

# The interplay of context, experience, and emotion at World Heritage Sites: A qualitative and machine learning approach

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This study illustrates how user-generated content, posted in the form of heritage site reviews on social media, can serve to reveal the relationship between the co-created interpretation of World Heritage Sites (WHSs) — in terms of values, tangible and intangible attributes, as well as site visit logistics — and the emotional experience of the site. Two WHSs are taken as a case study. More than 2000 reviews were retrieved from TripAdvisor and analyzed through the application of a mixed-method that integrates qualitative digital ethnography and machine learning. Results show that TripAdvisor reviews capture tourists' emotional reactions from personal encounters with heritage and provide insights into the range of values — including the social, historic, and aesthetical values — that visitors experience when engaging with aspects of the past to associate meanings for the present. Results also show that the relation between experiences gained at WHSs and contextual aspects is not linear, instead, it is a complex one that results from the interaction of different factors and their associated sentiments. We discuss our results by reflecting on their theoretical and practical implications.

Keywords: World Heritage; machine learning; visitors' experience; user-generated content; heritage values; value co-creation

## 1. Introduction

The UNESCO *Convention Concerning the Protection of the World Cultural and Natural Heritage* introduced the concept of *outstanding universal value* (OUV) as a prerequisite for the inscription of a heritage property on the World Heritage List (UNESCO, 1972: Article 11, paragraph 2). Every listed place meets a particular set of criteria and has its own statement of significance based on tangible and intangible attributes and their associative values. Although World Heritage Sites (WHSs) are recognized as belonging to the world's heritage, they have a range of different values for locals and tourists who interact with, understand the significance of, give meaning to, and experience the place in diverse ways (Harrison, 2010).

Understanding and managing visitors' experiences is one of the core responsibilities of the sustainable tourism industry (Byon & Zhang, 2010; Miller et al., 2019) because it influences revisit

intentions and recommendations to others to visit the destination (Castellanos-Verdugo et al., 2016; Kim, 2018; Scarpi et al., 2019; Thapa & Lee, 2017). In turn, the sustained visitor traffic brings a positive impact on the economic sustainability of the site as it generates benefits to the local community by contributing to job opportunities, poverty reduction, and conservation practices (Miller et al., 2019). Moreover, visitors' experiences can influence the conservation-related behaviors of visitors and hence limit the negative impact of tourism on the environmental and socio-cultural resources (Adelman et al., 2010; Miller et al., 2019). In this regard, the World Tourism Organisation (UNWTO), and the World Travel and Tourism Council (WTTC) define sustainable tourism as a form of tourism that fulfills the needed outcomes of tourism by ensuring tourists a meaningful experience, while protecting the hosting community's natural, historic, social and cultural environment (UNWTO, 2005; WTTC, 2020).

Along with this scholarship, current approaches to the sustainable management of cultural heritage have called for the application of a value-based approach to heritage conservation and management that considers place experiences, meanings, and values ascribed to heritage by various stakeholders, including the local community and the tourists (Australia ICOMOS, 2013; UNESCO, 2011). Within critical tourism studies, scholars acknowledge the agency of tourists in co-constructing the heritage experience, meaning, and value of heritage places (Zhang & Smith, 2019) and have argued that while the interpretation of heritage at WHSs is often dominated by the official discourse, informal agents, including tourists, can adapt, negotiate, and contest it to pursue their interests (Zhu, 2018). In the digital age, heritage activities are increasingly extending to online spaces and social media platforms are providing a window to non-expert perceptions of heritage as members of virtual communities discuss meanings, construct shared experiences and values, and generate alternative narratives to heritage (Freeman, 2018; Lewis et al., 2010; Silberman & Purser, 2012). As place experiences are drivers of value creation (Sørensen et al., 2018), visitors who share their experiences on social media become agents of value co-creation. Although the application of user-generated content (UGC) on social media is starting to receive increased attention in tourism research, the focus has been mostly on amenities: accommodation, restaurants, and hospitality (Li et al., 2018; Schuckert et al., 2015); In this study, we use UGC to understand the perceived experience of visitors at WHSs. Thus, the question we address is: how to identify and measure the interplay of contextual site aspects with co-created experiences and the emotions they elicit?

There is already a sizeable body of research on visitors' experience at destinations and UGC in tourism studies. However, few empirical studies have addressed visitors' experience in a WH context through the emotional lens provided by UGC (ex. Baniya et al., 2020; Gursoy et al., 2021; Stoleriu et al., 2019; Xu et al., 2021). This research seeks to expand the existing body of literature on this topic. We show that the use of online UGC with machine learning techniques can extract the experiences and values ascribed to heritage sites by visitors.

Furthermore, we do this by examining two WHSs in Lebanon (Byblos and Baalbek) – a location not commonly featured in the WH literature. It is believed that this study will provide knowledge that may help create a starting-point for future studies at these sites. Moreover, unlike existing studies that have thus far analyzed user-generated textual data in a single language (Guo et al., 2017; Stoleriu et al., 2019), this investigation extracts Trip Advisor reviews in all languages to ensure the inclusion of different cultural backgrounds in the investigation. This paper is divided into five sections. We begin by establishing a framework that incorporates three bodies of literature emphasized by our case study – visitors' experiences at heritage sites, visitors' perceived values at WHSs, and visitors' online co-creation of perceived experience. Then, we present the case study and the applied mixed-method integrating digital ethnography and machine learning for the analysis of reviews posted on TripAdvisor. This kind of data analysis is advantageous as the information is not directed by a survey, but is instead spontaneous and focuses on users' own expressions. The next section presents the findings. First, we identify visitors' freely expressed values of their heritage experience and the contribution of the interplay of the different contextual aspects to the visitors' experience. Then, we draw on emotional responses to WHSs experiences. The last section discusses the results by reflecting on their theoretical and practical implications.

## **2. Theoretical Framework**

### ***2.1 Visitors' experience at heritage sites***

Tourism studies have enriched the debate over the agency of non-expert users of heritage (Khirfan, 2016; Zhang & Smith, 2019) and contributed to a growing body of literature aimed at understanding the socio-cultural experiences of tourists (Cetin & Bilgihan, 2016; Duim, 2007; Tribe, 2007). Experience is a difficult construct to define and measure because of its multiple elements and individualized personal nature (Knutson et al., 2007). Thus, studies examining the

socio-cultural experiences of tourists do so in terms of psychological well-being, sense of discovery, sense of belonging, and knowledge gains among other cognitive and affective aspects (Huang et al., 2019; Jafari et al., 2013; Ponsignon & Derbaix, 2020).

