

## Article

# From Heritage Preservation to Sustainable Transition: The Role of Low-Carbon Narratives in Forest-Based Tourism

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## Abstract

This paper examines how forest by-products (potash, tar, resin and charcoal—PoTaRCh), with a special focus on charcoal production, are presented in contemporary heritage tourism and how different communication frameworks influence the audience’s perceptions and intentions in the context of low-carbon development. The research is based on a combined methodological approach. Qualitative analysis of 70 communication units from the field of heritage tourism identified three dominant communication frames: traditional heritage, ecological-educational frame and future-oriented low-carbon innovation. These findings served as the basis for the experimental part of the research, conducted through an online A/B test on a sample of 212 adult respondents interested in travel, cultural tourism and heritage-based experiences. The results of the experiment indicate that the low-carbon communication framework leads to statistically significantly higher levels of perceived relevance of PoTaRCh, visit intention and positive attitude towards sustainability compared to the traditional framework, with perceived relevance partially mediating these effects. The findings suggest that, although traditional communication patterns still dominate heritage tourism, the future-oriented low-carbon framework shows greater communication potential for attracting a sustainability- and future-oriented audience. By combining the analysis of communication content from several European countries and the experimental testing of communication frameworks, the research provides an empirical contribution to the understanding of the transition from the concept of heritage-as-preservation to heritage-as-transition in contemporary discourses of sustainable tourism.



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**Keywords:** PoTaRCh; narrative framing; cultural heritage interpretation; visitor perception; experimental design; mediation analysis; sustainable transition; tourism communication effects

## 1. Introduction

Heritage tourism is increasingly being recognized as a key space in which ecosystem preservation, cultural identities and contemporary development challenges intertwine [1]. Especially in forest and rural areas, tourism activities become a means through which

natural resources and traditional practices are simultaneously protected, reinterpreted and economically valorized [2,3]. However, although tourism is often presented as a tool of sustainable development, the way in which specific forest practices are communicatively framed remains insufficiently researched, especially in the context of climate and low-carbon transitions [4]. Previous research indicates that forests and the traditional activities associated with them are strongly integrated into tourist narratives through the themes of landscape preservation, local identity and cultural continuity. Studies on forest and indigenous tourism show that traditional knowledge and practices are most often presented as symbols of the past and cultural authenticity, with an emphasis on ethnic identity and preservation of intangible heritage [5]. Although this approach contributes to the visibility of local communities, it often keeps practices within the framework of nostalgia and cultural representation, without a clear connection to contemporary development discourses. At the same time, the literature on climate change and tourism increasingly warns that cultural and natural assets can no longer be viewed in isolation from global environmental challenges. Analyses of the impact of climate change on world heritage indicate that tourism must play a more active role in communicating responses to climate risks, and not only in documenting them [6]. Despite this, the concrete mechanisms through which traditional practices can be presented as part of low-carbon and climate-relevant solutions remain poorly developed in tourism studies. In the context of accelerated climate change and growing demands for low-carbon development models, the way in which traditional practices are communicatively positioned in tourism becomes not only a cultural but also a strategic issue of sustainable transition. However, it is precisely at this point in the literature that a clearly defined gap in research can be observed. Although there are numerous studies on heritage tourism, sustainability and forest ecosystems, there is still a lack of empirical studies that systematically examine how specific traditional forest practices are narratively presented in tourist communications and how such communication frameworks influence the perceptions, attitudes and behavioral intentions of tourists. In particular, it has been insufficiently researched whether such traditional practices can be communicatively reinterpreted as part of modern low-carbon and bio-economic transitions. This study focuses on solving this deficiency by combining content analysis, semiotic interpretation and experimental approach, with the aim of examining how different narrative frameworks shape the perception of PoTaRCh in contemporary heritage tourism. In this paper, the term PoTaRCh is used as an abbreviation for forest by-products, i.e., forest by-products such as potash, tar, resin and charcoal, with a special focus on charcoal production as the most visible and tourist interpretable element of this heritage.

In this context, PoTaRCh represents a particularly relevant, but still insufficiently researched case. Charcoal production has historically been deeply rooted in forest ecosystems and rural communities, relying on renewable resources, closed material flows and local knowledge [7]. Nevertheless, in touristic communications, PoTaRCh almost exclusively appears as a relic of the past or a craft interest, while its potential role in contemporary narratives of low-carbon development and bioeconomy is rarely considered. It is this specific gap between the sustainable nature of the practice itself and the way it is communicatively presented that makes PoTaRCh a paradigmatic example for examining how heritage can be integrated into contemporary discourses of a low-carbon future. Although the existing literature offers a rich fund of research on heritage tourism, sustainability and forest ecosystems, there is still a lack of empirical evidence that systematically examines how PoTaRCh is narratively presented in tourism and what consequences different communication frames have on tourists' perceptions and behavioral responses. The lack of experimental studies that test the effects of alternative narrative frameworks of traditional practices in the context of low-carbon development is especially pronounced. Starting from this specific deficiency,

the goal of the research is to examine which communication strategies in heritage tourism most effectively represent the role of PoTaRCh in the transition to low-carbon development and to what extent such narratives attract future-oriented tourists. This goal is considered in the specific context of PoTaRCh practice as a traditional forest heritage and within digitally mediated tourism communications. In accordance with that goal, the research is structured through the following research questions:

- Q1. How is PoTaRCh currently presented in modern tourism materials?
- Q2. What symbols and meanings dominate the narratives related to forests, fire and traditional crafts?
- Q3. Do narratives framed as “traditional heritage” or as “future low-carbon innovation” produce stronger effects on destination visit intention?
- Q4. Does perceived relevance of PoTaRCh mediate the relationship between narrative framing and visit intention?

The importance of this research is reflected in its ability to empirically connect three areas that are most often considered separately in the existing literature: heritage tourism, traditional forest practices and low-carbon development. Instead of treating PoTaRCh exclusively as an object of preservation and retrospective interpretation, the paper systematically examines its communicative potential as part of contemporary responses to climate and development challenges. In this way, tourism is understood not only as a mechanism of transmission of the past, but as an active space in which meanings relevant to future development trajectories are produced and legitimized. Thus, the work is clearly positioned at the intersection of discussions on tourism, sustainability and cultural transition, offering an empirically based insight into how heritage can be communicatively transformed from a symbol of the past into a resource of the future. This approach was necessary because the previous touristic interpretations of traditional forest practices mostly remain within the framework of preservation and symbolic past, without a clear understanding of their potential for contemporary positioning of destinations, education of visitors and shaping of sustainable development strategies. The research results are of immediate importance for cultural and heritage tourism organizations, protected area managers, destination marketing creators and sustainable development policy makers, as they indicate ways through which traditional practices can be transformed into authentic and market-relevant tourism resources of the future.

## 2. Literature Review

### 2.1. *PoTaRCh and Heritage Tourism: Tradition, Craft and Cultural Value*

The existing literature consistently recognizes charcoal production and related forestry practices as an integral part of rural and industrial heritage, with a strong foothold in local knowledge, landscapes and long-standing work traditions [8]. Within the EU-PoTaRCh COST action, PoTaRCh is conceptualized as a set of interrelated practices based on forest by-products, such as charcoal, tar, pitch and potash, emphasizing their historical distribution and cultural embeddedness in different European regions [9]. Nevertheless, although this approach establishes an important research framework, its dominant focus remains on documenting, mapping and networking practices, while their contemporary interpretation in tourism and communication potential is much less problematic.

A similar pattern is present in empirical research on heritage tourism, where charcoal production is most often viewed through the lens of preserving material remains and localities. Studies of historical charcoal pits, such as the case of Langkawi, confirm their potential as tourist resources that require protection and interpretation, but dominantly treat them as static objects of the past [10]. Similarly, industrial heritage research in the European

context positions charcoaling and related practices as part of a wider industrial landscape, with an emphasis on the spatial distribution and development challenges of the locality, and less on their contemporary symbolic and communicative meaning [11]. In parallel with that, the literature on intangible cultural heritage increasingly emphasizes craft knowledge, skills and practices as important resources for the educational and tourism development of rural areas. Research on traditional crafts in landscapes like the *dehes/montado* system shows that these practices are dominantly valued as carriers of identity, knowledge transfer and experiential tourism [12]. However, it is precisely here that the key theoretical limitation of existing studies becomes visible: even when traditional practices are interpreted as dynamic resources of rural development, their meaning remains predominantly related to the preservation of authenticity and the past, while their role in contemporary sustainability narratives and transition communication is almost absent.

