

Exploring the Role of Information and Communication Technologies in Co-creation Processes within Cultural Heritage Tourism

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Abstract. *This study examines the role of information and communication technologies in supporting co-creation processes within cultural heritage tourism experiences. While there is an increasing appreciation of the fact that digital technologies act as significant facilitators of interaction and value co-creation, limited attention has been paid to how these technologies are distributed across different stages and dimensions of the co-creation process and how they relate to citizen behavioral outcomes. In this study, a theoretical framework was used to investigate the presence of the digital tools in the process of antecedents, service encounters, and post-experience behaviors of a sample of tourism heritage experiences derived from an earlier systematic literature review. The findings show that the use of information and communication technologies in feedback co-creation forms and feedback behavior dimensions is prevalent but underutilized in earlier stages such as antecedents and enabling conditions for co-creation. Furthermore, these technologies are rarely used in co-design and co-production activities, despite co-production being the most commonly occurring form in the sample. This situation is also noticed in the citizen behaviors outcomes. Although advocacy is a common dimension in the sample, just a few examples were facilitated by digital tools. Overall, the results highlight a different use of digital tools across co-creation processes and suggest opportunities to increase digital engagement in heritage tourism. This study contributes to the ongoing discussion on the technology-enabled co-creation by identifying several gaps for future research.*

Introduction

The UNESCO Chair in ICT (2017) showed that the increasing integration of digital technologies into tourism has significantly changed how experiences are designed and assessed. In recent years, information and communication technologies (ICT) have played a central role as facilitators of interactions between tourists, service providers, and destinations, contributing to the view of co-creation as an important paradigm in tourism experience research (Guo et al., 2024). Within cultural heritage tourism in particular, co-creation is increasingly using as a complex and multiple stage process where visitors play an active role in the creation of values and memorable experiences (Minkiewicz et al., 2014; Boukas & Ioannou, 2020; Zhao et al., 2024).

Current academic literature emphasizes the ability of ICT to increase participation, engagement, and accessibility in the heritage context by enabling information exchange, interaction, and feedback at various stages of the visitor experience (Guo et al., 2024; Roque et al., 2024; Baker et al., 2022; Mele & Egberts, 2023; Masmoudi & Jmour, 2025; Pasandideh, 2024). ICT tools such as digital platforms, mobile applications, and social media have been widely associated with enhanced visitors' involvement and engagement after their experiences, making ICT as a key enabler of co-creation and citizens' behaviors in tourism (Boukas & Ioannou, 2020; Antón et al., 2018; Nobre & Sousa, 2022; Bonacini, 2018; Zhao et al., 2024).

Research on technology-supported tourism lacks a comprehensive account on how ICT supports different dimensions and stages of co-creation within cultural heritage tourism. Prior

studies focus mainly on ICT-enabled feedback mechanisms and post-visit interactions (Antón et al., 2018; Boukas & Ioannou, 2020), often overlooking earlier phases of the co-creation process such as antecedents and enabling conditions (Chiu & Huang, 2022; Roque, et al., 2024). Fewer studies showed that digital tools facilitated co-production activities (Anastasiadou & Vettese, 2019; Vegas et al., 2023) during the service experience, as well as supported advocacy behaviors (Trunfio et al., 2020; Bonacini, 2018) as part of the experience's outcomes. Against this background, the present study addresses the following research question: how does ICT support the co-creation of cultural heritage tourism experiences? Specifically, it examines where and how technology supports the co-creation of heritage tourism experiences.

Literature review

Co-creation in heritage tourism

The World Tourism Organization defines cultural tourism as a “type of tourism activity in which the visitor's essential motivation is to learn, discover, experience, and consume the tangible and intangible cultural attractions/products in a tourism destination” (UNWTO, 2019). They include cultural heritage along with other cultural manifestations.