At least three research streams address the factors that contribute to the visitor experience at heritage sites. The first emphasizes the link between the physical environment and heritage site attributes (spatial layout, design, elements related to aesthetic appeal, and atmospherics) and overall satisfaction with the cultural heritage experience (Bitner 1992; Huh, Uysal, and McCleary 2006; Bonn et al. 2007; de Rojas and Camarero 2008). The second argues that the heritage tourism experience is determined by people's personal interpretation and connections to the place they visit, their expectations, and cultural norms rather than the innate historical attributes of the site (Poria et al., 2003; Timothy, 2018). In this approach, scholars provide insights into the relationship between the physical and the imaginary realms of the heritage tourism experience (Knudsen & Greer, 2016). The third suggests a range of factors that contribute to the visitors' experience, such as accessibility, pre-visit information, the interpretation of heritage sites, heritage preservation, visitors' perception, mobility, smell, and other factors (Laws 2007; Kempiak et al. 2017; Alazaizeh et al. 2019).

Falk and Dierking (1992, 2000) proposed the interactive experience model to accommodate the complexity and diversity surrounding the heritage visitation and experience. The model involves three overlapping contexts: the personal (motivations, emotions, knowledge, and personal interests), the sociocultural (beliefs, customs, shared values, and behavior), and the physical (the heritage setting). Pine and Gilmore (1998) developed the concept of the experience economy and identified four realms of experience – entertainment, esthetics, education, and escapism – that are distinguished at two levels: (1) involvement (active or passive participation) and (2) connection with the environment in terms of absorption (mental involvement) or immersion (physical involvement). This typology of experience has been widely used in empirical studies aimed at understanding tourism experiences (Hosany & Witham, 2010; Oh et al., 2007; Radder & Han, 2015; Suntikul & Jachna, 2016).

The medium of WHS interpretation – guided/non-guided, formal/informal, audio panels/printed materials, or digital/visual reconstruction – plays an important role in shaping visitors' experience as it helps them learn about the history of the site, make sense of it, and understand its significance (Weng et al., 2020). Several world bodies, including the UN, have

called on the interpretation of WHSs to (1) be inclusive; (2) communicate all aspects of the site's historical, cultural, social, and environmental values; and (3) encourage individuals to reflect on their own perceptions of the site (ICOMOS, 2008; Nowacki, 2021; UNESCO, 2018). Different interpretive methods can vary along a continuum between participative interpretation – which stimulates tourist creative expression and sense-making – to a positivist interpretation – that emphasizes passive consumption of the scientific narrative of the site (Reisinger & Steiner, 2006). Participative heritage interpretation is a form of experience co-creation (Ross, 2020), in which tourists are encouraged to engage meaningfully and emotionally with the historic site and to share their individual interpretations of it, therefore are given an active role to construct narratives based on their values, beliefs, knowledge, and motivations (Liu & Lin, 2021; Prebensen et al., 2018; Ross, 2020).

Even though scholars have extensively studied visitors' experience at heritage attractions and experiences mediated by the medium of interpretation, this research investigates experiences at WHSs as freely expressed and shared by visitors without the intervention of a survey or interview. This study approaches the construct of experience entirely from the perspective of visitors with no biasing influences from the researcher.

## ***2.2 World Heritage and visitors' perceived values***

To be inscribed on the WH list, a site needs to meet the test of authenticity as well as one or more of the six cultural heritage criteria that define OUV. According to the *Nara Document on Authenticity* and the Nara+20, the values, for which a heritage site is being conserved, provide the basis for assessing all aspects of authenticity (ICOMOS, 1994). Authenticity is a relative criterion that varies according to socio-cultural contexts (ICOMOS, 1994; Labadi, 2010) and is regarded as a condition that should be met in order to validate a statement of cultural value or significance (Boccardi, 2019). In heritage tourism, authenticity is subject to personal valuation and is closely related to visitors' personal memory, experience, and cultural background (Dai et al., 2021). In tourism studies, visitors' perceived authenticity of heritage sites has been extensively discussed and mainly approached through three dimensions: the objective (tangible quality that can be found in an object), the constructive (value judgment that is contextual and socially constructed), and the existential (phenomenological and relates to tourists' personal connection with the destination that

is cultivated through a particular tourism experience) (Dai et al., 2021; Domínguez-Quintero et al., 2020; Park et al., 2019).

In addition to authenticity, WHSs must also meet the criteria defined by OUV. In the context of WHSs, OUV is defined as “cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity” (UNESCO, 2019, p. 20, paragraph 49). The OUV for which a WHS is designated is foremost not the sole value perceived by different groups of people who live in, use, or visit the site (UNESCO, 2018). WH associative values are socially constructed, attributed, not intrinsic, therefore, derived from peoples’ feelings about, perception and experience of, and relationship to the heritage place, its history, and social practices (Cameron, 2020; de la Torre, 2013; Gibson & Pendlebury, 2009; Mason, 2002); thus, heritage values are subject to change across time and space as they are shaped by contextual factors, such as economics, cultural trends, and social forces (Mason, 2002). Diverse groups may attribute different, and sometimes conflicting, values to heritage places (Alonso Gonzalez, 2014; de la Torre, 2013; Serageldin, 2000). Systems of values of different stakeholders are porous, influence one another, and do not stand on the same level (Heinich, 2011, 2017). In this context, while some values are univocal, others are ambivalent, meaning they can be positive or negative, depending on the context (Heinich, 2011). The ambivalent, dissonant, and contested nature of heritage values is well documented in tourism and heritage studies (Duval et al., 2019; Gentry & Smith, 2019; Smith, 2006). Moreover, scholars have developed extensive typologies of heritage values to provide insights into the significance of cultural heritage to different groups – including local communities, experts, and tourists – and ensure inclusion in decision-making processes (de La Torre & Mason, 2002; Heinich, 2011; Stephenson, 2008). On this basis, creating opportunities for visitors to experience both their personal definition of heritage value and normative views of OUV is critical in WHSs conservation processes (Buckley, 2018).

