Heritage Beyond Singular Narratives

Embracing Diversity in Participatory Heritage Planning Empowered by -Artificial Intelligence

Foroughi, M.

DOI
10.7480/abe.2023.19

Publication date
2023

Document Version
Final published version

Citation (APA)
Foroughi, M. (2023). *Heritage Beyond Singular Narratives: Embracing Diversity in Participatory Heritage Planning Empowered by -Artificial Intelligence*. [Dissertation (TU Delft), Delft University of Technology]. https://doi.org/10.7480/abe.2023.19

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A+BE | Architecture and the Built Environment | TU Delft BK

23#19

Design | Sirene Ontwerpers, Véro Crickx

Cover photo | The cover photo crafted by Mahda Foroughi, is a dynamic collage sourced from Trouw magazine, the UNESCO website, and the Yazd World Heritage Base website. Our connection to the city extends beyond physical boundaries – it thrives within online communities. As we traverse these urban landscapes, we discover that each step is unique, shaped by our individual perspectives and values. We need to communicate and hear each other to understand each other's points of view and digital technology could be key in this process.

Keywords | consensus, inclusivity, heritage values and attriutes, cultural significance, text mining, Natural Language Processing

ISBN 978-94-6366-757-9
ISSN 2212-3202

This dissertation is open access at https://doi.org/10.7480/abe.2023.19

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Heritage Beyond Singular Narratives

Embracing Diversity in Participatory Heritage Planning Empowered by Artificial Intelligence

Dissertation

for the purpose of obtaining the degree of doctor
at Delft University of Technology
by the authority of the Rector Magnificus, prof.dr.ir. T.H.J.J. van der Hagen
chair of the Board for Doctorates
to be defended publicly on
Tuesday 31 October 2023 at 12:30 o'clock

by

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This dissertation has been approved by the promotors.

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The researcher Mahda Foroughi is funded by a full scholarship from the Ministry of Science and Technology of Iran

To the underrepresented communities
whose voices and perceptions deserve recognition

Mahda Foroughi

Acknowledgements

I've reached the end of a remarkable journey, both personally and professionally, and it has been quite a challenge. But it's also a time to look back at the valuable experiences that have opened my mind and enriched my life in unexpected ways. Today, I stand here, ready to embark on a new path, and I know that I couldn't have made it without the support and opportunities given to me by many different people along the way. I want to express my heartfelt thanks to the special people who have made my academic journey possible and filled it with support and encouragement.

Firstly, I am deeply grateful to my wonderful parents. They have been there for me from the beginning, encouraging me to study hard and never give up. Their love and belief in me have been my motivation to keep going, even when things got tough. I can't thank them enough for all the sacrifices they've made to help me succeed. To my loving husband, I want to say thank you for being my rock throughout this journey. Your unwavering support and understanding have meant the world to me. You've always believed in my abilities and pushed me to do my best. Having you by my side has made all the challenges easier to overcome. Also, my brothers' support, encouragement, and expertise have been invaluable, and I am deeply thankful for their unwavering presence in my life. My family's support gave me the power to start this journey and I was very lucky to have great people including my supervisors and colleagues aside from me along the way.

I am thankful to Dr. Seyed Amir Mansouri who was one of the first professors who trusted in me and my academic abilities which gave me the motivation and strength to go further in my academic journey. I will always cherish the impact he had on my path. I want to express my gratitude to my mentor and supervisor, Prof. Ana Pereira Roders. She believed in me when I was just starting my academic career and gave me the chance to shine. Her guidance and expertise have been invaluable in shaping my research journey. She has been more than a supervisor; she's been a friend and a guiding light. Besides, Dr. Azadeh Arjomand Kermani's support and belief in my potential from the very beginning of my academic journey ignited a spark within me and set me on the right path. As I ventured further into this profound academic pursuit, Dr. Bruno de Andrade stepped in as a guiding force during the middle phase. His creative insights and thoughtful inputs enriched my work and opened up new perspectives, infusing renewed energy and passion into my studies. And finally, in the last phase of my Ph.D., Dr. Tong Wang's dedication and expertise helped me navigate

through challenges and reach the culmination of this significant milestone. Each of these esteemed professors has played a vital role in shaping my academic journey, and I am profoundly grateful for the unique contributions they have made to my growth as a scholar.

I thank all the members of my Doctoral Committee – Prof. Dr. A.R. Pereira Roders, Dr. T. Wang, Prof.Dr. J. Teller, Prof.Dr. G.L.M. Burgers, Prof.Dr. J. Muntañola Thornberg, Dr. R.J. Kleinhans, Prof.dr. L.C.M. Itard, and Prof. Dr.-ing. U. Pottgiesser – for the comments, the advice, and for what I'm sure will be a stimulating final discussion.

Moreover, there are many more individuals to express my gratitude to, as our collaborations have profoundly enriched my journey. I consider myself fortunate to have been part of an inspiring research group, whose remarkable research projects served as a constant source of inspiration for me. Their invaluable advice, constructive comments, and innovative solutions were instrumental in guiding me through challenging times. Their unwavering support and camaraderie made the academic road less daunting, and I am genuinely appreciative of the positive impact they had on my growth and development as a scholar. I am also truly grateful for my friends' unwavering support who believed in me and stood by my side throughout this journey. With such supportive and inspiring individuals around me, I am confident that I can continue to grow and achieve even greater heights in the future. Their friendship has been a source of strength and motivation, and I cherish the bond we share.

The path I've traveled has been an empowering one, all thanks to the incredible individuals who have been part of it. As my thesis suggests, I consider these people to be the most crucial achievement and a strong foundation for whatever lies ahead. In the grand scheme of things, it all boils down to the people we meet and the connections we make, and I am deeply grateful for those who have walked beside me on this journey. I will carry your support and encouragement with me as I continue on this journey of learning and growth.

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List of Acronyms

AI	Artificial Intelligence
NLP	Natural Language Processing
BERT	Bidirectional Encoder Representations from Transformers
HUL	Historic Urban Landscape HV Heritage Values
UNESCO	United Nations Educational, Scientific and Cultural Organization
ICOMOS	International Council on Monuments and Sites

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Summary

Heritage planning is a broadening scope, from conserving the heritage property to its cultural significance. Cultural significance is defined by attributes and values, respectively, the attributes motivate the listing of a resource as heritage, and the values justify the heritage listing. A value-based approach considers heritage planning as a dynamic process in which each stakeholder, including interdisciplinary experts and communities, can convey unique cultural significance to heritage, which may vary among stakeholders. This value-based approach is strongly recommended both in academia and, by international recommendations.

Recognition of varying cultural significance by different stakeholder groups can sometimes lead to tensions. Participatory heritage, however, aims to foster consensus-building while also acknowledging the value of conflict as a means to generate new ideas and solutions. Various studies have explored how to consider both majority and minority to construct more holistic and integrated decisions. Scholars so far have applied conventional research methods in participatory practices, which can be time-consuming and expensive, particularly for built heritage, where diverse stakeholder groups are involved. While automated methods have been effective in digital humanities, their application in heritage planning is still limited.

Therefore, the objective of this research is to identify the differences and similarities between different stakeholder groups on the cultural significance they convey to built heritage, by using Artificial Intelligence (AI) models (e.g., multi-label text classification) and information repositories (e.g., social media platforms). This research presents a theoretical framework of the crucial factors affecting consensus-building on the values and attributes defining the cultural significance of heritage, in a public participation process and the relations between these factors.

Based on the presented theoretical framework, a public participation methodological framework, empowered by AI, is developed and tested in the case study of Yazd, Iran. The study focuses on windcatchers, which are key attributes conveying outstanding universal value, as inscribed on the UNESCO World Heritage List. This research compares three main stakeholder groups' perceptions: experts, policymakers, and users.

The findings reveal that there is consensus on acknowledging windcatchers as a valuable attribute in Yazd although stakeholder groups assign different values to windcatchers. The methodological framework, empowered by AI, demonstrates its ability to reveal the stakeholders' understanding of the cultural significance of heritage properties. This methodological framework is replicable for other case studies, and it is a valuable resource for fostering participatory heritage practices in the future.

This thesis contributes to the advancement of knowledge on the relationship between public participation, cultural significance, and AI in heritage planning based on the case study of windcatchers in Yazd. This research offers a critical reflection on the changes expected in heritage planning, going beyond singular narratives and embracing greater diversity. It emphasizes the contribution of stakeholders in defining cultural significance and acknowledges the rising importance of public participation, empowered by AI. The findings offer guidance to heritage practitioners, culture brokers, public officers, and policymakers on how to consider and align the perceptions of various stakeholder groups on cultural significance conveyed to heritage for the benefit of inclusive heritage.

Samenvatting

Erfgoedplanning heeft een breed perspectief: van het behouden van het erfgoed zelf tot het behouden van de culturele betekenis. Culturele betekenis wordt gedefinieerd door kenmerken en waarden, waarbij de kenmerken de reden zijn voor de opname van een bron in het erfgoed en de waarden de opname rechtvaardigen. Een waardegerichte benadering beschouwt erfgoedplanning als een dynamisch proces waarin alle belanghebbenden, inclusief interdisciplinaire experts en gemeenschappen, een unieke culturele betekenis aan erfgoed kunnen toekennen. En dat kan variëren tussen belanghebbenden. Deze waardegerichte benadering wordt sterk aanbevolen, zowel in de academische wereld als door internationale organisaties.

Erkenning van de verschillende culturele betekenis door verschillende belangengroepen kan soms leiden tot spanningen. Participatieve erfgoedplanning heeft echter tot doel consensusvorming te bevorderen en tegelijkertijd de waarde van conflicten te erkennen als een middel om nieuwe ideeën en oplossingen te genereren. Verschillende studies hebben onderzocht hoe zowel meerderheden als minderheden worden meegenomen om meer holistische en geïntegreerde beslissingen te nemen. Tot nu toe hebben wetenschappers conventionele onderzoeksmethoden toegepast in participatieve praktijken. Vooral voor gebouwd erfgoed, waarbij diverse belangengroepen betrokken zijn, kan dit tijdrovend en kostbaar zijn. Hoewel geautomatiseerde methoden effectief zijn gebleken in digitale geesteswetenschappen, worden zij in erfgoedplanning nog steeds slechts beperkt toegepast.

Daarom is het doel van dit onderzoek om de verschillen en overeenkomsten tussen verschillende belangengroepen te identificeren met betrekking tot de culturele betekenis die zij toekennen aan gebouwd erfgoed, door gebruik te maken van kunstmatige intelligentiemodellen (zoals multi-label tekstclassificatie) en informatiebronnen (zoals sociale media-platforms). Dit onderzoek presenteert een theoretisch kader van de cruciale factoren die van invloed zijn op consensusvorming over de waarden en kenmerken die de culturele betekenis van erfgoed definiëren, in een proces van publieke participatie.

Op basis van het gepresenteerde theoretische kader wordt een methodologisch kader voor publieke participatie, versterkt door AI, ontwikkeld en getest in de casestudy van Yazd, Iran. De studie richt zich op windtorens. Dit zijn belangrijke

kenmerken die een uitzonderlijke universele waarde bezitten, zoals beschreven op de UNESCO Werelderfgoedlijst. Dit onderzoek vergelijkt de percepties van drie belangrijkste belangengroepen: experts, beleidsmakers en gebruikers.

De bevindingen tonen aan dat er consensus bestaat over het erkennen van windtorens als een waardevol kenmerk in Yazd, hoewel belangengroepen verschillende waarden toekennen aan windtorens. Het methodologisch kader, versterkt door AI, toont zijn vermogen om het begrip van belanghebbenden van de culturele betekenis van erfgoed duidelijk te maken. Dit methodologisch kader kan ook toegepast worden bij andere casestudies en is een waardevolle bron voor het bevorderen van participatieve erfgoedpraktijken in de toekomst.

Dit proefschrift draagt bij aan de vooruitgang van kennis over de relatie tussen publieke participatie, culturele betekenis en AI in erfgoedplanning, gebaseerd op de casestudy van windtorens in Yazd. Dit onderzoek biedt een kritische reflectie op de verwachte veranderingen in erfgoedplanning, die zullen uitstijgen boven het vertellen van singuliere verhalen en die meer divers zullen zijn. Het benadrukt de bijdrage van belanghebbenden bij het definiëren van culturele betekenis en erkent het toenemende belang van publieke participatie, versterkt door AI. De bevindingen bieden richtlijnen voor erfgoeddeskundigen, cultuurmakelaars, overheidsfunctionarissen en beleidsmakers, over hoe rekening gehouden kan worden met de percepties op de culturele betekenis van erfgoed van verschillende belangengroepen, en hoe deze op elkaar afgestemd kunnen worden.