Recently, international organizations have recognized the necessity of having guiding principles for well-planned and managed tourism projects which can contribute to safeguarding cultural heritage and sustainable development. In this regard, the ICOMOS International Charter for Cultural Heritage Tourism (2022) has put forward a set of seven principles oriented to: prioritizing heritage conservation, guiding tourism through informed planning, improving public understanding and the visitor experience, respecting community rights, fostering collaboration, strengthening resilience, and including climate and sustainability considerations.

Preventive conservation of cultural heritage involves a wide range of actions oriented to minimize the long-term deterioration of cultural assets, including an integrated approach and shared responsibilities among multiple stakeholders (Clark, 2000). In the same sense, the involvement of communities and relevant stakeholders in heritage decision-making and conservation actions as part of tourism heritage objectives have received special attention from scholars (Lusetyowati, 2015; Zhu & Salazar, 2015).

Value co-creation has emerged as a transformative approach that can contribute to the integration of tourism with the dynamic, inclusive, integral and sustainable processes conservation of cultural heritage. The concept of value co-creation is based on the idea that value creation occurs through the active involvement of multiple stakeholders, including local communities, visitors, institutions, and enterprises.

Co-creation was originally described as the collaborative creation of value between firms and a newly connected, informed, and active customers (Prahalad & Ramaswamy, 2004). Vargo and Lusch (2016) expanded this view within a broader framework of service-dominant logic, arguing that value is co-created through networks of multiple actors—including beneficiaries. All actors contribute with resources such knowledge and skills within service ecosystems framed by institutional arrangements such as norms and policies.

Drawing on the Experience Economy theory proposed by Pine and Gilmore (1998), Binkhorst and Den Dekker (2009) defined tourism as a relational network—human centered—of collaborative processes among different stakeholders engaged in shaping and participating in the co-creation of the tourism experiences.

Recent systematic reviews in tourism and hospitality have aimed to clarify the co-creation process and propose conceptual research frameworks. Ribeiro et al. (2023) developed a framework

that included antecedents, consequences, and mediating and moderating factors of value co-creation, distinguishing between individual and institutional outcomes. Carvalho and Alves (2023) defined key dimensions, drivers, and results of co-creation. According to Mohammadi et al. (2021), a model was introduced that includes antecedents, process, and outputs, all of which are determined by the context. The authors proposed three dimensions of co-creation: feedback, co-design and co-production forms, each one related to prerequisite forms, such as involvement, engagement, and participation, and also to different efforts required from customers (low, medium, and high).

Co-creation of value in heritage tourism

Within tourism heritage, Minkiewicz et al. (2014) found that visitors at heritage museums actively co-create their own experiences, along with deriving value from this engagement. Both drivers and barriers for co-creation have been identified by the author, and co-production was explained in terms of the visitors' active participation in activities during the consumption process, emphasizing their tangible, hands-on involvement.

The review of cultural heritage information practices conducted by Zhao et al. (2024) views value co-creation as an approach and process that facilitates sustainable heritage preservation, transmission, and utilization. This is achieved by collaborative information behavior among multiple actors, involving common resources and skills while developing open cultural heritage ecosystems that leverage digital technologies. Similarly, Boukas and Ioannou (2020) argued that the co-created experiences of visitors at cultural heritage destinations could contribute to sustainability.

Value co-creation was identified in different heritage tourism contexts, including museums (Boukas & Ioannou, 2020; Trunfio et al., 2020; Roque et al., 2024), tangible heritage sites (Tully & Allen, 2017; Ross, 2020; Liang et al., 2024), and intangible heritage experiences (Chiu & Huang, 2022; Vegas et al., 2023; Masmoudi & Jmour, 2025).

Information and communication technologies (ICT) in co-created heritage tourism experiences

The use of ICT in the tourism sector contributes to the enhancement of accessibility, participation, and learning towards sustainable heritage. The USI UNESCO Chair resumed how ICT can be used for developing and promoting sustainable heritage tourism. They detailed the following aspects: the enlargement of access, the enrichment of better experiences through informal learning and gamification, the connection between stakeholders involved in digital storytelling and awareness campaigns, the disintermediation of some relations between stakeholders in favor to benefit local communities, and the education of tourism operators (UNESCO, 2017).