While normative statements of value may dominate the official discourse, Zhang (2020) argued that tourists at WHSs do not passively accept official interpretations, instead, they display an active sense of their own understanding of heritage. According to Gao et al., (2019) tourists are informal agents that contribute to the co-construction of heritage values even though these values may be dominated by authorized formal agents. In fact, several studies have shown that the WH designation does not significantly influence tourists’ perceptions of the site and on-site experience

(Baral et al., 2017; Poria et al., 2013). Thus, scholars stress the role of tourists in the process of value co-creation and argue that tourists are co-producers and co-designers of the places they visit (Ek et al., 2008; Kreziak & Frochot, 2011; Mkono, 2013; Tan et al., 2014). This has led to a change in the locus of control in the value creation processes, especially with tourists uploading and accessing UGC through mobile technologies (Munar & Jacobsen, 2014). When tourists share their experience on social media they don't only communicate knowledge-related aspects of destination attributes but also convey emotions and personal perceptions (Munar & Jacobsen, 2013). Reviews posted on virtual communities represent new tools of communication with tourists who have become active participants rather than passive subjects in their own experiences (Hand, 2008). Since online shared experiences shape destinations' images and visitors' decisions and expectations, understanding these experiences is key to improving destination evaluation and management (Stoleriu et al., 2019). In this research, we use machine learning techniques to identify tourist stated values as expressed through online UGC. In this regard, we can capture both the similarities and differences between co-created and normative values espoused for a given WHS.

### ***2.3 User-generated content and visitors' online co-creation of perceived experience***

The increasing use of digital technologies is transforming the production and experience of space, place, and landscapes (Roberts et al., 2019). UGC on social media is providing a means by which to develop novel methods and approaches to assess human-environment interactions, such as, activities, human behavior, event detection, and preferences to eventually add value to decision-making processes and heritage management (Martí et al., 2019). When people share content on social media, their online practices convey a collective image of a place and cultural values within the virtual community realm (Dunkel, 2015). In this context, the online space enables a new kind of tourism interaction that complements the experience of physical travel creating a bridge between real and digital worlds and providing innovative tools to understand people's experiences motivations, and behavior (Munar et al., 2013; Bertacchini et al., 2018; Giglio et al., 2019). In this sense, virtual communities mediate the co-creation of heritage experiences and associative values.

Many cultural heritage institutions, like museums and heritage sites, have used social media to collaborate with communities in cultural heritage knowledge co-creation (Jensen, 2013; Stuedahl, 2011). For instance, museums have been introducing alternative visitor experiences that transform audiences from observers into participators and co-creators of experiences (Holdgaard

& Klastrop, 2014). Nevertheless, some scholars have argued that participation within official heritage websites is often manipulated and tends to endorse experts' values and the dominant heritage discourse (Aigner, 2016; Loader & Mercea, 2011). Accordingly, it is argued that grassroots online practices, like posting reviews on TripAdvisor, build a non-expert's perception of heritage values and enable a circulation of meaning and a co-creation of tourism experiences from below (Munar & Jacobsen, 2013; Ginzarly & Teller, 2020).

The concept of co-creation was introduced in tourism studies in 2006 with a focus on offline interactions between the service provider and tourists (Payne et al., 2008; Mohammadi et al., 2020). Nevertheless, the concept developed with the emergence of social media to consider as well the online sharing of experiences and interactions between tourists within a virtual context (Reichenberger, 2017; Rihova et al., 2015). The tourist perspective of co-creation considers the latter as it happens in the tourist sphere before (trip planning phase), during (tourism phase), and after travel (memory phase) (Campos et al., 2018). When tourists share their travel experience in a virtual travel community they engage in the practice of co-creation in the post-travel phase (Campos et al., 2018). It is worth mentioning that co-creation occurs differently in the different phases of the tourism experience (D. Wang et al., 2012). For instance, in the tourism phase, tourists co-create their experience by engaging with heritage emotionally, by making the choice to explore specific heritage assets based on their personal interests, or by subjectively constructing their personal interpretation of the site reflecting on prior knowledge and personal imagination and feelings (Minkiewicz et al., 2014; Ross, 2020). This on-site co-creation (tourism phase) is defined as "the sum of the psychological events a tourist goes through when contributing actively through physical and/or mental participation in activities and interacting with other subjects in the experience environment" (Campos et al., 2018, p. 23). These psychological events comprise perceptions, mental images, bodily sensations, emotions, and awareness of needs, among others (Alabau-Montoya & Ruiz-Molina, 2020; Kim, 2010).

In this article, we address online co-creation through the practice of sharing in the post-travel phase. Within this context, co-creation may be defined as the result of sharing information about personal experiences at specific destinations on UGC platforms resulting in a collaborative development of value for both the sharers and the readers of UGC (Cox et al., 2009). Here the process of co-creation occurs as visitors extend their trip in time and space by recalling memories and reflecting on the experiences they lived by sharing their stories using digital technologies

(Caldito et al., 2015). Precisely when an experience triggers strong emotions, such as joy, sadness, or satisfaction, visitors feel the desire to communicate their experience and share their memories of it online (Litvin et al., 2008; S. Wang et al., 2017). This practice of sharing affirms the virtual space as a social and cultural space (Munar et al., 2013). In fact, when visitors share their experience and generate heritage narratives, whether public knowledge or personal stories, and emotions felt in heritage places, their online practices result in a collective construct of value for online platform users enabling new prospects for digitally-mediated forms of experience value co-creation (Cox et al., 2009; Lam et al., 2020). In this context the tourist-tourist co-creation in the memory phase can occur in different ways. For instance, (1) tourists can share their experience through active interaction with their connected social networks of friends, followers, and other tourists, or (2) the collective online reviews of tourists could create, reinforce, or devalue the perceived experience or image of a destination (Caldito et al., 2015). In this paper, we address the experience of WHSs as it occurs in the visitor sphere by addressing the sum of visitors' inputs in the form of online reviews that collectively co-create the perceived heritage experience in the memory phase.