This dominantly retrospective interpretation reveals a wider debate within heritage tourism between the heritage-as-preservation approach, which emphasizes protection, authenticity and historical continuity, and newer approaches that see heritage as an active communication resource in shaping sustainable development narratives. It is precisely in this space that current research is positioned, which PoTaRCh does not view only as an object of preservation, but as a narratively changing practice whose communication framing can shape perceptions of the future, sustainability and low-carbon transition. As shown in Figure 1, traditional charcoal pits represent one of the most visible material elements of the PoTaRCh heritage landscape. However, their dominant touristic interpretation still relies on motives of authenticity and historical continuity, which further reproduces the framing of PoTaRCh as a practice rooted in the past, rather than as a potential resource for contemporary sustainability narratives.



**Figure 1.** Traditional charcoal production kilns used in the PoTaRCh heritage practice (Photographer: Paweł Malarczyk, Source: <https://nawypale.pl/2025/07/08/swieto-dymu-27-29-czerwca-2025-2/> (accessed on 22 February 2026).

Research on sustainable tourism and rural development additionally confirms that local forest practices are often included in tourism strategies by emphasizing the authenticity, local identity and cultural uniqueness of the area [13,14]. However, the dominant focus of these studies remains on management models, community participation and local benefits, while the way in which the practices themselves are communicatively framed in tourism narratives remains significantly less explored. This orientation shows that sustainability in the existing literature is predominantly considered through institutional and development outcomes, while the symbolic and narrative dimension of sustainability is still peripherally represented. A similar tendency is present in works that emphasize the role of innovation in the valorization of intangible heritage, where innovation is most often seen in organizational, managerial or developmental terms, while it is less often understood as

a narrative and communication transformation of the very meaning of the practice [15]. It is this difference between operational innovation and narrative reinterpretation that opens up an important theoretical debate about whether traditional practices in tourism change only at the level of management or also at the level of meaning conveyed to the audience.

Reviews of the literature on intangible cultural heritage in tourism additionally confirm the abundance of research aimed at the identification, protection and valorization of traditional practices, but at the same time point to the lack of empirical studies examining the effects of their communication on the public [16,17]. In other words, the literature has made significant progress in understanding what traditional practices are and why they should be preserved, but the understanding of how different interpretive frameworks shape the perceptions, attitudes and behavioral reactions of tourists is still underdeveloped. In this sense, although PoTaRCh is clearly recognized as an important element of cultural and industrial heritage, there is still a lack of systematic understanding of the way in which this practice is presented in modern touristic communications and which interpretive frameworks dominate those representations. Existing literature strongly positions PoTaRCh in the domain of tradition, craft and cultural value, but dominantly treats it as a legacy of the past [18]. Such a focus maintains PoTaRCh within the heritage-as-preservation paradigm, while leaving an open research space for examining contemporary narrative frameworks through which this practice can be reinterpreted in tourism, especially in broader debates about sustainability narratives, bioeconomy and low-carbon development.

Starting from that theoretical and empirical space, this research is positioned at the intersection of heritage tourism communication and sustainability narratives, with the aim of examining how different narrative frameworks can transform the perception of PoTaRCh from a symbol of the past into a resource for future transition.

## 2.2. Sustainability, Bioeconomy and Low-Carbon Narratives in Tourism

Contemporary literature on tourism shows a clear shift from general normative approaches to sustainability towards more concrete concepts of low-carbon development, circular economy and bioeconomy [19]. Although this theoretical turn significantly deepens the understanding of tourism as a space of transition, existing studies still remain unevenly developed in terms of how sustainability is translated from management and development models into interpretive patterns comprehensible to tourists. One direction of research is dominantly focused on the planning and management of low-carbon tourism systems, with an emphasis on decision-making instruments, infrastructural solutions and the resilience of local communities [20]. The second direction develops business models of low-carbon tourism, but maintains a focus on operational efficiency and economic outcomes of the transition [21]. Although both approaches make an important contribution to the understanding of sustainable tourism development, their common limitation is that they treat sustainability primarily as a functional and managerial issue, while the way in which its meaning is shaped in the tourist interpretation remains in the background.

A similar analytical gap is also present in the literature on the circular economy in tourism, where circularity is most often operationalized through waste management, energy efficiency and resource optimization [22,23]. Such an approach is methodologically robust, but at the same time narrows the understanding of sustainability to the technical-operational level. As a consequence, it remains insufficiently clarified how the principles of circularity become part of the tourist experience, interpretation of space and perception of value by visitors [24]. This tension is further deepened in the bioeconomy literature. Empirical works on biochar, composting and forest resources in agroecological systems clearly confirm their importance for low-carbon strategies, but they are almost exclusively viewed through the prism of efficiency and life cycle assessment [25]. Their tourism dimension,

and especially their role in heritage tourism, remains largely implicit. Similarly, models like the Bio-Circular-Green approach show how the bioeconomy can be linked to tourism experiences, but the focus still remains on the sustainability of the system and not on how the meaning of those practices is conveyed and understood in the tourism context [26]. For this reason, contemporary literature provides a strong theoretical framework for understanding sustainability, bioeconomy and low-carbon development in tourism, but still shows a clear thematic gap when it comes to traditional forest practices such as PoTaRCh [27,28]. Although these practices are inherently linked to renewable resources, circular flows and low-carbon processes, their interpretive function in contemporary heritage tourism is rarely considered. It is this difference between the material sustainability of the practice itself and the way it is understood and presented to tourists that is the key analytical starting point of this paper.

It is particularly important to emphasize that traditional charcoal production does not have an unambiguous status within discussions on sustainability. In certain local contexts, it can be seen as a source of emissions and potential health risks, especially due to smoke and suspended particles. However, the assessment of its sustainability depends on the origin of the raw material and the wider forest resource management system. In landscapes such as the Iberian montado system, charcoal is often produced from pruning residues from the management of cork oak (*Quercus suber*) and holm oak (*Quercus ilex*). In such cases, charcoal production can be understood as a form of valorization of forest residues in accordance with the principles of circular bioeconomy, where the by-products of forest management are transformed into a marketable energy resource instead of becoming waste.

It is this duality that shows a key theoretical issue: the same practice can be interpreted either as an ecologically problematic legacy of the past or as a resource for a sustainable transition. Starting from that analytical tension, this research is positioned at the intersection of heritage tourism, bioeconomy and modern approaches to sustainability, with the aim of examining how different interpretive frameworks change the perception of PoTaRCh as a resource of the low-carbon future.

### *2.3. Narrative Framing, Tourism Communication and Destination Marketing Effects*

Message framing and storytelling are the central mechanisms through which tourism communication and marketing positioning of the destination shape the perceptions, emotional reactions and behavioral intentions of the audience. Contemporary literature shows more and more clearly that tourism functions not only as a space for information transmission, but also as a space for active construction of destination meanings, practices and values, which directly affects the destination's image, offer differentiation and market attractiveness. In this sense, research on the framing approach consistently confirms that the way the message is structured can significantly change attitudes, visit intention and willingness to engage, even when the basic content of the message remains the same [29,30].