Guo et al. (2024) noted that development in technology and use of digital platforms have transformed the tourism co-creation experiences. The authors proposed a framework for co-creating experiences employing augmented reality. They identified factors that affected each phase of the co-creation experiences, before, during, and after visitation, and concluded that augmented reality's psychological involvement, awareness, knowledge, and social connections formed before the visit contribute to strengthening the overall co-creation experience. At the same time, real-time storytelling, interactive engagement, and emotional connection enhanced the experiences during and after the visit.

The power of change through technology was addressed through a study conducted by Cao et al. (2024), which examined the effects of virtual reality and augmented reality in an urban setting. It was found that there were higher levels of satisfaction and transformation in the involvement of

the audiences with cultural heritage, and the use of those technologies promoted local engagement, comprehension, pride and stewardship.

The relation between ICT and long-term heritage conservation was also proposed by Zhao et al., (2024). The authors affirmed that social media will increasingly help create, share, and preserve cultural heritage information in the long-term.

Methodology

This study evaluates 69 articles, identified from a prior systematic literature review (SLR), in order to explore the ways in which information and communication technologies (ICT) support co-created heritage tourism experiences, using the SLR's conceptual framework (see Figure 1).

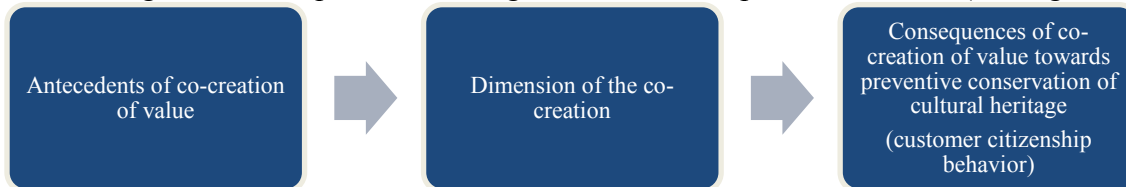


Figure 1. The process of co-creation of value in heritage tourism

Source: Author's own research contribution.

Sample of the Systematic Literature Review (SLR)

In the previous SLR, the impact of behavioral aspects from the outcomes of value co-creation on heritage preventive conservation was explored. A qualitative approach was used to compare and synthesize studies with diverse methods of investigation in the selected articles (Greenhalgh et al., 2004). The research was conducted according to the domain and framework-based approach (Paul & Criado, 2020), with the help of the Antecedents, Consequences, Mediation, and Moderation (ACMM) framework proposed by Ribeiro et al. (2023) within the scope of value co-creation in tourism.

The study followed the PRISMA 2020 guidelines (Page et al., 2021) to ensure transparency and replicability, following the three main phases: identification, screening, and inclusion.

During the identification phase, searches were made in Scopus, Web of Science, Science Direct, Springer Link, and Taylor & Francis, between April-May 2025, covering publications from 2009 to 2025. Search strings combined terms such as “value co-creation”, “tourism”, and “long-term”, using Boolean operators and wildcards in title, abstracts and keywords. A total of 289 records were gathered, out of which 12 duplicates were removed, and thus a total of 277 records were taken for the screening process.

During the screening phase, inclusion criteria involved empirical and theoretical research papers focusing on co-creation of value in heritage tourism especially concerning the impact of cultural heritage conservation and sustainable heritage management.

Systematic reviews and bibliometric analysis, non-peer reviewed articles and non-English articles were excluded from the review process to ensure no redundancy in information gathering. The two stages of screening (title and abstract, full-text review) reduced 277 articles to 115 eligible ones. Then the application of the criteria excluded 35 irrelevant articles that mentioned co-creation only nominally and 11 inaccessible articles. Thus, a total of 69 articles were identified for data extraction.