UGC, including photos, geographical location, and textual data, has been used for several purposes in tourism studies. This field of research is very wide in scope and addresses visitors' experiences, behavior, visitation patterns, and spatial distribution at a destination as well as eliciting tourists' opinions and sentiments toward a tourism product or destination (Li et al., 2018; Owuor & Hochmair, 2020). Given the wide scope of research on social media in tourism studies, Zeng & Gerritsen (2014) conducted a systematic review of 279 papers to frame the emerging discourse. The review shows that most researchers confirm the trustworthiness of UGC and concludes that UGC could inform future tourism management strategies. While user-generated data on social media have been explored to assess and map people's experiences, preferences, and perceived values, the majority of research efforts have been put into crowdsourcing information on recreation and nature-based tourism as well as aesthetic value with less attention given to WHSs (Bubalo, van Zanten, and Verburg 2019; Toivonen et al. 2019). For instance, scholars have studied the perceived importance of protected areas and tourists' preferences for nature-based experiences (Hausmann et al., 2018; Levin et al., 2017; Teles da Mota & Pickering, 2020; Tenkanen et al., 2017; Walden-Schreiner et al., 2018). A recent study examined the destination attributes that influence Chinese tourists' negative experiences at destinations through the analysis

of travelogues posted on Mafengwo – a popular Chinese online tourism community (Kim et al., 2020).

With around 490 million active users, TripAdvisor is the largest travel information, reviews, and recommendations website and one of the most trustworthy online travel information platforms (Munar and Jacobsen 2013). TripAdvisor reviews provide information about the experiences of reviewers after visiting the destination as well as recommendations and advice to potential tourists for their consideration upon visiting (González-Rodríguez et al., 2016). In the 21<sup>st</sup> century, more than one-fifth of international travelers depend on social media as a travel information source (IPK International, 2015). The participation of different stakeholders, including visitors, is recognized as a fundamental tool in sustainable heritage management (Bruyere et al., 2009), within this context, cultural heritage management is expected to enhance the quality of visitors' experiences and at the same time reduce the potential negative impact of increased tourism on heritage sites and local communities (Alazaizeh et al. 2019; Caust and Vecco 2017). This paper contributes to the body of knowledge by highlighting methods to collect and analyze multilingual review data from TripAdvisor allowing for the extraction of insights into visitors' values, perceived experiences, and sentiments..

### 3. Study Area

In 1984, UNESCO inscribed Baalbek and Byblos on its list of WHSs. The UNESCO selection criteria were justified in reference to criteria (ii) and (iv) for Baalbek and criteria (iii), (iv), and (vi) for Byblos. The statement of OUV reveals the variety of tangible and intangible attributes (*what* is mentioned to be of value) and values (*why* is it of value) existing in the designated WH property (Sanjod et al., 2016). In Table 1, we breakdown the statements of OUV, retrieved from the UNESCO World Heritage Center web page<sup>1</sup>, to identify the values referred to in the different selection criteria for both WHSs. This reading is important as it can help in the parsing of UGC and relation to statements of OUV. Table 1 shows that the selection criteria were justified in reference to different cultural values, namely the historic, aesthetical, scientific, and social values through themes like *local traditions, planning and layout, urban organization, religious complex, and Mediterranean world* (UNESCO, 2010a, 2010b). The Statement of OUV describes the

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<sup>1</sup> <https://whc.unesco.org/en/statesparties/lb/documents/>

complex of temples at Baalbek as “one of the most famous sanctuaries of the Roman world and a model of Imperial Roman architecture” and it describes Byblos as an “outstanding witness to the beginnings of the Phoenician civilization” that is “associated with the history and diffusion of the Phoenician alphabet” (UNESCO, 2010a, p. 23, 2010b, p. 14).

Even though Baalbek and Byblos are two WHS in Lebanon, they have different contextual characteristics – the first is located in the Beqaa Valley, which is close to Lebanon's border with Syria and is designated as a Hezbollah area, while the second, in addition to the historical remains, is known for its sandy beaches, open-air bars, and outdoor cafes. Both sites are promoted differently by local municipalities, while Byblos is promoted as the city of peace and multi-communal coexistence, Baalbek is limited to its historic Roman construction (Chaddad, 2020).

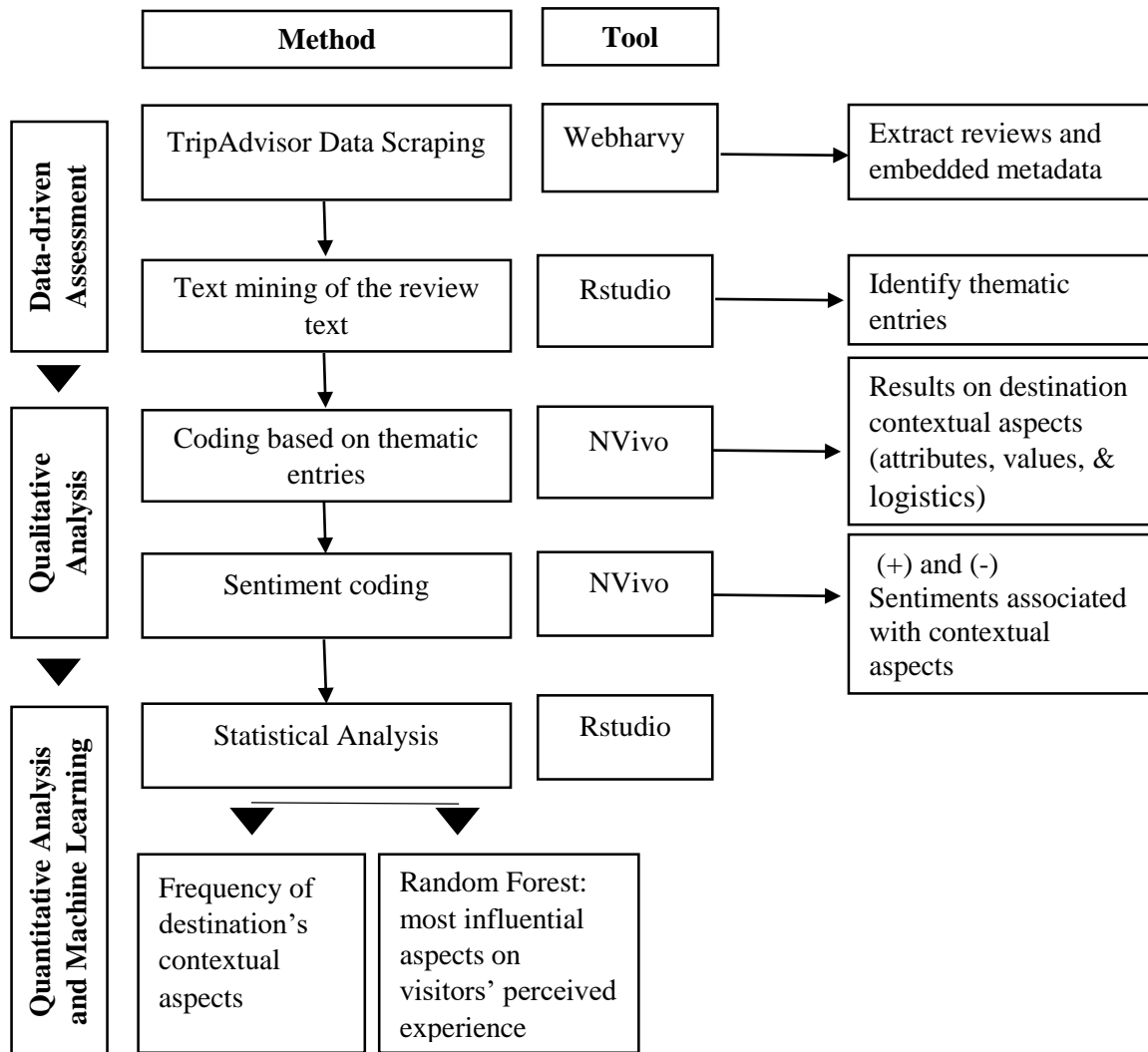
Table 1: UNESCO’s selection criteria for designating Byblos and Baalbek WH properties.