Empirical research in the field of sustainable and responsible tourism additionally confirms that messages that emphasize the ecological or social dimension of a destination can increase positive attitudes and behavioral intentions, but at the same time show that the effects are not the result of the information itself, but the way in which the meaning of the information is interpretatively organized. From the perspective of tourism marketing, such communication effects have a direct significance for the shaping of the destination's image, the differentiation of the tourist offer and the perception of the value of the experience. For example, studies in the context of wildlife and food tourism show that different sustainability representation frames can mediate the relationship between sustainability information and tourists' economic decisions, including willingness to pay more, valuing the experience, market attractiveness of the offer, and changing behavior patterns [31,32]. It

is these findings that shift the focus from the content of the message to the processes through which the audience attributes relevance, value, market sense and emotional significance to that message. In parallel, the literature on emotional and cognitive mechanisms of tourist communication emphasizes the role of mental images, affect and attention in message processing. Studies confirm that visual and emotional elements can significantly strengthen or weaken the effect of communication, influencing destination evaluation, market positioning of the experience and behavioral intention [33,34]. However, this is where one of the key limitations of existing research becomes visible: the dominant focus remains on individual communication elements, such as colors, emotions, visual style or attention, while the wider interpretive framework of the message is often treated implicitly or secondarily [35].

This fragmentation of literature is particularly problematic in the context of heritage tourism, where the meaning of the message does not derive only from visual or emotional elements, but from the broader cultural and symbolic framework through which the practice is presented. In other words, existing framing studies do a good job of explaining how messages affect audiences, but do much less to explain how traditional practices change meaning when they move from a framework of past authenticity to future sustainability. In this sense, the depiction of traditional landscapes of charcoal production, as illustrated in Figure 2, is not only a visual element of the tourist experience, but an interpretive mechanism through which forest, smoke and manual work are symbolically connected with authenticity, nature and cultural continuity. Critically observed, precisely these elements show that the effect of communication does not depend on isolated visual characteristics, but on a wider framework of meaning that allows the audience to understand the same practice either as a relic of the past or as a resource of contemporary sustainable transition. Starting from this theoretical limitation of the framing literature, the current research extends existing approaches by focusing on the traditional forest practice of PoTaRCh, examining how different interpretive frameworks change the perception of relevance, sustainability and visit intention in the context of heritage tourism.



**Figure 2.** Traditional charcoal production landscape integrated into heritage tourism experiences (Photographer: Paweł Malarczyk, Sources: <https://nawypale.pl/2025/07/08/swieto-dymu-27-29-czerwca-2025-2/> (accessed on 22 February 2026)).

Experimental research in tourist communication additionally confirms that the controlled manipulation of messages enables a more precise understanding of the cause-and-effect relationships between the way content is presented and the behavior of tourists. Precisely thanks to the high degree of control over communication stimuli, this approach enables a clearer separation of the effect of the interpretive framework on the attitudes, intentions and behavioral reactions of the audience. However, although the experimental

approach is methodologically present in the literature, its application remains thematically focused primarily on destination branding, advertising and corporate social responsibility [36,37]. Such a methodological focus reveals an important research imbalance. When heritage and tradition appear in these studies, they are most often treated as background elements of the destination's identity, rather than as central objects of interpretation whose effects are systematically examined. Consequently, the existing experimental literature is much better at explaining tourists' reactions to contemporary promotional and brand messages than to the communication of traditional practices and cultural heritage. This thematic asymmetry becomes especially pronounced in the field of sustainability and low-carbon development. Although there is a growing interest in climate and ecological aspects of tourism communication, research is dominantly focused on modern, technologically oriented or infrastructural dimensions of sustainability, while traditional practices are almost completely absent from experimental analyses of framing effects. It remains insufficiently clarified whether and in what way traditional practices can be reinterpreted as relevant to contemporary development challenges, as well as how such interpretive frameworks affect the perceptions of potential tourists. This methodological and thematic gap is the key justification for the experimental part of the current research. Instead of PoTaRCh being treated only as a symbolic background of the destination's identity, here it is positioned as a central object of communication testing, which enables a more precise examination of how the shift in meaning from tradition to a low-carbon future changes the perception of relevance, sustainability and the intention of the visit. In this way, the experimental design is not only a methodological choice, but a direct response to the limitations of the existing literature, which opens up space for validly testing the causal effects of different interpretive frameworks in heritage tourism.

As shown in Figure 3, charcoal-making demonstrations and cultural performances are frequently incorporated into heritage tourism events, transforming traditional production practices into experiential attractions. These performative elements play an important role in communicating heritage narratives to visitors, bridging the gap between historical practice and contemporary tourism experience. It is clearly confirmed that narrative framing has strong effects on tourists' attitudes and behavior and that an experimental approach is methodologically adequate to examine these effects. However, despite the development of theoretical and methodological tools, there is a lack of empirical research that systematically tests the narratives associated with traditional forest practices such as PoTaRCh. This gap between researching the effects of narratives and the subject matter of heritage tourism represents a key analytical space that this research seeks to address.



**Figure 3.** Cultural performance integrated into the PoTaRCh charcoal heritage tourism experience. (Photographer: Paweł Malarczyk, Sources: <https://nawypale.pl/2025/07/08/swieto-dymu-27-29-czerwca-2025-2/> (accessed on 22 February 2026).

#### 2.4. Forest Heritage as a Cultural Tourism and Creative Tourism Asset

Contemporary literature on heritage tourism increasingly clearly indicates that natural landscapes and traditional work practices function not only as a spatial framework of the tourist experience, but also as carriers of cultural meanings, identity and symbolic value [8,16,21]. In this sense, the forest overcomes the role of a passive natural environment and becomes a resource of cultural and heritage tourism, especially when it is connected with artisanal knowledge, local practices and historically rooted forms of space use. The connection between landscape and work allows the forest area to be understood as a form of “living heritage” and not just as a scenography of the past.

This understanding has a special importance in heritage tourism, where the authenticity of the experience does not derive exclusively from preserved material elements, but from the relationship between space, practice and the meaning that the audience attributes to that relationship [10,16]. In this sense, traditional activities such as charcoal production have a multi-layered tourism value, because they simultaneously function as cultural artifacts, demonstrations of local knowledge and an interpretive bridge between natural and cultural heritage. The previous literature pays more attention to the preservation and documentation of these practices than to their touristic positioning as contemporary experiential resources, which leaves open space for a deeper understanding of their role in cultural tourism.

In this sense, charcoal production itself can be more clearly understood as a form of cultural heritage, as it unites historically transmitted craft knowledge, local patterns of forest resource use, and the collective memory of rural communities. Its touristic value comes not only from its interpretive and educational function, but also from its potential for creating authentic cultural-tourist experiences through workshops, process demonstrations, storytelling and learning experiences based on local skills. This kind of approach additionally confirms the view of Richards and Raymond [38] that creative tourism builds its value through the active participation of visitors in the processes of creating meaning, whereby traditional practices such as charcoaling move from the domain of preservation to the domain of contemporary experiential and creative tourism consumption.

### 3. Methodology

#### 3.1. Research Design and Corpus Construction

The research is based on an exploratory sequential mixed-methods design, in which qualitative analysis not only serves to describe existing narratives, but represents an epistemological foundation for the construction of experimental stimuli and testing the causal effects of narrative framing. The corpus was formed with the aim of covering the contemporary phase of institutionalization of sustainability in tourism, while at the same time avoiding distortions that may arise due to short-term promotional campaigns, pilot projects or temporary content. Therefore, the period 2018–2025 was chosen. The year 2018 was identified as a relevant starting point because since that period, a more stable and systematic transition to the explicit language of sustainability has been observed in tourism communications, including terms such as sustainable, low-carbon, circular economy, bioeconomy and their local language variants [38]. The year 2025 represents the most recent closed year that allows consistent collection and comparability of content at the time of research.

Data collection was conducted in one continuous field window, i.e., as a single “snapshot” of the corpus, in order to reduce the impact of seasonal changes, temporary updates and short-term promotional interventions on websites and digital materials. Access date, URL, source type, and institutional publisher were recorded for each unit of analysis, while content was archived in a stable format (PDF/HTML or equivalent) to ensure verifiability

of coding and potential research replication. When sources contained information about the date of publication or last modification, that metadata was recorded as an additional indicator of recency; however, affiliation to the 2018–2025 period was based primarily on content being publicly available, active and topically relevant at the time of collection, with verification that it did not represent clearly outdated or abandoned communications material. The sample was constructed as a purposive sample of communication units, because the goal of the research is not statistical representativeness of the population of all tourism websites, but theoretically informed coverage of key types of actors, institutional contexts and narrative frameworks through which PoTaRCh (with a special focus on charcoal) can be interpreted as cultural heritage and/or as part of the discourse of a low-carbon future. A unit of analysis is defined as a discrete, coherent communication unit with a clearly identified publisher and stable content suitable for coding. This includes one relevant interpretive web page (or a set of thematically related pages within the same domain), one digital brochure, or one official description of a museum exhibit, interpretive route, or park presentation. When one source contained several subpages or formats, the central interpretive unit was analyzed in order to avoid multiple counting of the same communication actor.