Data were extracted into an Excel template detailing each study's characteristics and co-creation processes. From the 69 articles, 44 addressed the process of co-creation fully or partially,

while 25 uses co-creation as a potential consequence of the heritage experience or as a topic for future research.

Identifying the presence and absence of information and communication technologies (ICT) across the co-creation process

To address the research question concerning the supporting role of ICT in heritage tourism experiences, this study uses a framework from the literature review to examine how such tools are utilized across the co-creation process in the 69 articles.

The suggested framework (see figure 1) is based on the Antecedents, Consequences, Mediation, and Moderation (ACMM) framework developed by Ribeiro et al. (2023). Within this framework, antecedents are defined according to the authors' classification into four categories of drivers: experiential, situational, relational, and organizational. Dimensions of co-creation are defined in line with Mohammadi et al. (2021) who categorized co-creation into feedback, co-design, and co-production forms. Additionally, following Arica and Corbaci (2020) and Assiouras et al. (2019), consequences of co-creation include customer citizen behavior (feedback, advocacy, helping, and tolerance) as proposed by Yi and Gong (2013).

The descriptive findings outline the presence or absence of ICT in the antecedents, dimensions, and consequence stages of co-creation, and the results are then compared to the trends seen generally in the sample. Through secondary data analysis, the results obtained by the study are based on theory-driven generalization from existing case studies (Yin, 2018).

Results and discussions

Within the proposed framework of antecedents, dimensions, and consequences (Figure 1), information and communication technologies (ICT) have been found to be: supportive antecedents for co-creation, enablers for co-creation, facilitators of co-creation forms during the service experiences, and as enablers of citizen behavior outcomes after the tourism service encounters.

Information and communication technologies (ICT) as supportive antecedents for the co-creation of tourism heritage experiences

From the 44 studies that address part or the whole process of co-creation in the sample, 23 studies present one or more drivers for co-creation. Based on the four types of drivers proposed by Ribeiro et al. (2023), *experiential* drivers are the most frequent type with eleven recurrences, closely followed by *situational* drivers with ten, and *relational* drivers with seven. There is just one *organizational* driver. Some studies evidenced more than one driver, but each trigger has been analyzed individually.

Of the 23 studies, only three showed ICT as part of the experiential drivers. These are: the use of websites, blogs, and social media with various textual, visual and video contents as part of pre-event warm up for motivating participants of culinary workshops (Chiu & Huang, 2022); the use of ICT tools for mobile computing as a user requirement for content co-creation (Han et al., 2019), and the augmented reality-engagement psychology, along with awareness, knowledge, and social relevance as predictors of pre-travel visitation for potential co-creation (Guo et al., 2024).

Information and communication technologies (ICT) as enablers for the co-creation dimensions of tourism heritage experiences

From the 44 studies that address part or the whole process of co-creation in the sample, 11 studies showed ICT as enablers for co-creation. These include: 3D printing technologies and open-access

digital facilities (Anastasiadou & Vettese, 2019), technologies and on-site interactive facilities in museum contexts (Antón et al., 2018), accessible and engagement platforms (Xie & Shi, 2019), diverse ICT tools within museum (Roque, et al., 2024), augmented reality applications (Guo et al., 2024), social media platforms (Zhou et al., 2023), travel blogs (Mele & Egberts, 2023), digital platforms and video-mapping installations (Cisneros et al., 2020), mix reality technologies, virtual, and augmented realities (Trunfio et al., 2020), and digital storytelling applications (Vegas et al., 2023; Bonacini, 2018).

Other studies include latent enablers such as interactive multimedia (Graziano & Privitera, 2020), virtual reality mobile application (Briciu, et al., 2020), and social media travel vlogs (Ding et al., 2025), online platforms (Lemmetynen et al., 2025), and technological infrastructure (Calle-Lamelas et al., 2024) for potential co-creating information, city branding, and governance.