<b>OUV</b>	<b>Baalbek criteria for inscription</b>	<b>Byblos criteria for inscription</b>
<b>Historic/Aesthetical/Scientific Value</b>	They reflect an extraordinary amalgamation of Roman architecture with local traditions of planning and layout [...] It contains some of the largest Roman temples ever built, and they are among the best preserved [ <b>Criterion (iv)</b> ].	Byblos provides one of the primary examples of urban organization in the Mediterranean world [ <b>Criterion (iv)</b> ].
<b>Historic Value</b>	The monumental complex of Baalbek is [...] one of the most impressive testimonies to the Roman period [ <b>Criterion (iv)</b> ].	Byblos bears an exceptional testimony to the beginnings of Phoenician civilization [ <b>Criterion (iii)</b> ].
<b>Aesthetical/Social Value</b>	The archaeological site of Baalbek represents a religious complex of outstanding artistic value. Baalbek [...] reflects the amalgamation of Phoenician beliefs with the gods of the Greco-Roman [ <b>Criterion (i)</b> ].	
<b>Scientific/Social Value</b>		Byblos is directly and tangibly associated with the history of the diffusion of the Phoenician alphabet (on which humanity is still largely dependent today) [ <b>Criterion (vi)</b> ].

## 4. Methodology

Figure 1 provides an overview of the method applied for the extraction, coding, and analysis of TripAdvisor reviews in this study.

Figure 1. Methodological workflow for the analysis of TripAdvisor reviews.



WebHarvy, a web data crawling software, was employed to retrieve TripAdvisor reviews and all embedded metadata: title, time of visit, reviewer's name, and country of origin for Byblos historic city and the Roman temples of Baalbek. Reviews for both locations were collected for the period between January 2015 and August 2019. A total of 1060 reviews were retrieved for Baalbek and 1170 reviews for Byblos. We extracted reviews in all languages, including English, French,

Spanish, Italian, Portuguese, Russian, and Arabic, to ensure the inclusion of different nationalities. We then employed an excel translation tool, namely the online Microsoft translator, to translate the data into English (Excel, n.d.).

The study applied a mixed-method for data analysis that integrates digital ethnography and machine learning. To develop a codebook for the qualitative content analysis, a data-based inductive thematic approach was applied. First, by applying text mining techniques, including word frequency and adjacency, and thematic clustering in RStudio (R Core Team, 2020), we gained insights into the content of reviews and identified thematic entries. Based on these preliminary text mining results, a codebook was generated for each destination. For each site, a list of 10 contextual aspects, including destination attributes, values, and logistics elements, emerged (see Table 2). Second, the dataset was processed through the NVivo software. Each destination was analyzed separately and the sentences making up roughly 25% of each destination's dataset were manually coded following the contextual aspects identified in the first step. The manually coded sentences were fed into NVivo to train the software's embedded auto-coding algorithm. Subsequently, the remaining 75% of review sentences were coded based on the generated coding patterns. The auto-coded results were then reviewed and fine-tuned to ensure accuracy. In order to add depth to the extracted themes within each sentence, sentiment analysis was conducted at the sentence level for each review. In this way, a matrix served to relate the number of contextual aspects and positive and negative sentiments associated with every review. To maintain the anonymity of tourists each TripAdvisor reviewer was given a number prefixed by BY or BA to indicate Byblos or Baalbek, respectively.

Finally, before running the supervised machine learning algorithm, we converted the contextual aspects to a  $[0, 1]$  scale by dividing the number of review sentences for a specific contextual factor by the number of all coded review sentences. For example, in a review with five sentences, if two sentences were about personal interpretation then the personal interpretation of the individual review would be 0.40. Then we calculated the sentiment of the reviews by dividing the number of expressed sentiments in each review with the sum of sentiments (positive and negative) in all reviews. Afterwards, we measured the overall review sentiment as a ratio of the number of positive sentiment sentences to the total number of sentences. We then applied a

Random Forest (RF) machine learning technique to map the unique mix of site contextual aspects noted in each review to the overall sentiment associated with the review.

A RF is an integrated method that introduces two random samplings (samples and variables) (Y. Wang et al., 2020). In training the RF model, multiple decision trees are constructed over random samples from the data using a collection of random variables (Cutler et al., 2012). Then, the judgment results of multiple decision trees are voted to obtain the final output (Y. Wang et al., 2020). For example, in this context, a forest of trees would be built such that each tree is reflective of a single random sample of reviews and predicts the sentiment of that review on the basis of a random subset of WH contextual aspects. The majority vote of all these individual trees would, in turn, when faced with a new review dictate the prevailing sentiment of that review.