چکیده

برنامه‌ریزی میراث فرهنگی، از حفظ میراث تا حفظ اهمیت فرهنگی میراث آن به تعمیم پیوسته‌ای می‌رسد. اهمیت فرهنگی به واسطه عناصر و ارزش‌ها تعریف می‌شود، به‌ترتیب عناصر، موجب ثبت یک منبع به‌عنوان میراث می‌شود و ارزش‌ها، توجیه کننده ثبت میراث هستند. رویکرد مبتنی بر ارزش در برنامه‌ریزی میراث فرهنگی، میراث را به‌عنوان یک منبع پویا در نظر می‌گیرد که در آن هر ذینفع، از جمله کارشناسان بین‌رشته‌ای و جوامع، می‌توانند اهمیت فرهنگی ویژه ای را به میراث نسبت دهند که ممکن است در میان ذینفعان متفاوت باشد. استفاده از ین رویکرد مبتنی بر ارزش در برنامه ریزی میراث فرهنگی، هم در دانشگاه‌ها و هم توسط توصیه نامه های بین‌المللی، توصیه شده است.

گروه‌های مختلف ذینفع ممکن است نظزات متفادتی در رابطه با اهمیت فرهنگی میراث داشته باشند و این مسئله ممکن است گاهی منجر به تنش در بین این گروه ها شود. با این حال، هدف از برنامه ریزی مشارکتی در میراث فرهنگی، ایجاد توافق و در عین حال بهره‌گیری از تناقض نظرات به عنوان وسیله‌ای برای تولید ایده‌ها و راه‌حل‌های جدید است. مطالعات مختلف نحوه مد نظر گرفتن گروه‌ها ی اقلیت و اکثریت برای رسیدن به راه‌حل‌های یکپارچه و همگانی را بررسی نموده‌اند. تا به حال دانشمندان از روش‌های تحقیق معمول در رویکردهای مشارکت عمومی بهره‌مند شده‌اند که ممکن است زمان‌بر و گران‌قیمت باشند، به‌ویژه در حوزه میراث فرهنگی که در آن گروه‌های ذینفع متنوعی شرکت دارند. در حالی که روش‌های اتوماتیک در علوم انسانی دیجیتال موثر بوده‌اند، اما کاربرد آن‌ها در برنامه‌ریزی میراث فرهنگی هنوز محدود است.

بنابراین، هدف این تحقیق، شناسایی تفاوت‌ها و تشابه‌ها بین گروه‌های مختلف ذینفع در رابطه با ارزش فرهنگی‌ای که به میراث نسبت میدهند، با استفاده از مدل‌های هوش مصنوعی (مانند طبقه‌بندی متن چند برچسبی) و مخازن اطلاعاتی (مانند پلتفرم‌های رسانه‌های اجتماعی) است. این تحقیق یک چارچوب نظری از عوامل تأثیرگذار در ایجاد توافق بین گروه های ذینفع در مورد ارزش‌ها و عناصر تعریف‌کننده میراث، در فرآیند مشارکت عمومی ارائه می‌دهد.

بر اساس چارچوب نظری ارائه‌شده، یک چارچوب روش‌شناختی برای مشارکت عمومی، با استفاده از هوش مصنوعی، توسعه میگردد و بر روی مطالعه موردی یزد در ایران آزمایش می‌شود. این تحقیق بر روی بادگیرها تمرکز دارد که عناصر کلیدی با ارزش جهانی برجسته هستند که در فهرست میراث جهانی یونسکو ثبت شده‌اند. چارچوب روش‌شناختی ارائه شده در این تحقیق، توانایی آشکارسازی ادراک ذینفعان از اهمیت فرهنگی میراث را با استفاده از هوش مصنوعی نشان می‌دهد. این چارچوب روش‌شناختی قابلیت استفاده برای سایر نمونه های موردی را دارد و منبعی ارزشمند برای تسهیل فرایند مشارکت عمومی در آینده می‌باشد.

این پایان‌نامه به پیشرفت دانش در مشارکت عمومی، اهمیت فرهنگی و استفاده از هوش مصنوعی در برنامه‌ریزی میراث بر اساس مطالعه موردی بادگیرها در یزد کمک می‌کند. این تحقیق یک بازتاب انتقادی در مورد تغییرات مورد انتظار در برنامه‌ریزی میراث ارائه می‌دهد، فراتر از روایت‌های تک‌زبانه و همچنین گسترش بیشتر تنوع را پذیرفته و از تأثیر ذینفعان در تعریف اهمیت فرهنگی خبر می‌دهد و اهمیت روزآمد مشارکت عمومی را تأیید می‌کند. یافته‌های این تحقیق میتواند خط راهنمایی برای افرادی که در زمینه برنامه‌ریزی میراث کار میکنند، شامل کارکنان سازمان های عمومی و دولتی و سیاستگذاران، فراهم می‌کند که چگونه بتوانند گرایش‌های گوناگون گروه‌های مختلف ذینفع به اهمیت فرهنگی را برای رسیدن به میراث مشارکتی در نظر بگیرند.

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1 Introduction

1.1 Background

The scope of heritage planning is broadening, shifting focus from solely conserving the heritage properties to encompassing their cultural significance, defined by values and attributes. A value-based approach to heritage planning recognizes the dynamic nature of heritage and encourages diverse stakeholder groups to participate in the decision-making process. This participatory approach aims to achieve consensus while embracing conflict as a catalyst for innovation. However, conventional research methods in participatory practices can be resource-intensive. Although new methodologies using Artificial Intelligence (AI) and information repositories have been successfully applied in digital humanities, their potential in heritage planning remains largely untapped. Therefore, this study aims to utilize AI models along with information repositories to analyze and understand the similarities and differences in the cultural significance attributed to built heritage by different stakeholder groups. The following paragraphs explain the main concepts of this research and their relations.

1.1.1 Heritage planning

Heritage planning is a comprehensive and dynamic process that encompasses the identification, conservation, management, and promotion of cultural heritage resources within specific geographic areas or communities. It aims to protect and manage heritage assets while recognizing their values. Value-based heritage planning is considered a “dynamic process of change management” (ICOMOS Australia 2013). Accordingly, a city is addressed as a “living heritage” with dynamic associative values which differ based on different stakeholder groups (Poulios, 2014; Ginzarly et al., 2019). This approach acknowledges that each community and its members may attribute different meanings to heritage (Taylor, 2004). Recognizing the diverse nature of heritage, it is strongly recommended to involve multi-disciplinary stakeholders,

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not just experts, in determining the cultural significance of heritage (UNESCO, 2011; Yung, et al., 2017; Ginzarly, et al, 2019; Bonet, et al., 2020; Li, et al., 2020).

Central to the value-based heritage planning approach is the concept of cultural significance. Cultural significance refers to the attributes that motivate the listing of a resource as heritage, and the values justify the heritage listing. Value-based heritage planning recognizes that different communities may convey diverse cultural significance to heritage, seeking to respect and celebrate this diversity. Through engaging communities, value-based heritage planning aims to ensure that heritage is inclusive, representative, and meaningful to all members of society (Poulios, 2014; Ginzarly et al., 2019). Participatory approaches foster a sense of ownership and empowerment among communities, creating a more inclusive and sustainable heritage planning practice.

1.1.2 Public participation

In recent years, there has been an increasing emphasis on multi-stakeholder participation in sustainable heritage planning (e.g., UNESCO, 2011; Yung, et al., 2017; Ginzarly, et al, 2019; Bonet, et al., 2020; Li, et al., 2020) and various models have been continuously formulated and adapted at local, national, and international levels (Rosetti, 2022). The goal of public participation in heritage planning is to build consensus around common points of view between various groups about what should happen in the future of a heritage property (Beyea, 2009).

By promoting public participation in heritage, social inclusion can be enhanced. Various publications highlight the benefits of inclusive approaches in different heritage subfields such as conservation (Court & Wijesuriya, 2015), urban development (Göttler & Ripp, 2017; UNESCO, 2011), museums (Simon, 2010), and public archaeology (Moshenska, 2017). In summary, the significance of participation as a critical success factor in heritage conservation, societal well-being, and effective heritage planning is evident across different subfields and research lines.

Involving users, policymakers, and experts in decision-making processes in heritage planning is important as evidenced by scholarly literature (e.g., Maginn, 2007; Cheng, 2013; Van Assche and Duineveld, 2013; Purbani, 2017). User involvement fosters a sense of ownership and stewardship, promoting support for heritage conservation initiatives (Poulios, 2014; Conforti, et al., 2015). Involving policymakers and experts brings specialized knowledge, regulatory frameworks, and strategic considerations into the decision-making process, aligning heritage planning with

broader policy goals and development objectives (e.g., Cheng, 2013; Van Assche & Duineveld, 2013; Purbani, 2017). Together, the involvement of users, policymakers, and experts enhances the quality of decision-making, promotes cultural sustainability, and engenders community engagement and support in heritage conservation efforts.

Public participatory heritage planning is recognized as essential for preserving the cultural significance conveyed by heritage while embracing the dynamic character of heritage (Court & Wijesuriya, 2015; Poulios, 2014). Countries worldwide have been highly encouraged to involve the public, besides experts and policymakers, in defining the cultural significance of listed heritage by the HUL recommendation (UNESCO, 2011). By adopting an inclusive approach, policymakers and heritage managers can make informed decisions that uphold the cultural significance of heritage properties.

1.1.3 Cultural significance

Ever since the Burra charter was adopted, the term “cultural significance” has been growing in prominence in heritage planning worldwide (The Burra Charter, 1999), but its explicit mention and definition in official documents and processes by UNESCO and the World Heritage Convention only occurred in 2008 (UNESCO, 2008). The Burra Charter for Places of Cultural Significance provides a formal definition that equates cultural significance with cultural heritage value, encompassing various values for past, present, and future generations (The Burra Charter, 1999). This definition complements the concept of the Statement of Outstanding Universal Value (SOUV). The SOUV is the statement of cultural significance detailing the cultural significance of outstanding universal value conveyed to heritage properties. It plays a crucial role in justifying the selection criteria and facilitating the nomination process for inscription on the UNESCO World Heritage List (UNESCO, 2005). According to the operational guidelines set in 2005, the OUV and the conditions of authenticity of the properties should be preserved or even improved after their inscription (UNESCO, 2005).

According to the Burra Charter, understanding cultural significance can vary among individuals and stakeholder groups (Australia ICOMOS, 2013). To facilitate successful policy decision-making and effective planning of heritage properties, it is essential to adhere to a systematic process of gathering and analyzing information to understand and define the cultural significance of heritage properties (Australia ICOMOS, 2013). The UNESCO 2011 Recommendation on the Historic Urban Landscape (HUL) supports this process, defining cultural significance as values (why to conserve) and attributes (what to conserve) conveyed to heritage by various stakeholder groups (UNESCO, 2011; Tarrafa Silva & Pereira Roders, 2012).

1.1.4 Consensus on the cultural significance

Participation of a diverse range of stakeholders to reach a consensus on the cultural significance of heritage has been strongly recommended worldwide both by scholars (García, et.al., 2019; Zhou, et.al., 2018; Harmon and Viles, 2013) and international organizations (UNESCO, 2011; UNESCO, 2016). However, various stakeholders can have contradictory views on what constitutes cultural significance, which can lead to conflict. Conflict is as crucial as consensus in participatory practices to generate new ideas and solutions (Bailey et al, 2011, Van Ewijk, 2011) and it is the responsibility of leaders and policymakers to embrace communities' diversity and conflict (Maginn, 2007; Fahmi and et al., 2016; Purbani, 2017).

The identification and acknowledgment of differences and similarities among stakeholders (Arnstein, 1969; Mitchell & Vigar, 2015; Reed, 2008) are essential to reach a consensus on the cultural significance in a public participatory process. By openly addressing conflictual issues, it becomes possible to navigate divergent cultural significance, find common ground, and work towards a shared understanding of heritage planning. Given that, revealing differences and similarities can be the first step of a participatory process that contributes to a more inclusive and robust decision-making process. Scholars showcase the significance of uncovering differences and similarities as a means to foster consensus through constructive dialogue, negotiation, and the implementation of consensus-building strategies (e.g., Peltonen & Sairinen, 2010; Blokhuis et al., 2012; García et al., 2019).