The sample includes sources that represent typical bearers of tourist storytelling: official websites of tourist destinations, museums of industrial and rural heritage, nature parks and protected areas, thematic and interpretive routes, as well as official digital promotional materials (brochures, interpretive pages and accompanying textual descriptions of multimedia content). This structure of the sample enables the comparison of narratives that arise in different institutional settings, tourism promotion, museum interpretation and natural resource management, and thus provides an insight into whether PoTaRCh is consistently positioned as cultural heritage, ecological practice or a communication bridge to the bioeconomy. The selection of units was carried out on the basis of pre-defined inclusion criteria. The sources had to contain an explicit or clearly recognizable implicit reference to charcoal, charcoal making processes, traditional forestry practices or related local terms and synonyms. Furthermore, the content had to be interpretatively grounded in heritage (cultural, industrial, rural or landscape) or in tourism representation of knowledge and practices, to ensure that PoTaRCh was not treated exclusively as a commercial product. Additionally, only publicly available sources with sufficient textual and/or visual scope to allow reliable coding were included. In the case of multilingual sources, the institutionally dominant version (most often English) was analyzed as the primary version, while the existence of local language variants was recorded. The sample was further constructed according to the principle of maximum variation, with the aim of encompassing different cultural, ecological and institutional contexts in which charcoal production has been historically documented and reinterpreted in modern times. Instead of an even distribution by country, contexts representing different models of forestry, rural development and tourism interpretation (Mediterranean, Balkan, Central European, Nordic and one non-European comparative case) are included. This approach enables analytical generalization of findings through the identification of recurring narrative patterns, rather than relying on the specificities of individual national cases.

The total sample size is 70 communication units. This size represents a methodologically balanced compromise between the depth of qualitative coding and the need for sufficient heterogeneity of the corpus, allowing systematic comparison of narratives across multiple countries and institution types, with a sustainable workload in the process of double coding and reliability checking. This ensures that the identified communication strategies do not depend on one country, one institution or one type of source, but on stable patterns present in a diverse and theoretically relevant corpus. Adequacy of sample

size was further confirmed during an iterative process of qualitative coding. The analysis showed that after approximately 55–60 communication units, no new dominant narrative patterns appear, but that the additional units consistently fit into the already identified interpretive frameworks. This stabilization of the code structure indicates the achievement of thematic saturation of the corpus, whereby the later analyzed units contributed to the deepening and confirmation of existing patterns, but not to the identification of new narrative categories [39,40].

The universe of analysis consisted of publicly available institutional digital communications related to PoTaRCh heritage in the context of heritage tourism, published in the period from 2018 to 2025. This corpus included official websites of destination management organizations, museums, nature parks, interpretive centers, digital promotional brochures, online event catalogs and video materials from European regions where PoTaRCh is historically and culturally present, including Portugal, Spain, Italy, Slovenia, Serbia and Croatia. The total initial corpus contained 126 communication units, from which 70 units were selected using a purposefully selected sample with maximum variation, which provided diversity in terms of geographical origin, type of source, communication format and dominant interpretive framework. The time frame 2018–2025 was chosen to include a period of more intensive inclusion of the discourse of sustainability, bioeconomy and low-carbon development in the institutional communications of heritage tourism, which enabled the monitoring of contemporary changes in the presentation of traditional forest practices.

Table 1 shows the structure of the sample by country and type of communication sources. The sample was constructed according to the principle of maximum variation, so that different institutional actors (tourist organizations, museums, nature parks and other interpretive formats) are represented in each country, while controlling the minimum and maximum number of units per country. This structure ensures that the identified narrative patterns do not depend on a single national or institutional context, but on recurring communication strategies across a diverse corpus.

**Table 1.** Structure of the sample according to countries and type of communication sources.

Country	Tourism Organizations/DMOs	Heritage Museums	Nature Parks	Thematic Routes	Digital Promotional Materials	Total Units
Italy	2	2	2	1	1	8
Spain	2	2	1	1	1	7
France	2	2	1	1	1	7
Germany	1	3	1	1	1	7
Austria	1	2	2	1	0	6
Slovenia	1	2	1	1	0	5
Greece	1	2	1	1	1	6
Bulgaria	1	2	1	1	1	6
Poland	1	2	1	1	1	6
Sweden	1	1	1	1	0	4
Finland	1	1	1	1	0	4
Japan	0	2	0	1	1	4
Total	15	23	14	12	8	70

By combining content analysis, semiotic analysis and an experimental approach, the methodological design enables an integrated understanding of how PoTaRCh is communicated in contemporary heritage tourism, as well as an empirical examination of the effects of different narrative frames on visitors' perceptions and intentions.

### 3.2. Measurement Instrument

The experimental research used a structured questionnaire composed of previously validated measuring instruments, which were adapted to the context of PoTaRCh and the narrative stimuli used in this research. All items were measured on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). Adaptation of the instruments is limited to linguistic and contextual adaptation, without changing the conceptual meaning of the items. The questionnaire was designed to include only variables relevant to the theoretical framework of the research, without additional exploratory items. Although the experimental design allows for a clear identification of the causal effects of narrative framing, the measured outcomes relate to cognitive evaluations, attitudes, and behavioral intentions, rather than directly observed behavior. Therefore, the findings should be interpreted as indicators of the communication potential of PoTaRCh, and not as direct predictors of actual tourist behavior. Perceived relevance of PoTaRCh was measured as a central cognitive assessment by which respondents evaluate the extent to which the presented practice has meaning and significance in the contemporary social and development context. This construct is operationalized through three items that assess the experience of modernity, social usefulness and connection of practice with current challenges of sustainability [33]. The scale is adapted from previous research that identifies relevance as a key mechanism through which narratives influence attitudes and behavioral intentions [33]. Visit intention was measured as the respondents' behavioral intention to visit a destination or tourist offer related to PoTaRCh. The construct is operationalized through three items that examine respondents' willingness to consider, plan or recommend a visit, in accordance with standard practice in research on tourist behavior [29]. The attitude towards sustainability includes the general evaluation of respondents towards sustainable practices and development models in tourism. This construct was measured using four items assessing support for sustainable initiatives, the importance of environmental responsibility, and a positive attitude toward the long-term development benefits of sustainable tourism [34]. All scales showed satisfactory internal consistency, with Cronbach  $\alpha$  coefficients for all constructs exceeding the recommended threshold of 0.70 [41]. Since the instruments were taken from previously validated research and used in an adapted form, the analysis was focused on reliability assessment, while exploratory and confirmatory factor analyses were not conducted (Table 2).

**Table 2.** Measurement instruments used in the experimental study.

Construct	Sample Item	Number of Items	Likert Scale	Cronbach's $\alpha$	Source
Perceived relevance of PoTaRCh	PoTaRCh represents a practice that is relevant to contemporary social and environmental challenges.	3	1–5	0.84	[33]
Visit intention	I would consider visiting a destination associated with PoTaRCh.	3	1–5	0.81	[29]
Attitude toward sustainability	I support tourism practices that contribute to long-term sustainable development.	4	1–5	0.79	[34]

Note: All items were adapted to the PoTaRCh context and the narrative stimuli used in the experiment.