In this study, we first randomly split the data into a training set (25% of the data set) and a testing set (75% of the data set). As classification datasets often have an unbalanced distribution of examples among the classes (i.e., the data comprises two classes, the minority class [negative sentiment in this case] and the majority class [positive sentiment in this case]) (Sáez et al., 2015), we applied the Synthetic Minority Over-sampling Technique (SMOTE) - one of the most well-known data pre-processing methods - to cope with the problem of unbalanced classes by oversampling the minority class (Sáez et al., 2015). The general idea of the SMOTE function is to artificially generate new examples of the minority class using the nearest neighbors of these cases while at the same time under-sampling the majority class examples, leading to a more balanced dataset (Chawla et al., 2002). We then engaged in parameter tuning to determine the number of predictors and the number of trees to include in the random forest model. The model achieved good results with accuracy equal to 88%. After generating the random forest, we extracted the most important contextual aspects of each site by examining the impact that each aspect has on decreasing the Gini Index at each split. The more the Gini Index decreases for a factor, the more important it is (see Table 3).

## 5. Results

### 5.1- Visitors' heritage discourse

For both WHSs under study, most of the reviews on TripAdvisor are posted by International visitors. In Baalbek, 12% of reviews are posted by National visitors, 11% by Arab nationalities, and 77% by international nationalities. In Byblos, 17% of reviews are posted by National visitors, 19.5% by Arab nationalities, and 63.5% by international nationalities. The results from the thematic analysis of TripAdvisor reviews showed that the combination of the personal interaction with the heritage site – including the mental and emotional connection with the site – the intangible attributes, and cultural values are the most prevalent stimuli of experiences in both WHSs (Table 2). The aspects affecting visitors' experience are largely common (5/10) to these two WH properties, with 5 unique aspects per WHS. Interestingly, the common aspects relate to the cultural values associated with the heritage place, including aesthetic value, historic value, personal interaction (social value), site condition, and price (economic value). This result shows that, in both WHSs, visitors use the same criteria and value systems in the judgment of the significance of tangible heritage assets. Concerning the unique aspects, Baalbek reviews mainly focused on safety and logistics, including tour guide and accessibility; while Byblos reviews focused on intangible attributes, such as the mix of activities, authenticity, and hospitality.

Moving forward, we provide insights into how visitors ascribe value to the two studied WH properties. Then we will investigate which contextual aspects are the most influential and how they interact to determine visitors' perceived experience.

As shown in Table 2, the coding differentiated between internal factors related to values ascribed to the WH property, tangible and intangible attributes, and external factors related to logistics. The coding of values differentiated between explicit and implicit expressions of affective immersion with heritage places. In the first, feelings are clearly articulated as reviewers express imaginations, meanings, and emotions involved in personal interactions with the heritage place. We coded these reviews under the *personal interaction* register. In both WHSs, physical encounters with heritage merge into feelings and allow some visitors to engage in a dialogue with the past contributing to meaning-making and to reinforcing the sense of place within the visitors' realm of experience. Here the historic value of tangible heritage is no longer an objective

description of heritage, as stated in the official documents, but a personal emotional response to said value.

Table 2. Contextual aspects affecting visitors’ perceived experience.

	Contextual Aspects	Contextual Definitions	Quotations
<b>Values</b>	Personal interaction	This social value refers to imaginations, connections to the past, meanings, and emotions involved in personal interactions with the heritage place.	BA672- You can feel that you are back in history almost a thousand years, it’s one of the most magical places I have ever visited. BY91- You can just stand there among the many ruins and stare at the Mediterranean thinking of how many people stood there before you to put feet on the same soil.
	Safety	This social value refers to tourist’s safety in the heritage site and surrounding area.	BA68- We were worried about the safety of the area as the FCO advice is against travel to this region [...] once there, everything seemed perfectly safe.
	Historic value	Refers to implicit interactions with the history of the heritage place.	BA102- One of the best historical sites in Lebanon and the Middle East ever, these are old roman temples from thousands of years. BY11- It was a wonderful experience visiting this place which is almost 6000 years old, a gem of history.
	Aesthetical value	Refers to aesthetics that mobilize a sense of place or contribute to positive/negative experience because of the presence or absence of an aesthetical quality.	BA42- It is hard to put into words just how overwhelmingly beautiful and impressive the Roman temple complex at Baalbek really is. BY44- There are breathtaking sea views all around.
	Price	This economic value refers to the cost of recreational amenities: restaurants, souvenir shops, or nearby hotels and heritage sites entrance fees.	BY412- The price was a little steep for just being able to walk around the castle. BA397- Camel rides are so expensive and souvenirs' prices should be heavily negotiated.

Table 2. Continued

Contextual Aspects	Contextual Definitions	Quotations
<b>Attributes</b>	Mix of activities	This intangible attribute refers to commercial, recreational, and cultural activities like bars, restaurants, and handcrafts. BY460- Many shops, historical buildings, and lots of cafes, bars, and restaurants around that we enjoyed during our visit to Byblos.
	Products	This tangible attribute refers to products sold in the historic commercial area, the <i>souk</i> . BY430- The old souk has a great architecture spoiled by stores selling Chinese products, the place is too commercial and I wish they make the stores sell Lebanese traditional products instead of the current ones.
	Condition	This intangible attribute refers to the existing state of preservation and restoration of the heritage site. BA89- Temple of Jupiter was actually never finished and the only remaining columns are not restored, so it's a bit disappointing. BY1137- The ruins are in excellent condition.
	Authenticity	Refers to a relative concept in value judgment that relates to the historical continuity of tangible remains. BY835- the old souk of Byblos preserves the authenticity of the city. BY1028- Only the citadel testifies to the authenticity, but the main street lacks authenticity.
	Hospitality	Refers to locals' friendly reception of visitors and tourists. BY493- Workers and owners of the stores [...] of the souk are friendly and welcoming.
	Scale	Refers to the large size of archeological remains and to how one's experience is influenced by it. BA705- The Temple of Bacchus is awe-inspiring with its 22 meters high columns where a human pales into insignificance.
<b>Logistics</b>	On-site information	Refers to interpretation materials that would enhance visitors' understanding of the site. BY365- There are no explanations for the castle but there are a few explanatory signs for other parts of the site.
	Tour guide	In situ tourist guide. BA3- We hired a guide [...] he pushed on too quickly and did not speak very clearly, other guides seemed better. BY275- Our guide explained the hidden depths of history that the place offers
	Accessibility	The extent to which the heritage property is easy to be reached or entered. BA302- the best place to experience firsthand unrestricted access to ancient temples. BA672- Shame that it was difficult to get access due to the political instability.