To reveal the cultural significance conveyed to heritage by different stakeholder groups, scholars introduced various theoretical frameworks (e.g., Fredheim & Khalaf, 2016; Ginzarly, 2019; Azzopardi et al., 2023). Among them, two theoretical frameworks have clear definitions (see Figure 1.1) and are used comparatively in UNESCO regions such as Europe and North America (Speckens et al., 2012), Africa (Vroomen et al., 2012), Asia and the Pacific (Boxem et al., 2012; Huids et al., 2013). These are a) the values framework, developed by Pereira Roders (2007), and b) the attributes framework, developed by Veldpaus (2015).See appendix A for more detailes on the theoretical frameworks.

Earlier scholars explored the application of theoretical frameworks using diverse research methods, mainly manual, in participatory practices to reveal the differences and similarities in the cultural significance that different stakeholder groups conveyed to heritage (e.g., Peltonen & Sairinen, 2010; Blokhuis et al., 2012; García et al., 2019; Garcia et al., 2018). But, manual methods can be time-consuming and expensive, particularly for built heritage, where many stakeholders are involved (Morrison & Xian, 2016; Li, et al., 2020). There is, however, a growing interest and

curiosity in the use of information repositories (e.g., social media platforms) and AI models to facilitate participatory heritage planning.

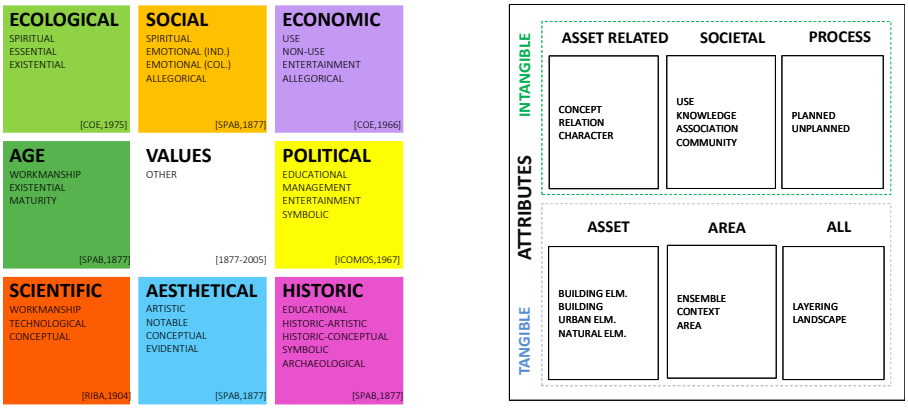

FIG. 1.1 Theoretical framework on cultural significance; values (Pereira Roders, 2007) and attributes (Veldpaus, 2015)

1.1.5 Information repositories

In the field of heritage studies, information repositories play a crucial role in providing a vast amount of data related to heritage sites, artifacts, and cultural practices. Different information repositories are serving various purposes and are used by different stakeholders. Some examples are bibliographic database (e.g., Scopus), Social media platforms (e.g., Instagram), and government archives (which includes official records, historical documents, etc.). These repositories include various sources such as digitized archives, cultural databases, online collections, and multimedia platforms. They serve as centralized hubs of information, storing valuable records, documents, images, videos, and other forms of digital content on heritage.

The use of traditional information repositories, such as archives, has been fundamental in heritage planning, providing access to valuable resources. However, with the rise of digital technologies, there has been a significant shift towards new digital repositories in the field. Academic publications have explored this transition, highlighting the benefits of digital repositories and information management for heritage planning (e.g., Ross,2012; Korro et. al.,2021; Macrì & Cristofaro, 2021).

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More specifically, social media is a recurrent data repository in innovative research, especially when willing to involve a large group and variety of people and interpret their perceptions and sentiments (e.g., Ginzarly et al., 2019; Van der Hoeven, 2019, Liao et. al., 2023). For example, Ginzarly et al. (2019) analyzed geo-tagged photos and tags shared through Flickr by online communities in Tripoli, Lebanon to reveal the attributes and values. These scholars revealed the potential of social media to involve citizens in heritage planning and provided insight into the various values conveyed to heritage.

Information repositories can promote inclusive heritage planning by capturing the viewpoints of different stakeholder groups. For instance, government archives (which store policy documents, etc.) provide insights into the perceptions of policymakers. bibliographic database (e.g., Scopus which stores academic literature) represents the viewpoints of experts in the field. Social media platforms (e.g., Instagram) can serve as a reflection of user perceptions. These diverse repositories can enable a comprehensive understanding of different stakeholder groups' perceptions, facilitating a more inclusive and informed decision-making process in heritage planning.

Usually, digital information repositories accumulate vast amounts of data which is increasing every day (sometimes every second in the case of popular social media platforms). Analyzing a big volume of data is impossible with conventional methods. It requires tools, methods, and processing techniques to handle the increasing influx of information. Given that, researchers employ AI techniques to analyze large datasets from digital information repositories (e.g., Alizadeh et al., 2019; Monachesi, 2020). AI offers powerful tools for processing and understanding large volumes of data, enabling researchers to uncover hidden patterns, relationships, and trends that may not be immediately apparent through manual analysis alone.

1.1.6 Artificial Intelligence

The combination of AI and information repositories has opened up new avenues for research, analysis, and decision-making. AI technologies have the potential to efficiently extract insights from large volumes of data stored in information repositories, transforming the way heritage planning is conducted. Textual data represents one of the primary types of information found in information repositories.

Particularly for textual data, Natural Language Processing (NLP) is an AI subfield focused on enabling computers to understand, interpret, and generate human language. Large language models like BERT (Bidirectional Encoder Representations from Transformers) have revolutionized NLP by achieving state-of-the-art

performance on various tasks (Tenney et al., 2019). Text classification, a core NLP task, involves categorizing text into predefined labels, and BERT's contextual understanding has greatly influenced this area. By pre-training on vast amounts of unlabeled text data and fine-tuning on specific tasks, BERT leverages its contextual knowledge to excel in text classification, capturing nuanced relationships within sentences (Tenney et al., 2019; González-Carvajal & Garrido-Merchán, 2020).

In addition to text classification, another important task in NLP is multi-label text classification. Multi-label text classification is a task in NLP where the goal is to assign multiple labels or categories to a given text document. Unlike single-label classification, where a document is assigned only one label, multi-label classification recognizes that a document can be associated with multiple labels simultaneously (Endut et al., 2022).

Overall, the combination of information repositories and AI techniques offers a powerful approach to revealing cultural significance in heritage studies (e.g., Liao, 2023; Layuno & Magaz-Molina, 2023). It allows researchers to tap into vast amounts of data, gain new perceptions, and generate valuable knowledge about the cultural significance of heritage in different contexts from different stakeholder groups' perceptions. Still, limited research has been conducted in this area. Among these, scholars mainly focused on social media.

1.2 Research gap

Despite the increasing importance of public participation in heritage planning, there is currently a research gap in terms of a comprehensive theoretical framework that specifically addresses the influencing factors in the public participatory process. Additionally, the Application of AI to analyze information repositories is seldom explored in participatory heritage planning and has never yet been used to compare social media with other information repositories such as bibliographic databases and online databases to compare various stakeholder groups' perceptions of cultural significance conveyed to heritage. Besides, there is a lack of literature on heritage-specific tools targeting the cultural significance of built heritage, distinguishing and relating attributes and values (Bai et al., 2021). Lastly, literature often focuses on the scale of country, city, and neighborhood (e.g., Alizadeh et al., 2019; Ginzarly et al., 2019; Monachesi, 2020), rather than a specific attribute type such as a

building element. Addressing these gaps will contribute to a deeper understanding of effective public participation and the potential of AI and information repositories to facilitate inclusive heritage planning processes.

1.3 Research Objective

The purpose of this study is to facilitate inclusive heritage planning by investigating the potential of Artificial Intelligence models, specifically the multi-label text classification model, to analyze unstructured textual data from various information repositories that represent three main stakeholders namely, users, experts, and policymakers to identify the differences and similarities between the three stakeholder groups on the cultural significance (values and attributes) conveyed to built heritage, which can be used as a source for making more integrated and informed decisions, aligned with the identified cultural significance.

1.4 Research question

To reach the above goal, this study aims to answer the main question:

How to identify and compare stakeholder groups' perceptions of the cultural significance of heritage using AI and information repositories to facilitate a public participatory heritage planning process?

To answer the main question, the research is guided by the following sub-questions:

1. What are the **critical factors** affecting the public participation process to reach a consensus on values and attributes defining the cultural significance of heritage?
2. What are the **values and attributes** defining the cultural significance of heritage**,** according to different groups of stakeholders namely experts, users, and policymakers?
3. What are the **differences and similarities** in the values and attributes defining the cultural significance of heritage, according to different groups of stakeholders?

1.5 Research setting

This is an articles-based doctoral dissertation. All the chapters, except for the introduction and conclusion chapters, have been submitted or published (completely or partially) as journal articles. For this reason, the chapters in the thesis have an introduction and a methodology section that guide the reader into the different sub-topics. A reader might sense some repetition. In addition to the published papers, a range of research activities, such as conducting workshops, participating in conferences, and contributing to book chapters, have provided valuable opportunities to expand knowledge on wider subjects related to heritage, participation, and artificial intelligence. These activities have gone beyond the immediate focus of this research and have facilitated collaborations with external researchers and institutions, resulting in additional publications that greatly influenced and enhanced the development of this doctoral thesis (see appendix C for more details).

1.6 Research case study

The Historic City of Yazd, located in Iran, is known for having the highest number of windcatchers compared to any other city in the country (Saadatian et al., 2012). Windcatchers are important attributes in Yazd, providing natural ventilation and thermal comfort in buildings. They consist of a vertical shaft with vents above the roof of a building that channels wind into interior living spaces, creating an air conditioning system. Windcatchers operate in conjunction with other building elements, such as courtyards, gardens, pools, thick earthen walls, doors, and windows, to ensure efficient air circulation at comfortable and healthy levels. The air passing over humid elements such as pools and gardens is cooled down due to the process of evaporation (see Figure 1.2).

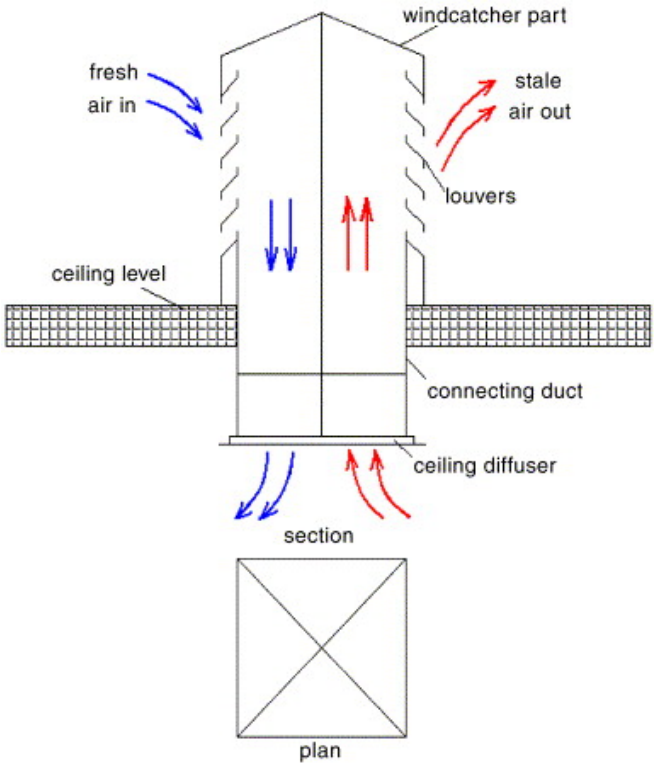

FIG. 1.2 Wind circulation in the main room with a windcatcher passing by pools, source: Dehghani-sanij et al., 2015.

The cultural significance of windcatchers in Yazd goes beyond their architectural function. They are important elements to daily users (e.g., residents) as many historic homes include at least one windcatcher in Yazd. Occasional users (e.g., tourists) also frequently highlight the importance of windcatchers, as they act as landmarks within the urban landscape and are visible from all corners of the historic city. Despite their importance, there is a lack of studies investigating different stakeholder groups' perceptions of the cultural significance of windcatchers in Yazd (Movahed, 2016). However, the inscription of the cultural heritage property named the "Historic City of Yazd" in the UNESCO World Heritage List in 2017, in which windcatchers are a key attribute, emphasizes the need to preserve and grow understanding of the cultural significance of windcatchers, not only for experts and professionals but also for a broader range of stakeholders, including daily and occasional users. Therefore, this unique but also common attribute is used as the object for the empirical analysis of this research.

The main stakeholder groups considered in this research project are users, experts, and policymakers, based on the theoretical framework presented by Pereira Roders (2019). Accordingly, different information repositories (e.g., social media platforms, bibliographic databases, and online databases) are used to collect perceptions of these three stakeholder groups addressed respectively in social media posts, literature, and policy documents.

