intelligence (Buhalis, p. 2022, 16). **Label: TOU-57**
- Metaverses are new online environments where people can communicate differently and engage more deeply with digital content than before (Çolakoglu, 2023, p. 2). **Label: TOU-58**
- Gursoy expects Metaverse consumers to behave differently because they can access more virtual resources. The Metaverse is designed to improve travelers' experiences by providing immersive pre-trip experiences and augmented content during travel (Buhalis et al., 2023a, p. 2). **Label: TOU-59**
- Marriott Hotels' exploration of "teleportation" via virtual reality in 2014 exemplifies innovative approaches to destination marketing and customer engagement, offering virtual experiences that closely mimic physical ones (Buhalis et al., 2023b, p. 710). **Label: TOU-60**

The findings highlight a trend towards leveraging technology to create personalized, seamless service experiences in travel and hospitality. Traditional service models are being replaced by data-driven approaches. A cohesive Tourism Supply Chain (TOU-50) is essential for integrating service providers to deliver customized travel solutions efficiently. The use of big data to tailor services and enhance customer convenience (TOU-51) shows a direct link between data analytics and competitive advantage through personalization. Technology plays a crucial role in enhancing customer experience (TOU-52), especially through social media and AI, which provide detailed customer insights for service personalization. A strategic approach involving data collection, unification, and user analysis for effective segmentation is vital (TOU-53). Digital technology streamlines customer interactions and eliminates inefficiencies (TOU-54). Sharing information across digital platforms enriches the customer journey and promotes user-generated content (UGC) and electronic word-of-mouth, critical for tourism marketing (TOU-55). UGC is becoming mainstream (TOU-56) due to smartphones, social media, consumer skepticism towards branded content, and ease of content creation. Millennials drive this trend, marked by the rise of visual content and high-quality UGC. The metaverse introduces new value co-creation in virtual spaces, enhancing physical experiences (TOU-57) and facilitating unique communication and engagement (TOU-58). The metaverse is expected to alter consumer behavior by offering abundant virtual resources and enhancing travel experiences (TOU-59).

5. Theoretical model

Based on the results of the qualitative analysis, a theoretical model for improving the tourism sector and tourism sustainable development was developed. The model is generic in nature, and depending on specific goals and touristic location, it can be modified accordingly. The model is presented on Figure 2.

Figure 2: Theoretical model for improving sustainable tourism and development
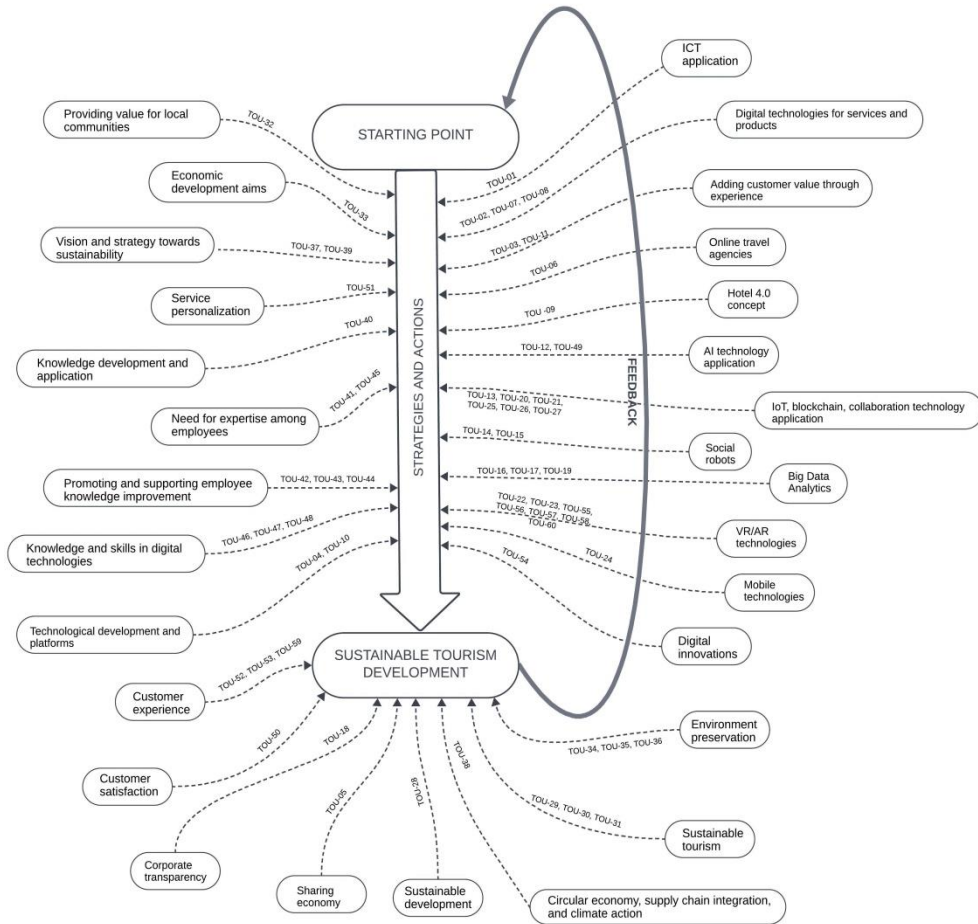
Source: Authors' research