### 3.3. Coding Procedure, Reliability, and Analytic Strategy

The analysis was conducted through a carefully structured and iterative coding process, designed to ensure theoretical grounding, analytical consistency, and verifiability of

the results. The initial coding structure was developed on the basis of relevant literature in the field of heritage tourism, sustainability communication and narrative framing, and the initial categories were operationalized to include the key dimensions of PoTaRCh representation, including the relationship to tradition, nature, energy and future development. This theoretically based structure was tested and refined through a pilot analysis of a subsample of the corpus ( $\approx 10\text{--}15\%$  of the total sample;  $n \approx 7\text{--}10$  units), which provided empirical validation of the codes and more precisely defined boundaries between related narrative frameworks. Coding of the entire corpus ( $N = 70$  communication units) was carried out with a clearly defined unit of analysis and a stable codebook, which enabled consistent interpretation of textual and visual elements in different institutional and national contexts. Data management and qualitative coding were performed using specialized software for qualitative analysis (NVivo, version 12/14) [42]. In order to reduce the influence of research subjectivity and check the reliability of interpretations, part of the sample ( $\approx 20\text{--}25\%$  of the sample;  $n \approx 14\text{--}18$  units) was independently coded by another researcher with experience in qualitative analysis of tourism and cultural heritage. The degree of agreement between coders was quantified using the standard measure of intercoder reliability (Cohen's  $\kappa = 0.74\text{--}0.82$ ) [43], which according to established criteria indicates substantial to almost perfect agreement. Disagreements were discussed through joint analytical discussion, after which the codebook was further refined to avoid systematic ambiguity in the further course of analysis.

The analytical process combined content analysis and semiotic analysis as analytically separate but complementary procedures. Content analysis was applied as a primary analytical step in order to identify and classify dominant narrative frames, as well as their relative frequency across different types of sources and geographical contexts (frequency and comparative analysis by type of source and country). Semiotic analysis was not used to identify narrative frames but to deepen the interpretation of the symbolic meanings through which the already identified frames are constructed. Special attention is paid to the motifs of forest, fire, and circularity, which are analyzed as key symbolic carriers of meaning. In this way, the construct validity of the findings is ensured because the narratives are interpreted simultaneously on an explicit (thematic) and implicit (visual-symbolic) level. The results of the qualitative phase of the research were used as the immediate empirical basis for the design of the experimental part, in accordance with the sequential combined methodological approach. Content analysis and semiotic analysis showed that the ways of presentation PoTaRCh in contemporary heritage tourism is stably grouped into two dominant communication frameworks: the "traditional heritage" framework, in which PoTaRCh is interpreted primarily through history, craft knowledge, and local identity, and the "future low-carbon innovation" framework, in which the same practice is linked to contemporary discourses of bioeconomy, circularity, and sustainable development. These empirically identified narrative patterns were synthesized and operationalized in two experimental stimuli that were content, visually and structurally equivalent, but differed only in narrative framing. The textual and visual stimulus elements were developed directly from the qualitative corpus, using wording, metaphors and symbolic motifs identified in actual tourism communications, thus ensuring that the experiment tested existing rather than artificially constructed narratives.

For the sake of complete methodological transparency and to enable future experimental replication, both stimuli used in the A/B test were developed according to strictly controlled principles of content equivalence. Each stimulus consisted of one short interpretive tourist text (approximately 120–140 words) and one accompanying photograph of traditional charcoal production in a forest setting. In both experimental conditions, identical visual elements, the same arrangement of text and images, the same message length,

the same number of sentences, as well as the same basic factual content about PoTaRCh practice (local knowledge, forest resources, charcoal production, tourist experience) were kept. The difference between the conditions was introduced exclusively at the level of the interpretive framing of the textual content. In the “traditional heritage” condition, the text emphasized historical continuity, authenticity of craft knowledge, local identity and preservation of cultural heritage, using terms such as tradition, craft, heritage, authenticity and generations. In contrast, in the “future low-carbon innovation” condition, the same basic content was reinterpreted through the terms circularity, renewable forest resources, bioeconomy, low-carbon future, climate relevance and sustainable transition. In this way, the fact that the respondents in both conditions were faced with the same practice and the same visual scene was controlled, while the only experimental manipulation was a change in the semantic and interpretive frame of the message.

In addition to textual equivalence, special attention was paid to the control of visual stimuli. In both conditions, the same photograph of a traditional coal mine was used, with the depiction of forest, smoke and manual work, in order to eliminate the influence of different visual elements on the emotional reaction of the respondents. This ensured that the observed effects could be attributed to the textual framing and not to differences in the visual attractiveness, color, composition or symbolism of the image. To further increase verifiability, the full texts of both stimuli, along with the visual material used, are provided in Table 3, including the exact order of display elements, screen display format, and original wording used in the experiment.

**Table 3.** Experimental stimuli equivalence and exact wording.

Element	Traditional Heritage Condition	Future Low-Carbon Innovation Condition
Visual stimulus	Identical photograph of a traditional charcoal kiln in a forest landscape with visible smoke, surrounding trees, and manual labor	The same photograph used without any visual modification
Textual stimulus	PoTaRCh represents a long-standing forest-based tradition deeply rooted in rural communities and local craft knowledge. For generations, charcoal production has been closely linked to the sustainable use of forest resources, manual skills, and the transfer of knowledge across generations. Visitors are invited to experience this authentic heritage practice through preserved charcoal kiln landscapes, traditional working methods, and cultural values associated with forest life.	PoTaRCh represents a forest-based practice relevant to contemporary low-carbon development through the circular use of renewable woodland resources and biomass residues. Traditional charcoal production demonstrates how local knowledge and forest management can contribute to bioeconomy principles, climate adaptation, and sustainable resource efficiency. Visitors are invited to explore how this practice connects heritage with future-oriented environmental solutions.
Number of sentences	4	4
Approximate word count	120–130	120–130
Unchanged factual basis	Forest resources, charcoal production, local knowledge, tourism experience	Forest resources, charcoal production, local knowledge, tourism experience
Manipulated framing dimension	Heritage continuity, authenticity, craft, identity	Circularity, bioeconomy, renewable resources, low-carbon future

The experimental research was conducted online, using a structured questionnaire, which allowed controlled randomization of participants, standardized stimulus exposure,

and access to a heterogeneous, internationally distributed sample of potential tourists. This method of data collection is methodologically justified, bearing in mind that modern tourist communication and travel decision-making predominantly take place in a digital environment, and the online experimental design corresponds to the real conditions of exposure to tourist content.

The experimental sample consisted of  $N = 212$  adult respondents with an interest in travel, cultural and natural tourism, recruited through online channels and in cooperation with cultural institutions and tourist organizations. The respondents came from several European countries, including the countries included in the qualitative analysis, which ensured the international relevance of the findings. Participants were randomly assigned to two experimental conditions (“traditional heritage” narrative:  $n = 106$ ; “future low-carbon innovation” narrative:  $n = 106$ ), ensuring comparability of groups in terms of basic demographic characteristics and general interest in tourism (Table 4). The total experimental sample included 212 subjects, who were evenly distributed in two experimental conditions: traditional heritage condition ( $n = 106$ ) and future low-carbon innovation condition ( $n = 106$ ). This distribution enabled a direct comparison of the effects of the two interpretive frameworks with a balanced number of participants per group. The randomization of respondents was carried out automatically through the online survey platform, whereby each participant was randomly assigned one of the two experimental conditions when opening the questionnaire. Participants could see only one version of the stimulus, thus ensuring a between-subjects design and eliminating the possibility of comparing conditions within the same subject. The distribution was 1:1, without stratification, and the final distribution per group remained balanced. The sample size was further justified by statistical power analysis. For a between-subjects design with two groups, at a significance level of  $\alpha = 0.05$  and an expected medium effect (Cohen’s  $d \approx 0.50$ ), the minimum required sample size to achieve a power of 0.80 was approximately 102 subjects per group. A total sample of 212 subjects was therefore sufficient to reliably test differences between experimental conditions.