1.7 Research design

This research presented a theoretical framework demonstrating the influencing factors on consensus-building in a public participation process. Besides, this research developed and implemented a methodological framework to understand the differences and similarities between various stakeholder groups' perceptions of cultural significance conveyed to heritage to ultimately facilitate consensus-building in participatory heritage planning. Perceptions of three main stakeholder groups namely users, experts, and policymakers, were revealed and compared. This interdisciplinary research project employs a diverse range of methods, including conventional quantitative and qualitative approaches as well as cutting-edge computational techniques leveraging artificial intelligence. The project presents a series of systematic and reproducible workflows designed to collect, process, structure, and analyze information revealing the cultural significance of urban heritage properties, drawing from information repositories. These workflows serve as a comprehensive toolbox for researchers in this field. The research design of this thesis unfolds in six chapters: They are respectively 1. Introduction, 2. Literature review, 3. Revealing users' perceptions using social media posts, 4. Revealing experts' perceptions using literature, 5. Revealing policymakers' perceptions using policy documents, 6. Comparative analysis to reveal differences and similarities in the cultural significance of windcatchers among the three main stakeholders' groups, and 7. Conclusion (see Figure 1.3).

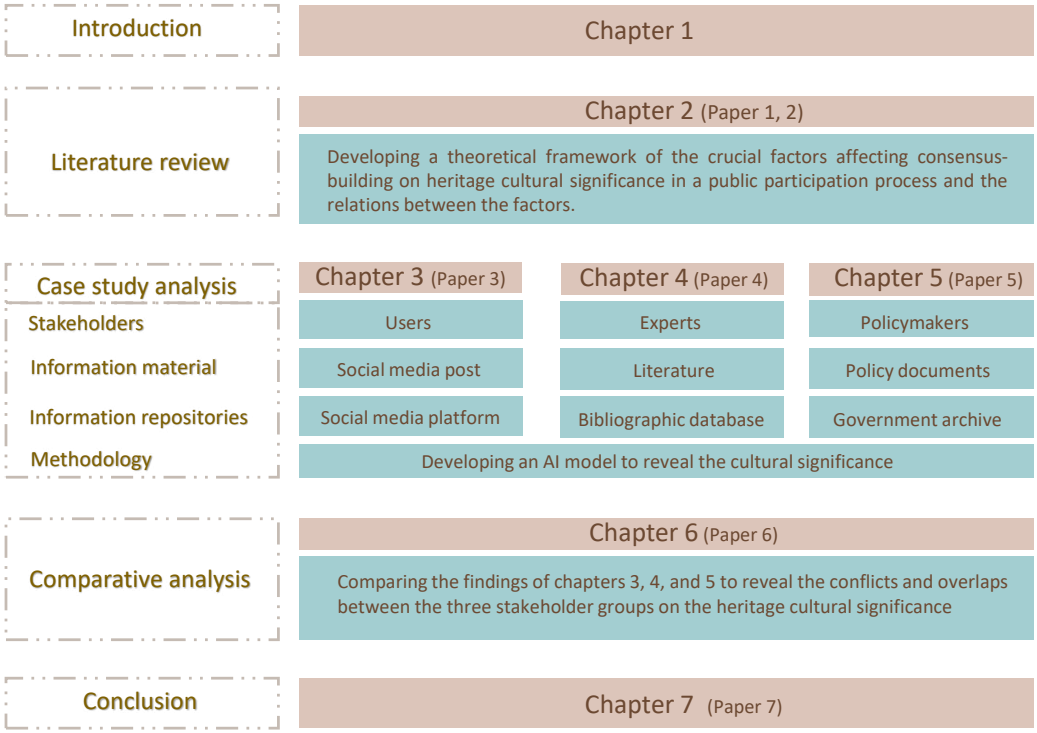

FIG. 1.3 Research design

Chapter 1, Introduction: This chapter provides a concise overview of the research topic, its significance, and the research objectives, setting the stage for the entire study. It also outlines the structure and organization of the thesis.

Chapter 2, Literature review: This chapter addresses the theoretical basis of this thesis. It includes a systematic literature review on the state-of-the-art. In this step, the study defines a theoretical framework of the crucial factors affecting consensus-building on the cultural significance conveyed to heritage in a public participation process and the relations between the factors. The result of this chapter is already published in two journal articles (Foroughi et al., 2023a; Foroughi et al., 2023b). The framework was used as the theoretical basis of this research.

Chapters 3, 4, and 5, Revealing the cultural significance conveyed to heritage by users, experts, and policymakers independently: The most relevant information repositories representing the three groups of stakeholders were used in this research. They are respectively, social media platforms (Instagram and Twitter),

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bibliographic databases (e.g., Scopus), and online data bases (e.g., UNESCO website). Moreover, due to the size of the data, an AI model is developed and used for automation analysis. To be more precise, using NLP techniques, a multi-label text classification model is developed where the goal is to assign multiple labels to a given text document. In this research, each label represents a specific class of value or attributes that the document can reference. In this study, we trained the BERT model to perform multi-label text classification. The objective was to predict the relevant labels, which represent either values or attributes, based on a given input text. The results of these chapters are already disseminated in the form of three journal articles, currently under revision.

Chapter 6, Revealing differences and similarities: This step uses the findings of chapters 3, 4, and 5 to conduct a comparative analysis of the cultural significance conveyed to heritage conveyed by users, experts, and policymakers, to reveal the differences and similarities among them. The results of this chapter are already disseminated in the form of one journal article, currently under revision.

Chapter 7, Conclusion: Finally, the dissertation comes back in an integral discussion on the application of the suggested frameworks to foster social inclusion in heritage planning. The results of this chapter are being prepared for publication as a conference article.

1.8 Outcome and relevance

This research offers critical insights into the changing approach to heritage planning and the increasing importance of public participation. It provides valuable information on how different stakeholders contribute to defining the cultural significance of built heritage and the implications for decision-making. The purpose of this study is to advance the current knowledge and provide a useful resource for researchers and practitioners who seek to advance the transition towards participatory heritage practices focusing on cultural significance. By implementing and enhancing these practices using AI and information repositories, it would be possible to preserve and promote living heritage, particularly in urban areas, while also utilizing heritage practices to facilitate sustainable development that is fair, inclusive, and environmentally conscious. This research results can be also used as a guide for leveraging the potential of heritage practices in fostering sustainable development that respects diversity.

References

Abbattista, F., Bordoni, L. and Semeraro, G., 2003. Artificial intelligence for cultural heritage and digital libraries. Applied Artificial Intelligence, 17(8-9), pp.681-686.

Alivizatou, M. (2022). Heritage and Development: A Participatory Approach. Routledge.

Alizadeh, T., Sarkar, S., & Burgoyne, S. (2019). Capturing citizen voice online: Enabling smart participatory local government. Cities, 95, 102400.

Arnstein, S. R. (1969). A Ladder of Citizen Participation. Journal of the American Institute of Planners, 35(4), 216–224.

Australia ICOMOS (2013). The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999). Technical report, Australia ICOMOS.

Azzopardi, E., Kenter, J.O., Young, J., Leakey, C., O'Connor, S., Martino, S., Flannery, W., Sousa, L.P., Mylona, D., Frangoudes, K. and Béguier, I., 2023. What are heritage values? Integrating natural and cultural heritage into environmental valuation. People and Nature, 5(2), pp.368-383.

Bai, N., Luo, R., Nourian, P., Roders, A. P. (2021). WHOSe Heritage: Classification of UNESCO World Heritage" Outstanding Universal Value" Documents with Smoothed Labels. arXiv preprint arXiv:2104.05547.

Bailey, K., Blandford, B., Grossardt, T. and Ripy, J., 2011. Planning, technology, and legitimacy: structured public involvement in integrated transportation and land-use planning in the United States. Environment and Planning B: Planning and Design, 38(3), pp.447-467.

Blokhuis, E.G.J., Snijders, C.C.P., Han, Q. and Schaefer, W.F., 2012. Conflicts and cooperation in brownfield redevelopment projects: Application of conjoint analysis and game theory to model strategic decision making. Journal of Urban Planning and Development, 138(3), pp.195-205.

Bonet, L.E., Greene, M. and de Dios Ortúzar, J., 2020. Subjective valuation of tangible and intangible heritage neighbourhood attributes. Habitat International, 105, p.102249.

Boxem, R., Fuhren, R., Roders, A.P., Veldpaus, L. and Colenbrander, B.J.F., 2012. Assessing the cultural significance of world heritage cities: the historic centre of Galle as case study. In conference; International Seminar on Urban Conservation: Measuring Heritage Conservation Performance; 2011-03-29; 2011-03-31 (pp. 75-81). CECI and ICCROM.

Chen, W., & Wang, D. (2018). The Role of Public Participation in Resolving Heritage Conservation Conflicts: A Case Study of a Historic Neighborhood in China. Sustainability, 10(9), 3285.

Cheng, Y., 2013. Collaborative planning in the network: Consensus seeking in urban planning issues on the Internet—the case of China. Planning Theory, 12(4), pp.351-368.

Colavizza, G., Blanke, T., Jeurgens, C. and Noordegraaf, J., 2021. Archives and AI: An overview of current debates and future perceptions. ACM Journal on Computing and Cultural Heritage (JOCCH), 15(1), pp.1-15.

Conforti, M. E., Fernández-Lomana, J. C. D., Mariano, M., Endere, M. L., & Romero Alonso, A. J. (2015). World Heritage and the local community: The case of Atapuerca (Burgos, Spain). Conservation and Management of Archaeo

Court, J., & Wijesuriya, G. (2015). Conservation and Development in Sri Lanka: A Case Study of Galle World Heritage City. In I. Agnoletti & P. G. Jones (Eds.), Urban Forests, Trees, and Greenspace: A Political Ecology Perception (pp. 211–228). Routledge.

Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2019). BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding. arXiv preprint arXiv:1810.04805. Retrieved from https://arxiv.org/abs/1810.04805

Endut, N., Hamzah, W.A.F.W., Ismail, I., Yusof, M.K., Baker, Y.A. and Yusoff, H., 2022. A Systematic Literature Review on Multi-Label Classification based on Machine Learning Algorithms. TEM Journal, 11(2), p.658.

Fahmi, F. Z., Prawira, M. I., Hudalah, D., & Firman, T. (2016). Leadership and collaborative planning: The case of Surakarta, Indonesia. Planning Theory, 15(3), 294–315. https://doi.org/10.1177/1473095215584655

Floridia, A. (2013). Deliberative Democracy and Local Government. Routledge.

Fredheim, L.H. and Khalaf, M., 2016. The significance of values: Heritage value typologies re-examined. International Journal of Heritage Studies, 22(6), pp.466-481.

Garcia, X., Benages-Albert, M. and Vall-Casas, P., 2018. Landscape conflict assessment based on a mixed methods analysis of qualitative PPGIS data. Ecosystem services, 32, pp.112-124.