There are 30 studies that address part or the whole process of co-creation that did not show ICT as enablers for co-creation. The small number of ICT enablers that were identified in the study highlights the need for additional research aimed at gaining insight into their influence during the co-creation process.

Information and communication technologies (ICT) as facilitators for the dimension of co-creation of tourism heritage experiences

Based on the classification of the dimensions of co-creation developed by Mohammadi et al. (2021), the most frequent form of the sample was co-production with 28 recurrences, followed by feedback with seven recurrences, and co-design with two occurrences. The information and communication technologies facilitated the co-production of three studies, the feedback co-creation of five studies, and the co-designing of one study.

The three studies that showed *co-production* forms of co-creation that were facilitated by ICT tools were related to the heritage dissemination resources: the onsite production of 3D printed souvenirs (Anastasiadou & Vettese, 2019), and the co-produced digital audio guides (Vegas et al., 2023; Bonacini, 2018).

The five studies that showed *feedback* form of co-creation that were facilitated by ICT tools were: real-time feedback during the visit facilitated by augmented reality (Guo et al., 2024), micro-narratives shared in digital museum spaces (Roque et al., 2024), online generated content about do-it-yourself institutions of popular music (Baker, et al., 2022), online experiential Alpine tourism representations (Mele & Egberts, 2023), and digital culinary heritage storytelling (Masmoudi & Jmour, 2025). There were two studies that included information shared without an ICT tool about the tea culture system as part of a co-creation behavior (Liang et al., 2024), and about the process of authentication for creating a new heritage hotel identity (Xie & Shi, 2019).

The study that showed a *co-design* form of co-creation was about the co-designing ICT platform as part of the TExTOUR European project (Pasandideh, 2024).

These results demonstrate that the ICT mainly facilitated the feedback co-creation form while supporting some tangible outputs of the co-production form of co-creation within the sample. In this case, the use of ICT tools is underrepresented. If co-production is a defining characteristic of the co-creation heritage tourism experiences, the ICT tools can be considered supportive but not essential for this stage of the entire co-creating process. It can also be said that they are present in facilitating a co-designing experience, but the limited number of this co-creation form in the sample makes it impossible to draw any concluding remarks.

Information and communication technologies (ICT) as facilitators for the citizenship behaviors co-creation outcomes

Based on the four dimensions of customer citizen behaviors (CCB) of the co-creation experiences proposed by Yi & Gong (2013), the most frequent dimensions were advocacy with 15 recurrences, followed by feedback with nine, and helping and tolerance with three recurrences each. In the studies, the advocacy dimension is not exactly referred to the loyalty or promotion to the firm (Yi & Gong, 2013), but oriented toward cultural heritage advocacy and as a form of heritage preventive conservation. Some studies evidenced more than one behavioral dimension, but each dimension has been analyzed individually.

From the 15 studies that present advocacy behavior dimensions, eleven are the result of co-production forms, and four are the result of the feedback co-creation form. Overall, the ICT facilitated advocacy behaviors in four cases: the promotion of protected or inaccessible heritage (Trunfio et al., 2020), promotion of common cultural heritage (Bonacini, 2018), the promotion of cultural heritage (Guo et al., 2024), and the promotion of local culinary business (Masmoudi & Jmour, 2025).

From the nine studies that present feedback behavior dimensions, seven are the result of co-production forms, and two are the result of the feedback co-creation form. Except for two cases of personal communication (Chiu & Huang, 2022) and feedback into archaeological practice itself (Tully & Allen, 2017), almost all the studies include some ICT tools that facilitate the behavior: online information provided by museums (Boukas & Ioannou, 2020), online content generation in blogs and social networks post-visiting museums (Antón et al., 2018), feedback through satisfaction surveys, physical books and social media (Nobre & Sousa, 2022), feedback of audio guides (Bonacini, 2018), feedback to do-it-yourself museums through reviews (Baker et al., 2022) and share information through narratives on blogs (Mele & Egberts, 2023).