Implicit interactions with the history of the place were coded as *historic value*. These reviews imply feelings through terms like wonderful, stunning, amazing, and great. This value was more mentioned in Byblos than in Baalbek. Other reviews draw on aesthetics that mobilize a sense of place or contribute to a positive experience because of aesthetical quality. These reviews are coded as *aesthetical value* and are mentioned more in reference to Byblos than Baalbek. In both WH properties, aesthetics are related to different aspects of the WH place, including (1) the natural landscape surrounding the WH, whereby reviewers express their feelings through terms like breathtaking and magical:

BY130- Its location overlooking the Mediterranean is magical.

And (2) heritage attributes and architectural details, whereby reviewers mainly appreciate the *beauty* of heritage:

BY171-This is a beautiful castle.

BA78-These are huge roman ruins with amazing and beautiful architecture.

While the natural context of both WH properties is not mentioned as an asset in the OUV statement or the national official statement of values, for many visitors it evokes an emotional response that elicits a personal engagement with the place.

It is clear that visitors' ontology for cultural heritage is different from that of the official heritage discourse. While the latter exhibits a focus on historical facts and context, visitors imply a philosophy of continuity that is more focused on present, active engagement with heritage. TripAdvisor reviews provide insights into visitors' real-time experiential knowledge and emotional reactions from personal encounters with heritage. The analysis of UGC shows that visitors appreciate the aesthetics of built and natural assets as well as the emotional, subjective authenticity, and affective engagement with the place that emerges out of an interplay between the visitor and the WHS. It can be claimed that UGC reviews reinforce the historic, aesthetical, and scientific values of WHSs presented in Table 1 as they provide insights into how people will feel when engaging with aspects of the past to associate values and meanings for the present. Here the sharing of experiences goes beyond the transfer of information to communicate personal perceptions, to shift from individual to collective values, and co-construct meanings and a particular image of the WH place. The integration of visitors' freely expressed values of their

heritage experience and the OUV, that the site manager seeks to protect, provides an opportunity to drive sustainable conservation and management.

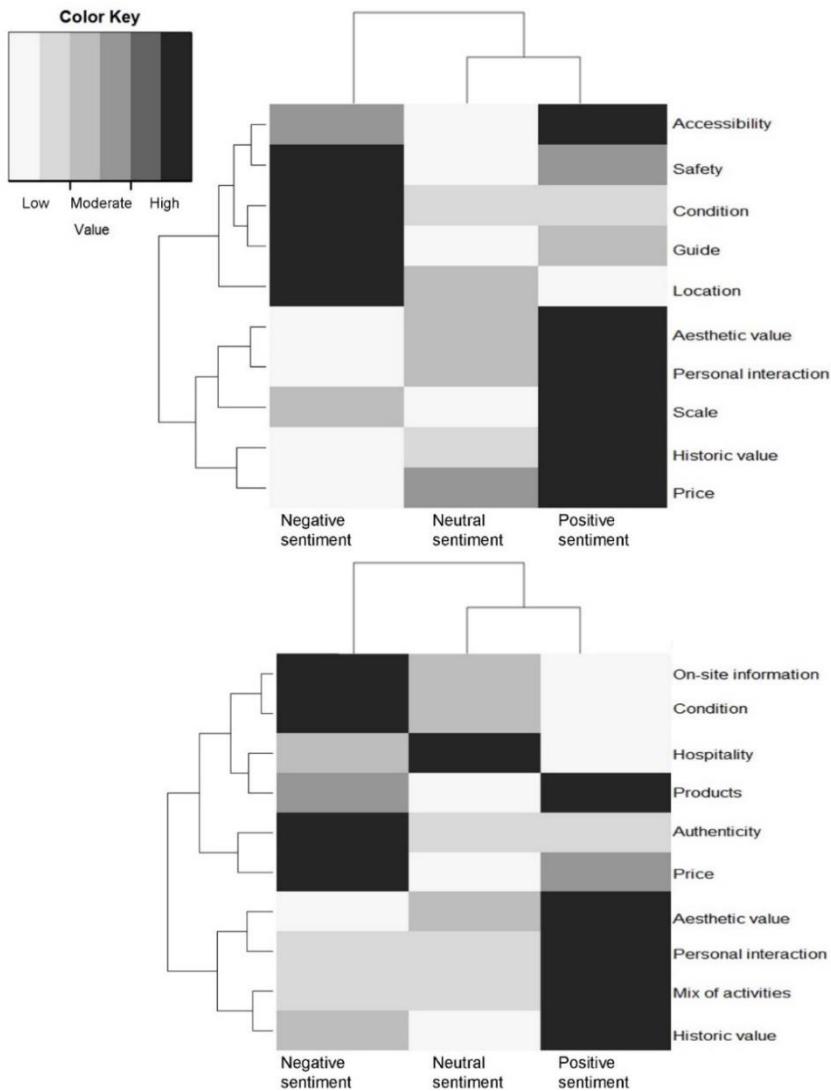
The outcome of the random forest analysis revealed that the different contextual aspects, such as the personal interaction with the site, mix of activities, and accessibility, do not have a linear relation with visitors' expressed sentiment at WHSs and don't contribute equally to the heritage experience. In fact, the combination of the different factors and the interplay among them generate different perceived experiences. Accordingly, the level of frequency with which different aspects were noted is not representative of their influence in predicting a positive experience (Table3). The ten most influential contextual aspects on visitors' perceived experience in Baalbek and Byblos are presented in Table 3.

Table 3. Ten most influential contextual aspects on visitors' perceived experience in Baalbek and Byblos.