Garcia, X., Benages-Albert, M., Pavón, D., Ribas, A., Garcia-Aymerich, J. and Vall-Casas, P., 2017. Public participation GIS for assessing landscape values and improvement preferences in urban stream corridors. Applied Geography, 87, pp.184-196.
García, G., Amaya, J. and Tenze, A., 2019. Cultural Significance: Linking Actors and Methods. In Structural Analysis of Historical Constructions (pp. 2053-2061). Springer, Cham.
Ginzarly, M., Roders, A. P., & Teller, J. (2019). Mapping historic urban landscape values through social media. Journal of Cultural Heritage, 36, 1-11.
Göttler, C., & Ripp, C. (2017). Participatory Urban Development: Critical Perceptions from the Global South. Springer.
Harmon, B. and Viles, H., 2013. Beyond geomorphosites: trade-offs, optimization, and networking in heritage landscapes. Environment Systems and Decisions, 33(2), pp.272-285.
Huids, N., van de Riet, E., Veldpaus, L. and Roders, A.P., 2013. Towards the heritage impact assessment of tourism: The historic route of Macao as case study. In Proceedings of International Conference on Tourism and the Shifting Values of Cultural Heritage: Visiting Pasts, Developing Futures (pp. 100-120). England: Ironbridge International Institute for Cultural Heritage, University of Birmingham.
Korro Bañuelos, J., Rodríguez Miranda, Á., Valle-Melón, J.M., Zornoza-Indart, A., Castellano-Román, M., Angulo-Fornos, R., Pinto-Puerto, F., Acosta Ibáñez, P. and Ferreira-Lopes, P., 2021. The role of information management for the sustainable conservation of cultural heritage. Sustainability, 13(8), p.4325.
Lavoie, C., Harvey, F., & Proulx, M. (2016). Participatory Processes in Heritage Governance: The Case of a UNESCO World Heritage Site in Canada. Journal of Environmental Planning and Management, 59(5), 819-837.
González-Carvajal, S. and Garrido-Merchán, E.C., 2020. Comparing BERT against traditional machine learning text classification. arXiv preprint arXiv:2005.13012.
Layuno Rosas, Á. and Magaz-Molina, J., 2023. Contributions of Social Media to the Recognition, Assessment, Conservation, and Communication of Spanish Post-Industrial Landscapes. Land, 12(2), p.374.
Li, J., Krishnamurthy, S., Roders, A.P. and van Wesemael, P., 2020. Community participation in cultural heritage planning: A systematic literature review comparing Chinese and international practices. Cities, 96, p.102476.
Liao, J., Liao, Q., Wang, W., Shen, S., Sun, Y., Xiao, P., Cao, Y. and Chen, J., 2023. Quantifying and mapping landscape value using online texts: A deep learning approach. Applied Geography, 154, p.102950.
Liu, J., Chang, W.C., Wu, Y. and Yang, Y., 2017, August. Deep learning for extreme multi-label text classification. In Proceedings of the 40th international ACM SIGIR conference on research and development in information retrieval (pp. 115-124).).
Liu, Y., Ott, M., Goyal, N., Du, J., Joshi, M., Chen, D., ... & Stoyanov, V. (2019). RoBERTa: A Robustly Optimized BERT Pretraining Approach. arXiv preprint arXiv:1907.11692. Retrieved from https://arxiv.org/abs/1907.11692.
Labadi, S., 2013. UNESCO, cultural heritage, and outstanding universal value: Value-based analyses of the World Heritage and Intangible Cultural Heritage Conventions.
McCall, M. K. (2018). Mediation and Heritage: Dispute Resolution in Cultural Heritage. International Journal of Heritage Studies, 24(3), 225-238.
Macrì, E. and Cristofaro, C.L., 2021. The digitalisation of cultural heritage for sustainable development: The impact of Europeana. Cultural Initiatives for Sustainable Development: Management, Participation and Entrepreneurship in the Cultural and Creative Sector, pp.373-400.
Maginn, P. J. (2007). Towards more effective community participation in urban regeneration: The potential of collaborative planning and applied ethnography. Qualitative Research, 7(1), 25–43.
Mitchell, N., & Vigar, G. (2015). Conflict, Negotiation, and Coexistence: Rethinking Heritage Value in the Globalized City. Journal of Planning Education and Research, 35(4), 411-426.
Moshenska, G. (2017). Key Concepts in Public Archaeology. UCL Press.
OMC. (2018). Governance of Cultural Heritage in the European Union: Research Report. European Commission.
Monachesi, P. (2020). Shaping an alternative smart city discourse through Twitter: Amsterdam and the role of creative migrants. Cities, 100, 102664.

Morrison, N., & Xian, S. 2016. High mountains and the faraway emperor: Overcoming barriers to citizen participation in China's urban planning practices. Habitat International, 57, 205–214. https://doi.org/10.1016/j.habitatint.2016.08.001

Movahed, K., 2016, August. Badgir (wind catcher) an example of traditional sustainable architecture for clean energy. In 2016 IEEE Smart Energy Grid Engineering (SEGE) (pp. 79-83). IEEE.).

Peltonen, L. and Sairinen, R., 2010. Integrating impact assessment and conflict management in urban planning: Experiences from Finland. Environmental Impact Assessment Review, 30(5), pp.328-337.

Pereira Roders, A. (2007). RE-ARCHITECTURE: Lifespan rehabilitation of built heritage, Eindhoven: Eindhoven University of Technology, 2007.

Pereira Roders, A., 2019. The Historic Urban Landscape approach in action: Eight years later. In Reshaping Urban Conservation (pp. 21-54). Springer, Singapore.

Poulios, I., 2014. Discussing strategy in heritage conservation: Living heritage approach as an example of strategic innovation. Journal of Cultural Heritage planning and Sustainable Development, 4(1), 16–34. https://doi.org/10.1108/JCHMSD-10-2012- 0048.

Purbani, K., 2017. Collaborative planning for city development. A perception from a city planner. Przegląd Naukowy. Inżynieria i Kształtowanie Środowiska, 26(1 [75]).

Reed, M. S. (2008). Stakeholder Participation for Environmental Management: A Literature Review. Biological Conservation, 141(10), 2417-2431.

Rosetti, I., 2022. Participatory heritage practices in, for, as sustainable urban development (Doctoral dissertation, University of Antwerp).

Ross, S., 2012. Digital preservation, archival science and methodological foundations for digital libraries. New Review of Information Networking, 17(1), pp.43-68.

Saadatian, Omidreza; Haw, Lim Chin; Sopian, K.; Sulaiman, M.Y. 2012. "Review of windcatcher technologies". Renewable and Sustainable Energy Reviews. 16 (3).

Speckens, A.H., Veldpaus, L., Colenbrander, B.J.F. and Roders, A.P., 2012. Outstanding universal value vs zoning regulations: Willemstad as case-study. In conference; 6th International Seminar on Urban Conservation: Measuring Heritage Conservation Performance; 2011-03-29; 2011-03-31 (pp. 134-141). CECI and ICCROM.

Tătulescu, A. A., & Iosif, A. (2019). Using AI Techniques for Analyzing Cultural Heritage Information. In Proceedings of the 11th International Conference on Electronics, Computers and Artificial Intelligence (pp. 1-6).

Tarrafa Silva, A. and Pereira Roders, A. (2012). Cultural Heritage Management and Heritage (Impact) Assessments. In Joint CIB W070, W092 & TG72 International Conferenceon Facilities Management, Procurement Systems and Public Private Partnership.

Taylor, K., 2004. Cultural heritage planning: A possible role for charters and principles in Asia. International Journal of Heritage Studies, 10(5), pp.417-433.

Tenney, I., Das, D. and Pavlick, E., 2019. BERT rediscovers the classical NLP pipeline. arXiv preprint arXiv:1905.05950.

Torres-Pérez, A., & Cid-Serrano, L. (2016). Assessing Cultural Significance in Heritage Conservation: A Case Study of a Historic City in Mexico. Sustainability, 8(11), 1207.

The Burra Charter (The Australia ICOMOS Charter for Places of Cultural Significance) (November 1999) Australia ICOMOS, Articles 12 and 26.3.

UNESCO, 1972, Convention concerning the protection of the World Cultural and Natural Heritage (General conference, Paris, 16 November 1972).

UNESCO, 2005, Operational guidelines for the implementation of the world heritage convention. Paris: UNESCO World Heritage Centre.

UNESCO, 2011, Recommendation on The Historic Urban Landscape, UNESCO World Heritage Centre, Paris; France; Last accessed 12th January 2023: http://www.stellenboschheritage.co.za/wp-content/uploads/UNESCO-Historic-Urban-Landscapes-Recommendation-Short-Nov2011.pdf.

UNESCO, 2016, The Historic Urban Landscape Guidebook: Managing heritage in dynamic and constantly changing urban environments. Last accessed 12th January 2023: http://www.hulballarat. org.au/resources/HUL%20Guidebook_2016_FINALWEB.pdf.

UNESCO, 2017, "Outstanding Universal Value", Last accessed 12th January 2023: https://whc.unesco.org/en/list/1544/#:~:text=The%20City%20of%20Yazd%20is,developed%20to%20draw%20underground%20water.

Van Assche, K. and Duineveld, M., 2013. The good, the bad and the self-referential: Heritage planning and the productivity of difference. International Journal of Heritage Studies, 19(1), pp.1-15.
Van der Hoeven, A., 2019. Historic urban landscapes on social media: The contributions of online narrative practices to urban heritage conservation. City, Culture and Society, 17, pp.61-68.
van Ewijk, H., 2011. Collaboration in community research: Samenwerking in buurtonderzoek. European Journal of Social Work, 14(1), pp.41-52.
Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., ... & Polosukhin, I. (2017). Attention is All You Need. In Advances in Neural Information Processing Systems (pp. 5998-6008). Retrieved from https://proceedings.neurips.cc/paper/2017/file/3f5ee243547dee91fbd053c1c4a845aa-Paper.pdf
Veldpaus, L., 2015. Historic urban landscapes: framing the integration of urban and heritage planning in multilevel governance.
Vroomen, Y.G.J., ten Hoope, L.D., Moor, B.A.T., Roders, A.P., Veldpaus, L. and Colenbrander, B.J.F., 2012. Assessing the cultural significance of world heritage cities: Zanzibar as a case study. In conference; International Seminar on Urban Conservation: Measuring Heritage Conservation Performance; 2011-03-29; 2011-03-31 (pp. 67-74). CECI and ICCROM.
Waterton, E., & Smith, L. (2010). Negotiating Values: Heritage, Development and Community Engagement. International Journal of Heritage Studies, 16(1-2), 103-118.
Yücel, D., & Özyürek, A. (2017). Heritage, Participation, and Contested Urban Development: The Case of Istanbul. International Journal of Heritage Studies, 23(9), 835-851.
Yung, E. H. K., Zhang, Q., & Chan, E. H. W. (2017). Underlying social factors for evaluating heritage conservation in urban renewal districts. Habitat International, 66, 135–148. https://doi.org/10.1016/j.habitatint.2017.06.004.
Zhou, Q.B., Zhang, J., Zhang, H. and Li, X.R., 2018. Is all authenticity accepted by tourists and residents? The concept, dimensions and formation mechanism of negative authenticity. Tourism Management, 67, pp.59-70.

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2 Literature

Public Participation and Consensus-building in Urban Planning from the Lens of Heritage Planning: A Systematic Literature Review

This chapter is based on the following journal papers:
– Foroughi, M., de Andrade, B., Roders, A.P. and Wang, T., 2023. Public participation and consensus-building in urban planning from the lens of heritage planning: A systematic literature review. Cities, 135, p.104235
– Foroughi, M., de Anderade, B. and Roders, A.P., 2023. Dataset on the literature on public participation and consensus building: Bibliography and meta-analysis of selected studies. Data in Brief, p.109332.

ABSTRACT Public participation has been growing in both theory and practice of urban planning, including heritage planning. The reasoning is to facilitate the involvement of a broader group of stakeholders, beyond experts. More specifically, for heritage planning, participation could enable consensus-building on defining the significance of heritage, namely attributes (the resources that should be listed as heritage), and values (the reasons that attributes are important). However, there is not yet a holistic understanding of the influencing factors for consensus-building in the participatory planning processes for cultural heritage. To evaluate existing research from this angle, a systematic literature review was conducted on peer-reviewed articles using the Scopus database. As most of the studies focus on urban planning, this research examines the factors influencing consensus-building in the participatory planning process applied to urban and heritage planning and reflects on the applicability of these factors in heritage planning. The main factors were identified inductively and grouped into two categories: 1) public participation: actors, methods, and levels of public participation, and 2) consensus: approaches, and conflicts. The relations between these factors and their frequencies are investigated using statistical analysis methods, namely frequency analysis, independent-samples t-test, and

Spearman correlation. The literature confirms that urban planning has applied more diverse methods and tools for public participation compared to studies in the field of heritage planning and could inspire heritage planning. Conflict is recognized as an intertwined concept with consensus which is considered either a challenge or a necessity for inclusive decision-making. By proposing a framework integrating these factors and sub-factors and illustrating their relationship, this research could be useful for decision-makers and practitioners to better tailor the public participation process and means to implement it, considering the relevant factors involved.

KEYWORDS public participation, consensus, conflict, attribute, value, cultural heritage

2.1 Introduction

Urban planning has a rich history in public participation and consensus-building and accordingly, there has been much literature from both academics and practitioners published since the 1960s (see Innes & Booher, 2004). Public participation is a necessity of sustainable urban planning (Amado, 1970) that should be included in urban planning regulations (Forester, 1999). In the last decades, there has been a growing interest in public participation in heritage planning which is essential to develop sustainable heritage further (Landorf, 2009). A participatory approach is often positively associated with socially inclusive innovation processes, cultural value creations (Nakagawa, 2010; Sasaki, 2010), and forming a shared sense of identity (Biondi et al., 2020). It has been proven that local actors can support and actively contribute to the success of heritage planning (Mirzakhani et al., 2021; Li et al., 2020; Martinović and Ifko, 2018).