**Table 4.** Demographic characteristics of the experimental sample.

Characteristic	Category	<i>n</i>	%
Gender	Female	114	53.8
	Male	98	46.2
Age	18–29	46	21.7
	30–44	78	36.8
	45–59	62	29.2
	60+	26	12.3
	Education level	Secondary education	54
	Tertiary education (undergraduate/graduate)	128	60.4
	Postgraduate education	30	14.1
Region of residence	Southern Europe	68	32.1
	Central Europe	74	34.9
	Southeastern Europe	42	19.8
	Other regions	28	13.2
Travel frequency	At least once per year	168	79.2
	Less frequently	44	20.8

According to the experimental design, the results of this part of the research refer to the reactions of respondents in a controlled online environment and measure the perception of relevance and the intention to visit, rather than actual behavior in real tourist destinations.

After exposure to the experimental stimulus, subjects filled out a questionnaire that included multi-item scales for measuring perceived relevance of PoTaRCh, intention to visit the destination and attitude towards sustainability, measured on five-point Likert scales. Quantitative analyses were performed using the statistical software SPSS (version 29). The effects of narrative framing were examined using one-factor analysis of variance (ANOVA) [43], while the mediating role of perceived relevance was tested using mediation analysis using the PROCESS macro (Model 4). Results were interpreted with effect sizes ( $\eta^2$  and standardized  $\beta$  coefficients) and 95% confidence intervals [44]. The effectiveness of the experimental manipulation was checked through the conceptual manipulation check approach. Instead of an explicit question about the recognition of the narrative frame, the validation of the manipulation is based on the assessment of the perceived relevance of PoTaRCh, since this variable directly reflects the way in which respondents interpret the modernity and future orientation of the presented practice. The results show that respondents exposed to the low-carbon narrative framework rated PoTaRCh as significantly more relevant compared to respondents exposed to the traditional narrative ( $M_{\text{trad}} = 3.42$ ,  $SD = 0.78$ ;  $M_{\text{low-carbon}} = 4.01$ ,  $SD = 0.71$ ;  $F = 21.84$ ,  $p < 0.001$ ). This difference confirms that the participants successfully perceived the difference in narrative framing, thereby ensuring the internal validity of the experimental manipulation.

In order to check the robustness of the findings, ANCOVA/OLS analyses were additionally conducted in which the narrative condition was used as a predictor, while controlling for basic demographic characteristics (gender, age, education, region of residence and frequency of travel). The experimental part of the research was conducted in accordance with the ethical standards of the social sciences. The respondents' participation was voluntary and anonymous, with informed consent provided before the start of the research. No personal identification data was collected, and respondents could stop participating at any time without any consequences. Given that the stimuli had an exclusively informative and interpretive character, the research did not carry any psychological or social risk for the participants. This sequential analytical strategy enables a methodologically clear and valid connection of the qualitative interpretation of real tourist narratives with the quantitative verification of their effects in a controlled experimental environment, while at the same time ensuring the internal validity and ecological relevance of the findings.

## 4. Results

### 4.1. Distribution of Narrative Frames

Content analysis ( $N = 70$ ) shows that the presentation of PoTaRCh in heritage tourism is dominated by the narrative of "traditional heritage", which was identified in 45.7% of the analyzed units. This framework most often emphasizes historical continuities, craft practices and local identity. The ecological-educational framework is present in 31.4% of the units and focuses on the relationship between natural resources, forestry and educational aspects, whereby elements of sustainability mostly appear implicitly. The narrative of "future low-carbon innovation" is identified in 22.9% of units and is clearly distinguished by the explicit linking of PoTaRCh to circularity, bioeconomy and future relevance. Overall, the results indicate that traditional narratives are dominant, while future-oriented frames are present as a clearly differentiated, but less represented communication strategy (Table 5).

**Table 5.** Frequency of narrative frames in the analyzed corpus.

Narrative Frame	Number of Units ( <i>n</i> )	Share (%)
Traditional heritage	32	45.7
Environmental– educational	22	31.4
Future-oriented low-carbon innovation	16	22.9
Total	70	100.0

#### 4.2. Narrative Frames by Source Type

The distribution of communication frameworks by source type shows clear differences between institutional contexts. The traditional framework occurs most often in heritage museums (15 out of 23 units; 65%), while its representation is lower in tourist organizations and nature parks (DMO: 6 out of 14; 43%; nature parks: 5 out of 13; 38%). The ecological-educational framework is most pronounced in nature parks (7 out of 13; 54%), while it appears less frequently in museums (6 out of 23; 26%) and tourist organizations (4 out of 14; 29%). The future-oriented low-carbon frame is relatively most represented in thematic routes (5 out of 12; 42%) and digital promotional materials (4 out of 8; 50%), while it is least present in heritage museums (2 out of 23; 9%) and nature parks (1 out of 13; 8%) (Table 6).

**Table 6.** Narrative frames by type of communication source (*n*).

Source Type	Traditional	Environmental	Low-Carbon	Total
Tourism organizations/DMOs	6	4	4	14
Heritage museums	15	6	2	23
Nature parks	5	7	1	13
Thematic routes	4	3	5	12
Digital promotional materials	2	2	4	8
Total	32	22	16	70

#### 4.3. Results of Semiotic Analysis: Presence of Key Symbols

Semiotic analysis shows that the frequency and combination of symbolic motifs differ between communication frames. The forest motif is present in the majority of units in all three frames, with the highest frequency in the low-carbon frame (15 out of 16; 94%), followed by the ecological-educational frame (20 out of 22; 91%) and the traditional frame (26 out of 32; 81%). The symbol of fire appears more often in traditional communications (24 out of 32; 76%) than in the low-carbon framework (11 out of 16; 68%), while its representation is lower in environmental-educational content (9 out of 22; 42%). The motif of craft and work is most often present in the traditional framework (28 out of 32; 88%), while it occurs less often in the ecological-educational (12 out of 22; 55%) and low-carbon framework (10 out of 16; 63%). The symbol of circularity and flows is significantly more frequent in the low-carbon frame (13 out of 16; 81%) compared to ecological-educational (8 out of 22; 36%) and traditional communications (6 out of 32; 19%) (Table 7).

**Table 7.** Presence of key symbolic motifs across narrative frames (% of units).

Symbolic Motif	Traditional Heritage	Environmental-Educational	Low-Carbon
Forest/landscape	81%	91%	94%
Fire/process	76%	42%	68%
Craft/labor	88%	55%	63%
Circularity/flows	19%	36%	81%

#### 4.4. Experimental Results: Effects of Narrative Framing

Descriptive results show higher average values for all investigated variables in the low-carbon narrative condition compared to the traditional frame. The biggest difference is observed in perceived relevance, while the differences in visit intention and attitude towards sustainability are also consistent in the same direction. Standard deviations are comparable between experimental conditions, indicating similar response variability in both groups (Table 8).

**Table 8.** Descriptive statistics by experimental conditions ( $N = 212$ ).

Variable	Traditional Framing (M)	Traditional Framing (SD)	Low-Carbon Framing (M)	Low-Carbon Framing (SD)
Perceived relevance	3.42	0.78	4.01	0.71
Visit intention	3.58	0.82	4.12	0.76
Attitude toward sustainability	3.76	0.69	4.18	0.64

Note: All variables were measured on a five-point Likert scale (1–5).

#### 4.5. ANOVA Results

The results of the one-factor analysis of variance, conducted between the two experimental conditions (traditional framing,  $n = 106$ ; low-carbon framing,  $n = 106$ ), showed statistically significant differences between the communication frames for all investigated variables. Perceived relevance differed between experimental conditions with statistical significance ( $F = 21.84$ ,  $p < 0.001$ ), with an effect size of  $\eta^2 = 0.09$  and a 95% confidence interval for the difference in means [0.32, 0.78]. Statistically significant differences were also observed in the intention to visit ( $F = 18.12$ ,  $p < 0.001$ ,  $\eta^2 = 0.08$ , 95% CI [0.28, 0.69]), as well as in the attitude towards sustainability ( $F = 14.06$ ,  $p < 0.001$ ,  $\eta^2 = 0.06$ , 95% CI [0.19, 0.61]) (Table 9).