The developed model presented in Figure 2 depicts a starting point and strategies and actions that were noted in the qualitative analysis. The labels (TOU-1, TOU-2…) correspond to the appropriate qualitative result. As sustainability is a continuous concept, the model includes a feedback loop, which is used for evaluation and optimization of actions and strategies. This way, continuous improvement cycles are ensured.

6. Discussion

Major hotel chains, travel agencies, and airports leverage the benefits of digital technologies to provide their guests with unique user experiences and to create tailored travel packages. According to (WEF, 2023), over 40% of processes in the accommodation, food service, and leisure industry are predisposed to automation and AR. While some jobs in the tourism industry continue to operate in a traditional manner (e.g., dishwashing, cooking, diesel engine specialists for buses and trucks, etc.), there are segments, such as travel agents, receptionists, and information officers, as well as front-line supervisors for food preparation and service, that have the potential for automation and expansion. Tourism and hotel companies fully embrace sustainable development. These organizations support environmental protection, biodiversity conservation, climate change, and circular economy

issues, as shown by the SDGs, Glasgow Declaration, and Paris Agreement. Mahendru et al. (2023, pp. 2–3) argue that the significant environmental footprint of the tourism sector has fueled the perception that its rapid expansion contributes to environmental degradation. This concern has catalyzed the push for sustainable tourism practices and the pursuit of Sustainable Development Goals (SDGs). In response, some governments have implemented regulations to curb the adverse socioeconomic and environmental effects of tourism development, whereas others have pursued strategies to further boost tourism and its economic contributions.

Global market trends, particularly highlighted during the COVID-19 pandemic, have demonstrated that only organizations with a well-trained and high-caliber workforce are capable of swiftly adapting to market shifts triggered by crises (Bubanja et al., 2023, p. 48). Tourism and hotel organizations faced two challenges. First, Covid-19 caused a shortage of employees across the industry. Second, employees must learn new skills. Tourism and hotel workers must be digitally literate due to rapid technological advancement. Training, requalification, and upskilling programs that teach new and improved skills for the travel and tourism sector, such as digital literacy, will help solve the talent shortage. Training must be ongoing and address current and future needs (WTTC, 2022, p. 8).

7. Conclusion

The tourism industry has encountered significant challenges in recent years that profoundly affected its operations. In tandem with shifts in the global market, such as the COVID-19 pandemic and the rapid development of digital technologies, new trends in tourism and evolving consumer relationships with the offerings of tourism and hospitality organizations have surfaced. Consumers have grown more demanding, with these expectations frequently tied to generational affiliations (X, Y, Z).

The tourism sector is committed to sustainable development, which serves as a fundamental component of its worldwide progress. Consequently, businesses within this industry are focused on fulfilling the Sustainable Development Goals (SDGs) by the year 2030. The authors in the paper offer recommendations for additional research in the studied area, which domestic tourism and hotel organizations need to adopt for a more efficient and competitive personalized tourism offer:

- How extensively do domestic tourism and hotel organizations apply digital technologies in their operations?
- Which are the most common skills related to the use of digital technologies that are necessary to apply in business operations?
- What is the level of digital literacy among employees? How is it evolving? To what extent do domestic tourism and hotel organizations prioritize professional development for their employees in this regard?
- To what extent do domestic tourism and hotel organizations consider and prioritize sustainable development? Are they guided by the principles of SDG 2030?

Conflict of interest

The authors declare no conflict of interest.

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