In addition to academic literature, international policy documents such as the UNESCO Recommendation on the Historic Urban Landscape (HUL) recognize public participation as an essential tool in heritage planning, management, and conservation (Taylor, 2004; UNESCO, 2011; Veldpaus et al., 2015). Given the wider range of multi-disciplinary stakeholders, beyond experts, consensus-building is key to successfully defining the heritage and its cultural significance (values and attributes) (Myers David, et al., 2016; Den, 2014; Thomas, 2008). While in the past, there was no need for participatory consensus-building mechanisms, as experts, primarily humanity experts as historians, architects, and archaeologists, were the ones who determined the heritage listings.

Despite the growing literature on public participation and consensus-building in heritage planning (e.g., Van Assche and Duineveld, 2013; Wells and Lixinski, 2016; Dragouni and Fouseki, 2018), there is a knowledge gap on the factors affecting such processes. A holistic view of the factors affecting such processes is desired to better understand and manage the process. On the other hand, as mentioned, urban planning has a longer history and more diverse methods and tools for public participation compared to research in the field of heritage planning. Heritage planning can gain insights from urban planning by interpreting urban planning practices from a heritage planning lens. This approach follows the same principle proposed that heritage studies could benefit from the integration of urban and heritage planning studies (Hosagrahar, et al., 2016; Veldpaus, 2015). This study, therefore, aims to answer the research question: what are the factors and sub-factors influencing consensus-building in public participation processes in urban planning and heritage planning studies, and what are their relations?

To systematically select and examine relevant studies in more detail and answer the research question, it is necessary to understand the existing body of knowledge on this topic and also evaluate them critically. Therefore, it is desired to set up the search protocol to select and critically analyze the existing research, which is in line with the procedure of a systematic literature review. This research, therefore, aims to reveal the factors and sub-factors, using a systematic literature review approach.

Section two illustrates the research methods applied, followed by results in section three to show the identified influencing factors and sub-factors, and their relations. Section four presents a theoretical framework illustrating the relations among these factors to guide future research directions. Section five concludes the study. In this paper, we use the terms factors and sub-factors only to convey the parameters that affect consensus-building in urban planning and heritage planning. This paper revealed these parameters through the literature review.

2.2 Methodology

This section is divided into two parts in which section 2.1 describes the systematic literature review process and section 2.2 illustrates the analysis approach of the selected literature by manual thematic analysis to reveal important patterns and factors, supplemented by quantitative analysis to find the relations between the factors identified.

2.2.1 Search strategies

This research followed a systematic literature review process, adapted by Boland et al. (2017), developing a protocol for searching, finding, and selecting articles to minimize bias. The scope of the review was international in geographical extent and limited to English-language academic peer-reviewed articles. Relevant records were specified, categorized, and their main findings were extracted. A broader systematic literature review was conducted, based on three key terms, namely "public participation," "consensus," and "values and attributes." Although the different variations of these terms were used as search terms, these three terms are the ones used further in this paper (see Table 2.1).

TABLE 2.1 Search terms for the systematic literature review

Search concepts	Public participation	Consensus	Values and attributes
Definitions	Public participation concerns how local planning authorities should consider the issue of "public" influence over planning decisions in general (Thomas, 2003).	Consensus means a maximum agreement of perceptions. It may produce decisions that do not meet everyone's full expectations. But, it should not produce decisions through a narrow majority (Williams, 2012)	The cultural significance includes values (answering the question of "why resources should be protected?") and attributes (answering the question of "what resources should be protected?") that entitle each particular heritage asset. (da Silva, 2021)
Keywords	"public" OR "community" OR "citizen" OR "local" OR "actor" OR "stakeholder"	"conflict" OR "consensus"	"value and attribute" OR "heritage value" OR "cultural significance" OR "historical significance" OR "value and heritage" OR "significance and heritage" OR "attribute and heritage" OR "intangible and asset and heritage"
Wild cards	"participa*" OR "engag*" OR "involv*"		

Due to the low number of records of publications addressing all three concepts, this research includes articles that have at least two of the three key concepts in their title, abstract, or keywords. Scopus, a peer-reviewed academic database, was taken as the data source in June 2019, and publications were collected from the fields of Social Sciences, Engineering, Environmental Science, and Arts and Humanities. The inclusion and exclusion criteria were threefold: 1) the content of the paper, 2) the language of the full-text record (excluding non-English), and 3) the type of document (excluding thesis / full books). The PRISMA diagram (Liberati et al., 2009) illustrates the search process, starting with 618 records and ending with 121 studies, which complied with the selection criteria (see Figure 2.1).

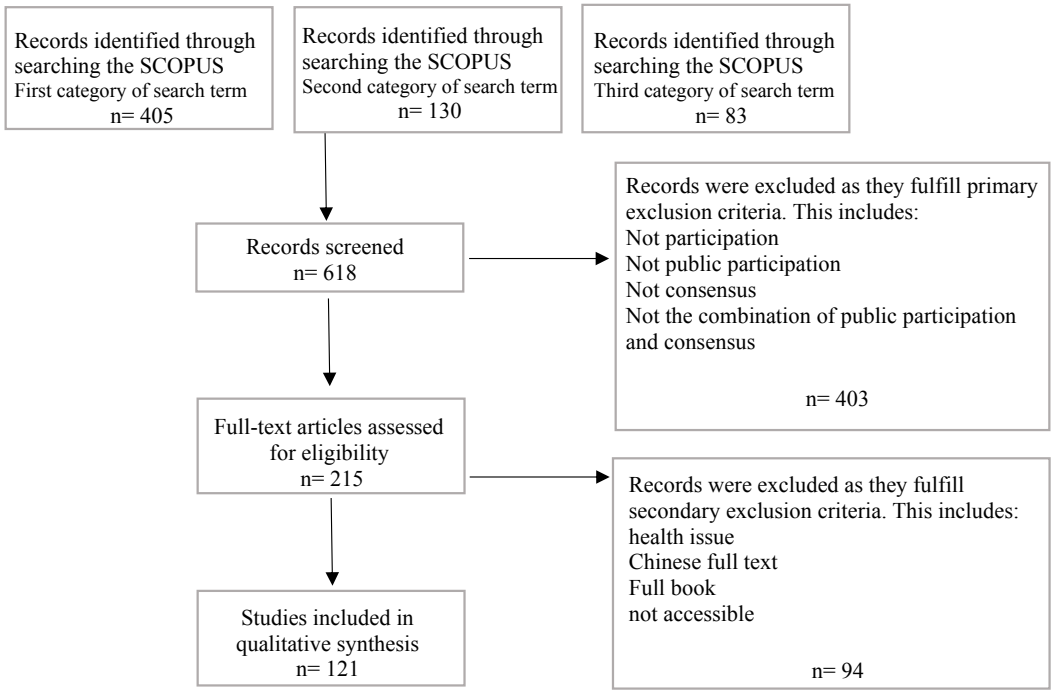

FIG. 2.1 PRISMA diagram, detailing the number of eligible records in each step and exclusion criteria

2.2.2 Classification and analysis

This study used manual thematic analysis to reveal important patterns (themes) about how a phenomenon is being addressed (Daly, Kellehear, & Gliksman, 1997; Schadewitz, 2007). The guidelines of Nowell et al. (2017) are followed through deriving and coding factors relating to public participation and consensus-building on cultural significance. To complement this approach, quantitative analysis was performed. This analysis contributes to finding unfound relations between the factors and sub-factors so that future studies and practices can have a holistic view of the intertwined complex relations. These statistical analyses include frequency analysis (the frequency percentages of the coded keywords), independent-samples t-tests, and spearman correlation analyses.

Frequency analysis is only used to further analyze factors for which qualitative content analysis was not possible due to the inconsistent definition in the literature. Independent-samples t-test which is useful to compare the means of two groups

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(Ross, 2017), was conducted to compare the factors and sub-factors in different groups of case studies. Spearman correlation is often used to evaluate relationships involving ordinal variables (Artusi, et al., 2002). It was used to find the significant and minor correlations between quantified factors and sub-factors. Finally, a theoretical framework of the factors and sub-factors and their relations is developed and further discussed.

The main factors were identified inductively and grouped into two categories: 1) public participation: actors, methods, and levels of public participation, and 2) consensus: approaches, and conflicts. These factors and sub-factors will be used to guide the analysis processes. The IAP2 (International Association for Public Participation) framework, built up on Arnstein's framework (1969), was used as the theoretical framework to analyze the level of public participation and rank them accordingly, between 1 to 5 (IAP, 2007). The IAP2 framework was used because it defines clear relations, goals, and techniques for each level of public participation facilitating the case studies' categorization (see Table 2.2).

TABLE 2.2 The IAP2 framework on public participation (adapted from IAP, 2007)

Levels	Inform(1)	Consult(2)	Involve(3)	Collaborate(4)	Empower(5)
Public participation goal	To provide the community with relevant and objective information to assist them in understanding the management project, approaches, and intended outcomes.	To obtain community feedback at the start of the management project to help with analysis, approaches, and/or decisions.	To work directly with the community throughout the management process to ensure that their concerns and aspirations are understood and considered properly.	To partner with the community to work through management problems, alternatives, solutions, and decisions together.	To place final decision-making and future projects in the hands of the community.
Example techniques	Fact sheets, Web sites, Open houses	Public comments, Focus groups, Surveys, Public meetings	Workshops, Deliberative polling	Citizen advisory committees, Consensus-building, Participatory decision making	Citizen juries, Ballots, Delegated decision

Besides, to classify the actors, the theoretical framework by Pereira Roders (2019), among different frameworks (e.g., Li, 2020), is used due to its clear definitions for heritage planning practices, which serves as the lens for this study (see Table 2.3). Respectively, it splits stakeholders into two groups, public and private stakeholders with three sub-categories within each group. Politicians, policymakers, and officers as public stakeholders. Professional/Experts, daily users, and occasional users as private stakeholders. This diversity is assumed to help distinguish patterns among them in literature.

TABLE 2.3 The framework on actors in heritage planning (adapted from Pereira Roders, 2019)

Main category	Stakeholders	Definitions, examples
Public	**Politicians**	National, regional and local politicians, the administration, the governors, alderman
	Policymakers	Those developing the plans and tools to manage local resources
	Officers	Those carrying out the implementation of policies applied to the local context and specific projects
Private	**Professional/experts**	Experts working both in academia, e.g., researchers, and in practice, as in consultancy and advice, e.g., technician, advice, designer or volunteer/amateur experts, e.g., local experts, pressure groups, knowledge groups
	Daily users	Those in contact with the heritage resources daily, e.g., owners, residents, and users. These also include the developers/private sector, with an (economic) stake in the heritage resource, e.g., selling, developing, exploiting, etc.
	Occasional users	Community in general, e.g., local, regional, and national population, tourists, educators

2.3 Results

2.3.1 General description

From the 121 publications, 18 studies research public participation fundamentally. Most literature (85%) analyzes public participation through case studies in the fields of spatial planning (87%), infrastructure planning (11%), and political management (2%). The case studies have different scales, ranging from neighborhoods (e.g., Aigwi, I. E. et al., 2019) to urban development projects (e.g., Hardoy et al., 2019; Brown and Raymond, 2014). These case studies are primarily located in Europe (40%), followed by America (29%) and Asia (20%), and last, by Oceania (10%) and Africa (1%). Table 2.4 illustrates the factors and sub-factors recognized and classified in this paper based on the two frameworks presented in the method section, and are broadly presented in the following sections.

TABLE 2.4 Factors and their sub-factors revealed through the literature review

Public participation	Consensus
Actor: Number of interest groups| Selection process| Participants' role	Approach
Level (1-5): Based on the IAP2 framework	Conflict: Approaches| Subjects of conflict| Conflict resolution
Method: Data collection: qualitative/quantitative/mixed Data analysis: qualitative/quantitative/mixed	

2.3.2 Public participation process

2.3.2.1 Actors

Actors who participated in the urban planning processes were widely addressed (68%), including the number of interest groups, types of invitations, selection criteria of the participants, and the role of different actors. The public participation process is being designed for a specific profile of actors, either a social group and/or age (e.g., local community: Garcia et al. (2017), Sujarwoand Caneva (2016); young students: Puolamäki (2017)). Among these case studies, residents are the most common daily users (e.g., Bergeron et al., 2014; Balug and Vidart-Delgado, 2015; Meutia et al., 2018; McLain et al., 2017; Bieling, C., 2014; Brown and Donovan, 2014; Henningsson et al., 2015; Brown and Weber, 2012), involved in 24 out of 85 case studies.

Most studies considered two or more interest groups. For example, McCreary et al. (2016) investigated a case study with 14 interest groups (the highest number found in the literature) to create recommendations to improve the future multi-stakeholder marine policy process. A full range of interest groups was involved, including commercial fishing businesses, recreational users, local governments from coastal cities, the U.S. Department of Defense, and conservation organizations.