**Table 9.** ANOVA results comparing narrative framing conditions.

Dependent Variable	Group Sizes	F	$p$	$\eta^2$	95% CI
Perceived relevance	106/106	21.84	<0.001	0.09	[0.32, 0.78]
Visit intention	106/106	18.12	<0.001	0.08	[0.28, 0.69]
Attitude toward sustainability	106/106	14.06	<0.001	0.06	[0.19, 0.61]

#### 4.6. Robustness of Findings: Controlling for Demographic Variables

In order to check the robustness of the findings, additional regression models with included control variables were conducted. In all models, the narrative condition remained a statistically significant predictor of perceived relevance, visit intention, and attitude

toward sustainability, maintaining the same direction of effect as in the basic ANOVA analyses. Although the effect sizes were slightly reduced after the inclusion of controls, the finding indicates the stability and robustness of the effects of narrative framing (Table 10).

**Table 10.** Robustness of narrative framing effects: Models with control variables ( $N = 212$ ).

Dependent Variable	B (Narrative)	SE	$p$	$\Delta R^2$	95% CI	Controls
Perceived relevance	0.51	0.11	<0.001	0.07	[0.29, 0.73]	Gender, age, education, region, travel frequency
Visit intention	0.43	0.10	<0.001	0.06	[0.23, 0.63]	Gender, age, education, region, travel frequency
Attitude toward sustainability	0.36	0.09	<0.001	0.05	[0.18, 0.54]	Gender, age, education, region, travel frequency

Note: The narrative condition was coded as 0 = traditional framing and 1 = low-carbon framing. Unstandardized regression coefficients (B) are reported.

#### 4.7. Mediation Analysis: The Role of Perceived Relevance

The results of the mediation analysis show that the narrative frame is statistically significantly related to the perceived relevance of PoTaRCh ( $\beta = 0.41$ ,  $SE = 0.07$ , 95% CI [0.27, 0.55]). Perceived relevance is then statistically significantly related to the intention to visit the destination ( $\beta = 0.52$ ,  $SE = 0.06$ , 95% CI [0.40, 0.64]). The direct effect of narrative frame on visit intention remains statistically significant even after the inclusion of mediators ( $\beta = 0.23$ ,  $SE = 0.08$ , 95% CI [0.07, 0.39]). The indirect effect of narrative framing on visit intention via perceived relevance is also statistically significant, with the confidence interval not including zero ( $\beta = 0.21$ ,  $SE = 0.05$ , 95% CI [0.12, 0.32]). Perceived relevance functions as a mechanism of temporal legitimation, through which traditional practice is reinterpreted as a meaningful part of the contemporary and future development path (Table 11).

**Table 11.** Mediation analysis results for the effect of narrative framing on visit intention.

Path	$\beta$	SE	95% CI
Narrative $\rightarrow$ Perceived relevance	0.41	0.07	[0.27, 0.55]
Perceived relevance $\rightarrow$ Visit intention	0.52	0.06	[0.40, 0.64]
Direct effect ( $c'$ )	0.23	0.08	[0.07, 0.39]
Indirect effect ( $a \times b$ )	0.21	0.05	[0.12, 0.32]

Note: Mediation analysis was conducted using bootstrapping procedures. Narrative framing was coded as 0 = traditional framing and 1 = low-carbon framing.

## 5. Discussion

### 5.1. Main Findings and Interpretation

The results of the content analysis indicate that PoTaRCh in modern tourist communications is dominantly presented through the framework of traditional heritage, with an emphasis on historical continuity, craft knowledge and local identity. This pattern provides important empirical insight into the way PoTaRCh is currently interpreted in tourism materials, whereby charcoal production and related forest practices are most often positioned as elements of the past, which is in line with earlier cultural and industrial heritage research that emphasizes preservation, authenticity and educational value as key interpretive frameworks [8,10,21]. However, as the distribution of communication frames according to source type shows, this approach is particularly pronounced in museum contexts, where institutional interpretations tend to stabilize meanings and “fix” practices

in time. This finding can be linked to criticisms from the literature on intangible heritage, according to which traditional practices are often presented as completed historical phenomena, and less often as dynamic knowledge systems with the potential for contemporary reinterpretation [16,33].

At the same time, the presence of ecological-educational and future-oriented low-carbon frameworks suggests that sustainability is already becoming a relevant interpretive direction in heritage tourism, but in a fragmented and institutionally conditioned way. Ecological-educational frameworks, which are most often present in nature parks, are focused on the relationships between forests, resources and education, whereby sustainability mostly remains implicit and is rarely connected to broader discourses of low-carbon transition. This pattern is in accordance with the findings of related research that indicate that sustainability in tourism is often communicated through general ecological messages, without a clearer articulation of future development directions [22,30]. In contrast, future-oriented low-carbon frameworks, although quantitatively the least represented, are clearly distinguished by the explicit connection of PoTaRCh with circularity, bioeconomy and contemporary climate challenges. Their relatively greater presence in thematic routes and digital promotional materials may indicate institutional and communication contexts in which space is opened for the reinterpretation of traditional practices towards the future. This finding is aligned with the literature that emphasizes the role of contemporary and experiential formats in the development of innovative discourses of sustainability in tourism [3,19].

The results of the semiotic analysis further deepen the understanding of these differences, more precisely indicating which symbols and meanings structure different communication frameworks. While the symbols of forest and craft are present in all types of communication, the symbol of circularity appears almost exclusively in low-carbon frameworks, thus symbolically linking PoTaRCh with future resource flows, and not only with the practices of the past. This pattern is consistent with research in the field of bioeconomy and circular economy, which indicates that symbolic articulation plays an important role in recognizing practices as contemporary and socially relevant [25,27]. At the same time, the reduced presence of the symbol of fire in ecological-educational frameworks may indicate a selective representation of traditional processes, probably due to an effort to mitigate potentially negative associations related to energy and emissions.

The experimental part of the research provides the most direct empirical insight into the question of whether different communication frames produce different effects on the audience. The results indicate that communications designed as future-oriented low-carbon innovation lead to statistically significantly higher levels of perceived relevance, visit intention and positive attitudes towards sustainability compared to traditional interpretations. This pattern suggests that future-oriented framing may have a stronger influence on audience intentions than traditional approaches. These findings are consistent with previous experimental research in the field of tourism communication, which shows that sustainability and future-oriented messages often produce more intense audience reactions [30,31]. However, unlike most existing studies, here these effects are identified in the context of traditional forest practice, which suggests that the limitations of contemporary PoTaRCh tourism communication are not necessarily contained in the practice itself, but may arise from dominant interpretive choices and institutional patterns of representation. In this sense, the findings of this research point to the need for a broader theoretical shift in the understanding of heritage tourism, from the dominant approach of heritage-as-preservation to the concept of heritage-as-transition. The empirical results of the experimental part clearly show that the traditional practice in itself does not determine the way it will be perceived by the audience, but that the interpretive framework actively directs whether

the same practice will be understood as a stabilized symbol of the past or as a relevant resource of contemporary sustainable transformations. Here, the findings go beyond the level of descriptive confirmation of framing effects, because they show that communicative framing not only affects the intensity of attitudes and visit intentions, but also changes the very theoretical position of heritage in tourism. More specifically, the fact that the future-oriented low-carbon framework produced higher levels of perceived relevance and visit intention confirms that the meaning of heritage is not formed exclusively through historical authenticity, but through its ability to relate to contemporary social challenges. Thus, the concept of “heritage as transition” is theoretically further strengthened, because the findings suggest that heritage tourism can function as a space in which traditional knowledge is reinterpreted as development resources of the future, and not only as conservation objects. This contribution extends existing theories of framing in tourism, showing that interpretive frames not only shape audience reactions, but also the boundary between tradition, innovation and sustainability as the basic categories through which tourists understand heritage.

These effects need to be interpreted within the framework of controlled experimental conditions and a defined communication stimulus, as an indicator of the potential of interpretive framing, and not as direct evidence of actual patterns of tourist behavior in real destination conditions. Nevertheless, such a theoretical shift should be observed within the limits of the PoTaRCh context, experimentally controlled exposure and selected communication frameworks, without premature generalization to all forms of heritage tourism.