The other underrepresented two dimensions, tolerance and helping, do not specify the use of ICT tools that facilitate those behaviors.

These results demonstrate that ICT mainly facilitated the feedback behavior dimension, with seven out of nine recurrences. However, only four out of 15 advocacy behaviors were facilitated by ICT tools within the sample. In this case, the use of ICT tools is underrepresented. If the heritage advocacy behavior is understood as a form of heritage preventive conservation, the ICT tools can be considered supportive but not essential for this outcome behavior of the co-creating process. This evidence complements Zhao et al., (2024), who affirmed that social media is expected to play an expanding role in the long-term generation, distribution and preservation of cultural heritage information.

Conclusion

Regarding the research question on the influencing and supporting role of information and communication technologies (ICT) in heritage tourism experiences, the findings indicate that ICT is embedded throughout the co-creation process of cultural heritage experiences. ICT supports co-creation during service encounters, and influences citizen's behaviors after the experience. These findings corresponds with Guo et al. (2024), who claim that technological advancements and popularization of digital platforms have significantly changed the nature of co-creation in tourism. However, a more detailed analysis of the presence and absence of ICT tools within specific constructs of the co-creation process reveals several evidence gaps that suggest further investigation.

The limited number of ICT tools identified as experiential antecedents of co-creation, as well as the lack of them among other types of drivers, situational, relational, and organizational, points out a research gap. Further research is needed to explore if the causes of those differences are due to context, methodology, or untapped ICT potential. Few cases of ICT enablers for the service encounters in the sample underscores the need for deeper research into their role across the entire co-creation process within tourism heritage contexts.

While ICT tools are underrepresented in the antecedents and enabling conditions, they are stronger in feedback co-creation form, but appear overlooked in co-production form which is significant considering being the most common form of the sample. As there are just a few cases of co-designing forms, it is not possible to suggest whether the lack of ICT tools is relevant. Research with bigger and more varied samples would help determine whether ICT tools play a more central role in co-production processes across various heritage settings, and focus on how they can facilitate co-design experiences.

Focusing on citizen behavior as outcomes of the co-creation experiences, ICT tools are strongly represented in feedback dimension, but overlooked in advocacy which is relevant due its high frequency across the sample, so this limited role deserves further study. As tolerance and helping dimensions are scarce, no concluding affirmation can be done. Further studies employing wider samples and comparative settings can examine why there is a high facilitation of feedback behaviors and a relatively low facilitation of advocacy behaviors, as seen in this study. Future studies can examine categorization of ICT tools and their capacity for heritage-related behaviors. Longitudinal studies can measure how ICT tools facilitated heritage-related behaviors for preventive conservation purposes.

Overall, the limited range of ICT tools identified across different stages and dimensions of the co-creation process call for research into their supportive functions, heritage-specific constraints, and methodological limits. Scholars call future studies about its use for personalization of museum visits with mixed realities (Tongpaeng et al., 2024), its definition in the co-creating process between visitors and museums (Trunfio et al., 2022), and its potential contribution to long-term heritage preservation of cultural heritage information (Zhao et al., 2024). In this line, future longitudinal research could examine how ICT facilitated heritage-related behaviors. Such research would be particularly valuable in assessing whether short-term digital interactions can be translated into long-lasting positive heritage impacts, including preventive conservation.

Acknowledgments

During the preparation of this work, the author utilized ChatGPT 4 to enhance readability and language clarity. Following the use of this tool, the author meticulously reviewed and revised the content as necessary and assume full responsibility for the final content of the publication.

This study is part of a PhD research program under the supervision of the Transilvania University of Brasov and the University Savoie Mont Blanc. This project has received funding from the European Union's Horizon Europe research and innovation program under the Marie Skłodowska-Curie grant agreement N° 101126643.

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