The selection of participants was mentioned as critical to the success of the public participation process (Pérez-Soba et al., 2018; Finka et al., 2017; Arciniegas and Janssen, 2012; Starkl et al., 2013; Gerasidi et al., 2009). Given that, Gerasidi and his colleagues (2009) defined a selection process in three sequential steps. This process offered an equal chance of involvement to each interest group. Accordingly:

A Stakeholder mapping (identification of all potential stakeholders who influence or is affected by the project decisions);

B Assessment of stakeholder's interests, positions, and how they could be affected by project risk and viability;

C Selection of different stakeholders to be involved in the study processes.

After the interest groups' selection, participants would often be invited. While in some case studies participation was open to everyone (e.g., Martinović and Ifko, 2018; Walsh and Burch, 2012; Dolff-Bonekämper, 2010; Golobiĉ and Maruŝiĉ, 2007). In other case studies, participants were mainly selected with different sampling methods. These sampling methods include random sampling (e.g., Dragouni and Fouseki, 2018; Marcucci et al., 2017; Bergeron et al., 2014; Brown and Weber, 2012), snowball sampling (e.g., Lo and Lee, 2011; Hopkins, 2010; Garcia et al., 2018), stratified sampling (e.g., Bentrupperbäumer et al., 2006), non-proportional quota sampling (e.g., Garcia et al., 2018), purposive sampling (e.g., Garcia et al., 2017), and convenience sampling (e.g., Gray et al., 2017).

The role of participants was also recognized as a critical element in the success of the public participation process (Mirzakhani et al., 2021; Biondi et al., 2020; Jung et al., 2015). A few scholars have already explored the role of leaders, planners, policymakers, and seldom the public (e.g., Cheng, 2013; Van Assche and Duineveld, 2013; Purbani, 2017; Fahmi et al., 2016; Maginn, 2007). Accordingly, leaders (e.g., Purbani, 2017; Fahmi et al., 2016) and city planners (e.g., Cheng, 2013; Van Assche and Duineveld, 2013; Purbani, 2017) were identified as stakeholders who can play a variety of roles. Leaders can nurture dialogues, foster participation, balance power, and manage conflicts. Planners can facilitate dialogues, strategize and synthesize, build democratic politics, and raise awareness on disciplines' diversity as well as find common ground among them.

In addition to the roles that leaders and city planners can undertake, the role of policymakers was considered crucial. Maginn (2007) suggested three roles for the policymakers: 1. developing a more sophisticated understanding of the topography and culture of local communities, 2. demonstrating an explicitly genuine commitment to participation by embracing community diversity and conflict, 3. being more critically aware of the impacts of their cultural practices. Overall, these roles can contribute to policymakers' understanding of the effect of their decisions on structures, processes, policy discourse(s), and approaches towards local communities on the participatory experiences of different groups within a neighborhood.

In heritage planning, daily users living close to heritage properties have the highest priority to be involved because their daily routines and rituals are associated with local cultural heritage (Nic Eoin et al., 2013; Poulios, 2014). Conforti, et al. (2015) argue that the values that these key stakeholders convey to heritage attributes need to be well-considered to enhance their motivation for safeguarding cultural heritage. Daily users were found as the second most involved in the participatory process with different roles. Further research could explore key stakeholders' roles in a successful public participation process. The role of other stakeholders (e.g., leaders, planners, and policymakers) was primarily as facilitators, to support, guide, and assist the key stakeholders in the decision-making processes of local cultural heritage planning (Li et al., 2020; Lekakis, 2013; Poulios, 2014; Chipangura et al., 2017).

2.3.2.2 Levels of public participation

Most literature (80%) provided information about the level of public participation but did not classify it according to any theoretical framework. In more than half of the case studies (55%), public participation practices matched level two of the IAP2 framework, i.e., consultation (see Figure 2.2). These case studies provided a one-way interaction between the participants and the organizing team in which the participants gave information to the execution team. This consultation process typically took place in different steps of the public participation process, using various methods and data sources (Aigwi et al., 2019; Biedenweg et al., 2019; García et al., 2019).

For example, van der Hoeven (2020) collected data from a collaborative heritage website and performed thematic analysis to identify recurring patterns. Yu et al. (2019) investigated a project at level two of the IAP2 framework by collecting data via interviews with key stakeholders, reviewing project documents, and using a model to analyze stakeholders' conflicts and develop action schemes.

The next most frequent level of participation is level three (32%), involvement, enabling two-way interaction between the participants and the execution team. Participants do not interact with each other but only with the execution team. An example of such a process is García and his colleagues' study (2019), which followed three steps. Residents of two traditional neighborhoods of Cuenca, Ecuador, were surveyed to examine their perceptions of the significance of cultural heritage. Then, stakeholders were mapped according to their links, influence, and particular interests in the neighborhood (e.g., practices, rituals, and festive events). Lastly, a series of interactive workshops facilitated knowledge exchange between participants and the execution team.

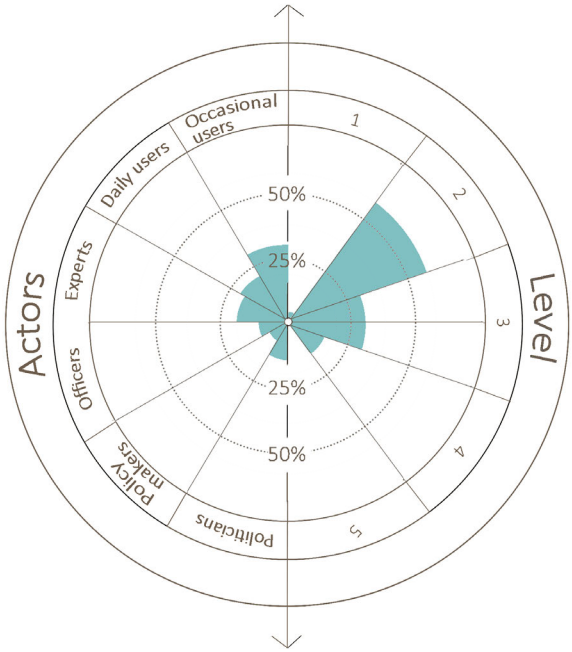

FIG. 2.2 Range of interest groups and level of public participation revealed in the 103 case studies analyzed (among 121 analyzed literature) according to the IAP2 framework.

Some cases matched level four (12%), to collaborate, through which a two-way interaction was established between the participants and the execution team and between the participants themselves. In the study of Golobiĉ and Marušiĉ (2007), residents of Komenda, Slovenia, Europe participated in a survey including a writing part and a cognitive map to give their perceptions of land-use planning. Then, the interest groups were identified based on the differences and similarities in participants' answers. In addition, the cognitive maps were processed and synthesized with experts' knowledge, and new maps were created. These maps were used in the workshops to facilitate conflict identification and resolution with all the participants' collaboration with each other and the execution team.

Wilson and Desha (2016) were the only found study specifically focused on level one (1%), to inform, which only informs the participants, specifically to raise awareness about heritage property. A digital campaign was held in Oceania through which digital images and snapshots of information (e.g., pictures of buildings with a description of their history and values, for example, the Regent Theatre) were regularly shared with the public through Facebook, Instagram, Pinterest, and Twitter. A diverse range of over 2,000 community members was attracted to this online event. Informing enables a one-way interaction between the participants and the execution team in which the participants get information from the execution team. However, most of the other case studies with a higher level of public participation also include this step.

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The literature did not reveal case studies that empower the residents (level five) through which a two-way interaction is possible between the participants and between the participants and the execution team. The difference between levels four and five is that in the latter, the executive team gives the decision-making power fully to the participants.

Overall, almost all case studies went further than informing and at least consulted with the stakeholders, which denotes varied experiences in public participation processes. In this way, participants' perceptions were collected to be considered in the decision; however, the participants were not directly involved in the decision-making and consensus-building process in most case studies (88%). Besides, according to the literature, there is still a long way to conduct public participation projects at the last level, to empower.

A high level of public participation like empowerment is sometimes necessary for heritage planning (Chipangura et al., 2017; Achig-Balarezo, et al. 2017; Oevermann, et al. 2016; Human, 2015) as it could lead to wider mobilization of daily users in protecting the heritage (Li et al., 2020; Chinyele and Lwoga, 2018; Lewis, 2015). However, a high level of public participation has barriers and consequences depending on the contextual and political situation of the projects and would not always lead to success. This is probably the reason behind the average and low level of public participation (levels two and three) in most case studies. In levels two and three, daily users can contribute to identifying heritage attributes and values as well as local social issues (Bruku, 2015). However, as they will not be involved directly in decision-making, there is a higher risk that daily users' interests get ignored by other stakeholders.

2.3.2.3 Methods of public participation

The literature is rich in exploring various participatory methods that can engage the public in the decision-making process to enable different levels of public participation (e.g., workshops, meetings, and interviews). These methods had been detailed in most of the case studies (90%) in data collection and data analysis steps (e.g., Sujarwo and Caneva, 2016; Mohammadi, et.al., 2018; Aigwi, et.al., 2019; Yu, et.al., 2019). Still, some studies used other terms including interaction step(e.g., Ghavami, et.al., 2017; Shen, et.al., 2012) and exchange of knowledge and actual experiences step (e.g., Rouwette, et.al., 2016; Shen, et.al., 2012). Due to the high occurrence found in the literature that mentions data collection and data analysis steps, this study adopts data collection and analysis as the terms to use. However, we do emphasize that public participation steps are also about other aspects like data sharing and learning processes.

This research classified the methods into quantitative, qualitative, and mixed methods. While qualitative methods are more associated with the actors' interaction, quantitative methods use mathematical methods. Within qualitative methods, studies use digital, analog, or both digital and analog tools. All the studies with quantitative methods used both analog and digital tools (e.g., SPSS software) (see Figure 2.3).

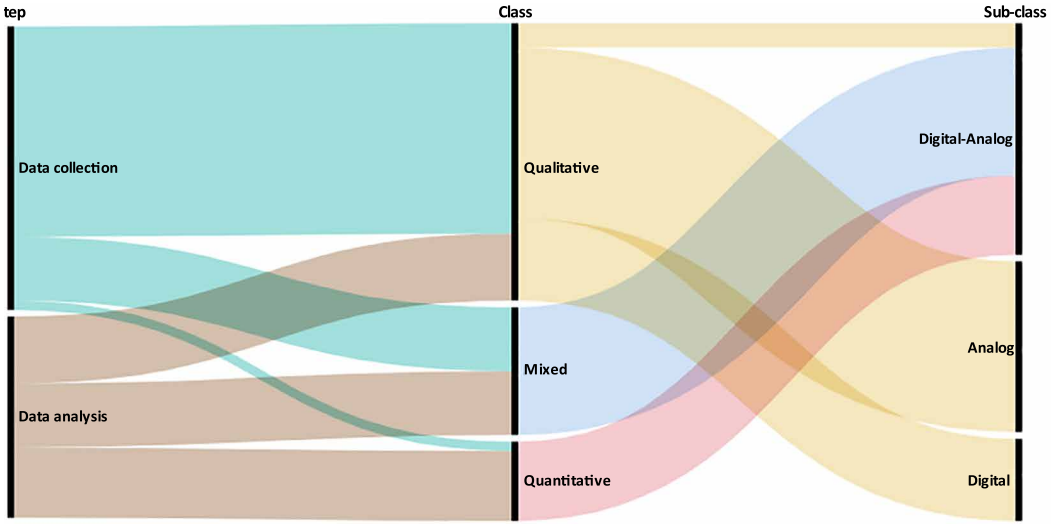

FIG. 2.3 Classification, interrelation, and the ratio of case studies dealing with specific research methods

Almost all the case studies (90%) detailed public participation methods concerning the data collection step. Qualitative methods have the highest percentage (74%) including analog methods(70%), namely participants and site observation, site visits, interviews, workshops, meetings, and living laboratory; digital methods (23%), namely digital interviews, workshops, meetings; and combination of analog and digital methods (7%). The rest used mixed methods (23%), and quantitative methods (3%) namely interviews, surveys, and questionnaires.

The most common data collection methods are expert-based, namely meetings, interviews, workshops, surveys, and mappings. However, digital and automated methods are growing in application, such as social media analysis (Chen et al., 2018), a combination of collaborative platforms and Building Information Modeling (BIM) (Bertolinelli et al., 2018), Cloud-based Virtual Reality (Zhang et al., 2017), and Software tools used for building the visions (Pérez-Soba et al., 2018).