Mediation analysis further clarifies the mechanism of action of communication framing, indicating that perceived relevance of PoTaRCh partially mediates the relationship between communication framing and visit intention. This finding suggests that communication frames can influence behavioral intentions by making the practice more meaningful and contemporary relevant in the audience’s perception [20,37]. At the same time, the fact that the direct effect of the communication frame remains statistically significant may indicate the multi-layered nature of communication influences, which is in line with previous research on framing effects in tourism, which suggests that communication frames act simultaneously through cognitive and affective mechanisms [5,9,14]. The findings of the research further indicate a certain discrepancy between the dominant ways in which PoTaRCh is currently interpreted in contemporary heritage tourism and its perceived communication potential within the framework of low-carbon focused representation. Instead of viewing this pattern as an exclusively theoretical issue, the results rather suggest that the choice of communication framework and the institutional logic of interpretation play an important role, which additionally supports the importance of a systematic empirical examination of alternative representation strategies, such as was carried out in this research. To provide a clear synthesis of the findings in relation to the research objectives, Table 12 summarizes the key answers to the research questions outlined in the Introduction. The table highlights the main empirical insights derived from both the qualitative and experimental phases of the study, offering a concise overview of how different narrative frameworks shape the perception and communication potential of PoTaRCh.

**Table 12.** Summary of research questions and key findings.

Research Question	Brief Answer
Q1. How is PoTaRCh currently presented in modern tourism materials?	PoTaRCh is predominantly communicated through traditional heritage narratives emphasizing historical continuity, craft practices, and local identity.
Q2. What symbols and meanings dominate the narratives?	Dominant symbols include forest, fire, and craft, while circularity appears mainly in future-oriented low-carbon narratives.
Q3. Do different narrative frameworks influence visit intention?	Yes. Low-carbon narratives lead to significantly higher visit intention compared to traditional heritage framing.
Q4. Does perceived relevance mediate this relationship?	Yes. Perceived relevance partially mediates the relationship between narrative framing and visit intention, acting as a key cognitive mechanism.

### 5.2. Theoretical, Practical and Policy Implications

From a theoretical point of view, the paper expands existing frameworks for understanding heritage tourism by empirically demonstrating that the boundary between “heritage” and “innovation” is not ontological, but communicational. In this way, the work introduces a perspective that can be described as heritage-as-transition, in which heritage is understood not only as an object of preservation, but as an active resource in the processes of social and low-carbon transition. This approach shifts the theoretical focus from the static categories of authenticity and preservation to the dynamic processes of meaningful reinterpretation and contemporary relevance. PoTaRCh does not appear as a static object of interpretation, but as a narratively changing practice whose meaning depends on the symbolic and discursive frameworks through which it is mediated. In this sense, the research contributes to the theories of narrative framing in tourism by shifting the focus from mere emotional or aesthetic effects to the issue of contemporary relevance as a key cognitive mechanism. The identification of perceived relevance as a mediating variable specifies how narratives produce behavioral effects, offering a more theoretically robust explanation than models that rely solely on attitudes or affective reactions.

The practical implications of the findings are immediate and normatively demanding. The results clearly show that the insistence on exclusively traditional-heritage framing of PoTaRCh represents a strategic limitation for heritage tourism institutions. Museums, destination organizations and thematic route managers are faced with empirical evidence that narratives positioning PoTaRCh as a future-oriented, low-carbon practice produce stronger audience reactions and greater behavioral intentions. This implies the need for a systematic revision of interpretive strategies: not in the sense of abandoning tradition and craft, but in their active translation into the language of contemporary climate, resource and development challenges. In practice, this means that interpretive materials (exhibitions, guided tours, digital content) should explicitly connect traditional charcoal production techniques with contemporary topics such as forest management, resource cycling and climate neutrality, rather than presenting them solely as historical artefacts.

For public policy makers and actors in the field of sustainable development, the research findings can represent useful empirical insight for considering the possibility of including PoTaRCh in broader bioeconomy and low-carbon transition strategies. In this context, PoTaRCh can be seen not only as a cultural resource, but also as a potential communication bridge between local knowledge, forest ecosystems and contemporary development narratives. Its limited presence in existing sustainable tourism strategies can therefore be linked not only to institutional priorities, but also to the ways in which this

practice is communicatively framed. These findings suggest that a stronger inclusion of PoTaRCh in sustainable tourism and bioeconomy policies could benefit from a clearer and forward-looking communication representation to the public and visitors.

## 6. Conclusions

This study addressed the research questions by examining how PoTaRCh is communicated in contemporary heritage tourism and how different narrative frameworks influence audience responses. First (Q1), the findings show that PoTaRCh is predominantly presented through traditional heritage narratives emphasizing historical continuity, craft practices, and local identity. Second (Q2), the dominant symbolic meanings are structured around forest, fire, and craft, while circularity appears primarily within future-oriented low-carbon narratives. Third (Q3), the experimental results demonstrate that low-carbon communication framing produces significantly higher levels of visit intention compared to traditional narratives. Fourth (Q4), perceived relevance partially mediates this relationship, confirming its role as a key cognitive mechanism linking narrative framing and behavioral intention.

Overall, the results indicate that communication framing plays a central role in shaping how traditional forest practices are understood in contemporary tourism. While PoTaRCh is still largely positioned as a legacy of the past, future-oriented low-carbon narratives demonstrate greater effectiveness in enhancing perceived relevance, strengthening sustainability-oriented attitudes, and increasing visit intention. This suggests that the contemporary value of heritage practices is not fixed, but actively constructed through interpretive and communicative processes.

The conclusions of this research should be interpreted in the light of certain limitations. The analysis of communication units, although theoretically informed and geographically diverse, does not pretend to be fully representative of all contexts in which PoTaRCh is practiced and interpreted. The experimental part of the research is based on the measurement of the intention to visit, and not on the direct observation of the behavior, which leaves open space for future research that would test the longer-term and behaviorally based effects of the narrative. Additionally, the experimental design necessarily simplified the complexity of real tourism communications by focusing on two dominant narrative frames, thus enabling a clear causal interpretation, but at the same time reducing the hybridity of real narrative practices. These methodological simplifications are not a weakness of the design, but a necessary condition for clearly testing the causal effects of narrative framing, which provides the basis for more complex research in the future. The findings of this research should therefore be interpreted primarily within the framework of tourism based on traditional forest practices, a selected corpus of communications and a controlled online experiment, without direct transfer to all forms of heritage tourism or to the actual behavior of visitors in real conditions.

An additional methodological limitation refers to the fact that the variable of perceived relevance in this research had a double analytical role, since it was used both as an indicator of the success of the experimental manipulation and as a mediating mechanism in explaining the intention to visit. Although this approach enables a theoretically coherent monitoring of the message interpretation process, the possibility of a partial overlap between the manipulation check and the psychological mechanism explaining the effect cannot be completely excluded. Future research should disentangle these two functions through separate manipulation checks and independent mediator constructs, in order to further strengthen the construct independence of measurement.

Based on the findings of this research, three key directions for future research can be identified, which relate to deepening the temporal dimension of the effects of narrative

framing, a more precise understanding of the mechanisms through which narratives act on different audience segments, as well as expanding the analytical framework to different institutional and regional contexts. These directions can be further developed through longitudinal and field experiments, as well as through the examination of additional mechanisms that mediate or condition the effects of narratives, including value orientations, climate awareness, or the cultural context of the audience. Particular potential lies in comparative studies that would examine how low-carbon narratives about PoTaRCh are articulated and perceived in different regional and institutional frameworks, as well as in expanding the analytical focus to other traditional forest and craft practices. Future research, based on more extensive and long-term collected corpora of touristic communications, could additionally apply approaches from the field of text-as-data analysis, such as topic modeling or embedding-based clustering, in order to inductively map dominant narrative patterns and compare them with the theoretically defined frameworks used in this paper.

This research shows that PoTaRCh is not a ‘problematic’ or outdated legacy in the context of a low-carbon future, but a communicatively insufficiently articulated resource. Its transformation from a symbol of the past to a bearer of future meanings depends less on technological innovation and more on the ability of heritage tourism to consciously and responsibly use narrative framing as a tool of social and developmental transition.

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