<b>Contextual aspects (Baalbek)</b>	<b>Gini decrease</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Contextual aspects (Byblos)</b>	<b>Gini decrease</b>	<b>Frequency</b>	<b>Percentage</b>
<b>Condition</b>	73	342	12.4%	<b>Authenticity</b>	118	74	3.4%
<b>Personal interaction</b>	66	524	19 %	<b>Aesthetical value</b>	103	444	20.5%
<b>Tour guide</b>	58	368	13.4%	<b>Personal interaction</b>	92	334	15.4%
<b>Safety</b>	53	152	5.5%	<b>Price</b>	87	156	7.2%
<b>Scale</b>	51	368	13.4%	<b>Mix of activities</b>	55	260	12%
<b>Accessibility</b>	50	256	9.3%	<b>Historic value</b>	54	343	15.8%
<b>Location</b>	49	133	4.9%	<b>On-site information</b>	52	201	9.3%
<b>Aesthetical value</b>	45	309	11.2%	<b>Condition</b>	43	118	5.4%
<b>Historic value</b>	30	165	6%	<b>Products</b>	33	173	8%
<b>Price</b>	24	133	4.9%	<b>Hospitality</b>	21	65	3%

While visitors' experiences in Baalbek are mostly influenced by the condition of the WHS and personal interactions with heritage, safety concerns and logistics like the tour guide, accessibility, and the heritage site's location appear as important contributors to the overall experience, whereas aesthetic, historic, and economic values ascribed to heritage are the least influential. On the other hand, intangible attributes and cultural values have a large influence on visitors' experiences in Byblos. Table 3 shows that the most influential aspect is authenticity followed by aesthetic value, personal interaction, price, mix of activities, and historic value.

Figure 2. Heat map showing sentiments (negative, neutral, and positive) associated with destinations' contextual aspects. Upper, Baalbek. Lower, Byblos.



The criteria applied by visitors in the judgment of their experience have different characteristics. Some are univocal and are associated with either positive or negative sentiment in any context, and others are ambivalent. Figure 2 provides insights into the sentiments associated with the different contextual aspects in Byblos and Baalbek. It shows which of the aspects have the most effect on positive and negative experiences. What can be drawn from this illustration is that, in both WHSs, three cultural values – the historic, aesthetical, and personal interaction are mainly associated with positive sentiments. Whereas, in Baalbek, logistics-related contextual aspects are mostly negatively affecting the heritage experience. In Byblos, the lack of authenticity, price, on-site information, and the condition of the WHS mainly contribute to negative sentiments. Thus, the primary, most influential aspects in both sites – condition and authenticity – are mostly associated with negative sentiments. What can be concluded is that values are not marginal to the visitors' experience, but the negative influence of some logistics and the lack of specific qualities at WHSs affect the overall experience for visitors.

National organizations for WH management could benefit from the incorporation of grassroots UGC to co-produce engaging narratives that are largely driven by visitors' experiences and their collective sense of WHSs. We argue that UGC, when properly studied, can serve to uncover the interaction between policy in the management of a WHS, the OUV that were originally used to designate the WHS, and the emotions they elicit in site visitors. In this context, UGC data is useful to support decisions in several areas like WH place image for branding and marketing, tourism policies, and WH protection and enhancement strategies.

## **6. Discussion and Conclusion**

### ***6.1 Theoretical and practical implications***

The academic contribution of this research is threefold. First, it shows how sharing narratives about the heritage experience in the form of online reviews led to a collective digitally-mediated interpretation of heritage places. Our results showed that the informal interpretation of WHSs in the post-visit memory phase is highly associated with visitors' personal interaction with the site. The latter involves visitors' imagination, meaning-making, and emotions and is found to be important for providing a positive tourism experience. Thus, this study contributed to the ongoing discussion of WHSs interpretation and the role of public discussions in the public sphere (ex Ross,

2020; Silberman, 2018), including the virtual sphere, as a new interpretive paradigm and a deliberative discourse that is not limited to guided tours, experts' presentations, and heritage audiences but extended to memory communities.

Second, whilst building upon visitors' interpretation of their experience at WHSs, our results highlighted WHSs associative values. The range of values that different stakeholders attribute to WHSs has been extensively addressed in heritage and tourism studies. In our study, we point to the digitally mediated construction of meaning by showing how visitors experience positive/negative sentiments by deciphering the non-linear interaction between and influence of site features through a machine learning strategy applied to their online reviews. For instance, in our study, reviewers attribute social, aesthetical, and historical values to heritage by using expressions like *you can feel that you are back in history almost a thousand years, breathtaking views, and overwhelmingly beautiful*. In the line of Gao et al., (2019) and Zhang (2020), these personal expressions are a window to visitors' perception of heritage values. Thus, this study contributes to the existing body of knowledge on the agency of tourists providing evidence about how tourists display an active sense of their own experience and understanding of heritage and how by sharing online their experiences and ascribed values to WHSs they become agents in the co-creation of heritage values in the memory phase.

Third, while displaying the range of values, attributes, and logistics-related aspects that, when combined, result in the construction of visitors' perceived experience, we found that the relation between experiences gained at WHSs and contextual aspects is not linear, instead, it is a complex one that results from the interaction of different factors and their associated emotions. This finding is consistent with findings from other studies (ex Kempiak et al. 2017; Alazaizeh et al. 2019). Further to this, our results showed that the most influential aspects to the visitors' experience are not necessarily the most frequent ones in the UG reviews. If the analysis was done solely by frequency, the hidden layers of perceived experience would not have been captured. For instance, high prices and the lack of authenticity, namely visitors' perceived authenticity, would not have appeared as major contributors to negative experiences in Byblos.

In heritage tourism, cultural institutions and practitioners can employ the knowledge gained from visitors' online heritage practices to integrate alternative interpretations of WH. This

integration would promote more participative heritage interpretation, encourage tourists to engage meaningfully and emotionally with the heritage site, and enhance their experience. For instance, the promotion of Baalbek is limited to its historic Roman construction and is initially focused on OUV. So instead of being bounded by official narratives, destination marketing can integrate tourists' informal narratives to promote a living transmission of heritage experience and associative values.

## ***6.2 Limitations and future research***

Inevitably, this research has some limitations. First, the findings of this study are limited to the two WHSs under study and the use of TripAdvisor as the data source. To be able to make generalizations, future research could (1) investigate different types of WHSs, including cultural and natural heritage and intangible heritage, (2) investigate different geographical contexts, and (3) compare results from different social media platforms such as Flickr and Instagram.

Second, while this research is based on the premise of visitors' online co-creation of the perceived heritage experience, it mainly addresses visitors' passive engagement through the practice of sharing content on social media. In this study, we did not examine active online interactions between visitors. So future research could look at how online social interactions between visitors influence the co-created experience in the memory phase.

Third, it is important to stress that the analysis of social media data in itself is characterized by different challenges and limitations. For instance, it is difficult to pre-process textual data because of abbreviations, non-standard spellings, and multiple languages. In our study, we applied an Excel online translation tool to overcome the limitation of multiple languages. However, more sophisticated methods could be applied such as developing domain-specific training data sets to assist in machine learning for analyzing textual data.

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