Social media analysis is considered helpful for enabling access to a large amount of data at a low cost, capturing broader voices, collecting data without interventions, and accessing a private or semi-private perception of users' daily life. Thus, social media can be an additional resource to conventional approaches in many study areas (Chen et al., 2018). Pioneering Information Communications Technology (ICT) systems and informative tools, such as Building Information Modeling (BIM), can be employed as participatory tools since they allow for managing a massive number of data, which improves stakeholder collaboration and increases information accessibility. BIM simulates various scenarios understandable even to non-experts. According to Bertolinelli et al. (2018), these tools provide transparency, accessibility, and data verifiability.

Cloud-based Virtual Reality (VR) platform, another type of ICT, was used by designers to propose and modify design alternatives in the virtual environment easily. Through 3D databases and modeling approaches, users can compare different design alternatives and better understand the design concepts leading to a consensus (Zhang et al., 2017). Moreover, Pérez-Soba et al. (2018) applied the canvas to enable participants to create future visions. Canvas allows participants to use visual elements in images and text formats to fill a blank page. It is a user-friendly tool that needs no technical knowledge.

More than half of the literature (59%) detailed public participation methods concerning data analysis. In contrast with the data collection step, quantitative methods were the most frequent methods in the data analysis step (35%). Qualitative methods (33%) are the next most frequent among which 50% of the projects used digital methods, followed by analog methods (36%), and the last combination of analog and digital methods (14%). Lastly, mixed methods (32%) are used in the rest of the case studies.

Overall, Delphi (e.g., Aigwi et al., 2019; Diaz et al., 2018; Jayasooriya et al., 2019) and Analytic Hierarchy Process (AHP) (e.g., Diaz et al., 2018; Nordström et al., 2009; Regan et al., 2006) were the most commonly used methods in the data analysis step. It could be because they are straight-forward methods to reach consensus among various stakeholders as the actors' perceptions and preferences are quantified and accordingly the result will be calculated

Few cases explored Artificial Intelligence (AI), a new trend in digital heritage (e.g., Ghavami et al., 2017; Marcucci et al., 2017; Chen et al., 2018). Ghavami et al. (2017) applied Software Intelligent Agent (SIA) to elicit and model actors' preferences (e.g., land-use preferences encompassing residential areas, working areas, and educational service areas), and this training data is used for the learning

process of the SIA. They aim for an automated negotiation phase that involves negotiation among autonomous software agents trying to reach a consensus on behalf of the relevant actors. The model's validity was tested by interviewing the actors to check if the outcome was close to their social preferences. The research shows that all the actors acknowledge the results of the SIA learning approach.

In participatory heritage planning, there is a preference for methods that enable active participation in decision-making with awareness-raising and capacity-building (Borona & Ndiema, 2014; Mackay & Johnston, 2010). These methods aim to collect people's values, raise awareness, and empower people (Li et al., 2020; Poulios, 2014; Woodley et al., 2013) to grow in their roles in public participation. While these methods were often discarded for being costly and time-consuming, instead, digital tools (e.g., social media, AI, and VR) can compensate for these shortcomings.

2.3.3 Consensus

2.3.3.1 Approach

Although most case studies were focused on levels two and three of public participation, they also addressed consensus-building in decision-making processes. Other terms referring to the same concept of reaching an agreement were also found e.g., compromise, agree, agreement, convergence, and acceptance. While we understand that there are subtle differences between these terms, to aggregate the results, we included all studies that pointed to the process that resulted in some form of agreement across the stakeholders in our analysis. Different forms of the term "agree" (e.g., agreement, disagreement) were repeated in 49 records (40% of total literature). Only a few scholars defined consensus (e.g., Raynor et al, 2017; Bailey et al, 2011; Beaumont and Nicholls, 2008), but their definitions were contradictory. This echoes disagreement about 'consensus' in broader social theory too. While some scholars argue that reaching consensus is possible in decision-making (Habermas, 1987; Healey, P., 1997), others alter that to reach consensus, a minority of actors will always be marginalized and conflicts which is a concept often mentioned when referring to consensus will be ignored (Moote et al, 1997; Mouffe, 1994).

Habermas introduced “rational consensus” which is achievable by plural actors. Accordingly, Habermas developed the concept of an “ideal speech situation” where all the stakeholders are involved, on an egalitarian basis, in a rational and constraint-free communication in the public sphere for a depth of understanding and reconciliation of hitherto conflicting value claims (Habermas, 1987). There are many critical responses to the Habermas theory as this approach is possible through normalizing power relations and erasing the differences.

The consequent problem can be a broad refusal to participate – the ‘silent majority’ (Maier, 2001) or `latent public’ (Simon, 1982) – and consequently a lack of legitimacy in decisions made (Mascarenhas and Scarce, 2004). Forester (1999) highlights the importance of conflict and diversity as they lead to opportunities to learn about each other and create public values (mutual recognition and empowerment to act singly or together). Accordingly, the decoupling of consensus and meaningful public involvement was suggested by some scholars (e.g., Moote et al, 1997; Mouffe, 1994).

2.3.3.2 Conflicts

There are two major approaches to conflicts, while Habermas suggests that conflicts can be solved to reach a consensus (Habermas, 1987), Mouffe acknowledges conflicts’ potential for legitimate and inclusive decision-making (Mouffe, 1994). Most of the literature we reviewed, pursuit the first approach and considers conflicts as challenges to be solved (e.g., Kaya and Erol, 2016; Raynor et al, 2017; Lin and Geertman, 2015) discussing the issues, reasons, and conflict resolution methods (e.g., mediation, facilitation, negotiation, collaboration, and consensus-building). Still, some scholars have a different approach. (e.g., Bailey et al, 2011, van Ewijk, 2011). Accordingly, Van Ewijk (2011) stated that conflict is as important and beneficial as consensus in participatory practices because conflicts contribute to the generation of new ideas and solutions. This way, a balance between consensus and conflict is considered essential. Consensus and conflict are intertwined and should not be addressed without each other. Besides, García, et al. (2019) presented a methodology to consider the majorities and consensus, as well as, the minorities and controversial interests, to construct a holistic but integrated decision, in which all values are considered equally important.

The most addressed issue of conflict is a diversity of interests (Lin and Geertman, 2015; Kurki and Katko, 2015; Oda, 2014; Tudor et al., 2014; Starkl et al., 2013; Kaliampakos et al., 2011; Dolff-Bonekämper, 2010; Collier and

Scott, 2009; Tan, Beckmann, van den Berg and Qu, 2009). Conflict of interests was found caused by various backgrounds (Oda, 2014), e.g., between urban development and conservation experts (Starkl et al., 2013; Collier and Scott, 2009; Halla, 2005), and by the dominance of economic interests (Kaliampakos, Mavrikos and Menegaki, 2011; Tan, Beckmann, van den Berg and Qu, 2009).

Kaya and Erol (2016) investigated case studies in Izmir, Turkey trying to find reasons and solutions for conflicts over locally unwanted land uses. They categorized the issues of conflict into two groups, substantive reason, and procedural reason. The first depends on outcomes, and the second depends on processes. The substantive reason can be associated with types, locations, and impacts of results. The procedural reason can be related to the decision-making approach (not fully open and transparent, top-down), technical procedures, and the role of actors in the process. Kaya and Erol (2016) highlighted the necessity of considering both substantive and procedural issues for effective participation, as solving the conflict by mainly considering substantive reasons leads to failure.

Given the importance of conflict in public participation, some research undertook a methodological process encompassing the identification, assessment, and resolution of conflicts to reach an agreement (e.g., Peltonen and Sairinen, 2010; Blokhuis et al., 2012; Garcia et al., 2018; García et al., 2019). Kurki and Katko (2015) focused on conflict identification and assessment. To identify conflicts, data were collected using semi-structured interviews with all the primary parties (politicians, officials, local inhabitants, landowners, and representatives of a local NGO) and secondary documents (official documents, newspaper articles, appeals in court, and court decisions). Then, the material was analyzed using different categories of conflict assessment (history, parties, interests, context, and process dynamics), which were developed by Peltonen and Kangasoja (2009). The conflict assessment product is a conflict map in the form of a written summary of the analyzed material, including a timeline of the project, main events, and conflict issues. A workshop was held not aimed to solve the conflicts but to allow all parties to speak and listen to each other in a positive and cooperative atmosphere.

Participation is highly advised to include various stakeholders in heritage planning and to reach an inclusive sustainable heritage. Consensus on heritage values and attributes is often considered the goal of participatory heritage planning (e.g., García, et.al., 2019; Zhou, et.al., 2018; Harmon and Viles, 2013; Van Assche and Duineveld, 2013; UNESCO, 2011). Nevertheless, reaching an agreement can also eliminate diversity and conflictual perceptions, leading to a less inclusive decision. Given that, while methods were found to solve the conflicts and reach an agreement, the interests of minority groups might be undermined, even when they are key

stakeholders. García, et.al., (2019) suggest a methodology to reach a consensus that considers the majorities, as well as, the minorities, including controversial perceptions of heritage values. As such, heritage attributes can be valued differently by various individuals and interest groups, but still be respected.

2.3.4 Relation between the factors

This step investigates potential relations between the different factors and sub-factors discussed in the result section by calculating independent-samples t-test and Spearman correlation. This was done through the frequency analysis (number of repetitions of certain keywords) of participation and consensus, the research's publication year, method, and level of public participation.

2.3.4.1 Independent-samples t-test

An independent-sample t-test, a method to compare the means of two groups (Ross, 2017), was conducted using SPSS to compare means of the level of public participation and frequency of consensus for studies using different methods for data collection and data analysis. There is no significant difference in the frequency of consensus and the participation level in cases using different data collection methods. Nevertheless, there are three significant differences in the frequency of consensus and the participation level in cases using various data analysis methods (see Table 2.5).

As mentioned earlier in section 3.1.2, the participation level is analyzed according to the IAP2 framework. Among different methods of public participation, only one significant difference in participation level was found. This is related to case studies that use a combination of all methods, quantitative, digital qualitative, and analog qualitative (*M=2.55, SD=0.81*), and those using only quantitative *(M^1=2.16, SD=0.37), t (40) =2.09, p≤0.05.* Given that, studies using the combination of all methods have a higher participation level than those using only quantitative. Because quantitative studies mostly lack the interaction between participants and keep the project at level two (to consult). Interestingly, projects that combine quantitative methods with others get the advantage of quantitative methods to

1 M is the mean difference, SD is the Std. Error Difference, *t*(degrees of freedom) = t-statistic, *p* = significance value

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get the perceptions of a larger sample of participants and provide a setting for interaction through analog or digital qualitative methods.

Among case studies using different methods of public participation, two significant differences were found in the frequency of consensus. There is a significant difference in the frequency of consensus of records using only the analog qualitative method (*M=14.22, SD=15.51*) and those using only the digital qualitative *(M=6.4, SD=5.31); t (22) =1.80, p≤0.05.* There is a significant difference in the frequency of consensus using all the methods (*M=12.91, SD=11.04*) and those using only the digital qualitative *(M=6.4, SD=5.31); t (24) =1.99, p≤0.05* (Sedgwick, P., 2010).

The above t-test results show that the frequency of the term consensus in case studies using the combination of all methods or only the analog qualitative is more than double of case studies using digital qualitative methods. In other words, a variety of all methods or only analog qualitative methods tends to focus on consensus more than those only using digital qualitative methods. digital qualitative methods tend to focus more on facilitating interaction and discussion rather than consensus-building. Hence, the combination of qualitative and quantitative methods results in both higher participation levels and a higher focus on consensus-building.

TABLE 2.5 The independent-samples t-test of groups with significant results

Variables	Groups	Mean values	Standard deviation	t-Test	p-Value
Participation level	All the methods Quantitative methods	2.55 2.16	0.81 0.37	2.09	≤ 0.05
Frequency of consensus	Analog qualitative methods Digital qualitative methods	14.22 6.4	15.51 5.31	1.80	≤ 0.05
Frequency of consensus	All the methods Digital qualitative methods	12.91 6.4	11.04 5.31	1.99	≤ 0.05

2.3.4.2 Spearman correlation

Spearman correlation is often used to evaluate relationships involving ordinal variables (Artusi, et al., 2002). Given that, the Spearman correlation was calculated using SPSS between quantified factors, such as the research's publication year, level of public participation, and the frequency of the terms. The terms were "value and attribute", "consensus", "paticipa*", "involv*", and "engag*". There are some significant and minor correlations between several factors (see Table 2.6).

TABLE 2.6 The Spearman correlation of variables with significant associations

Variables	Spearman's rank correlation coefficient (r)	Sample number (n)	p-Value
Frequency of engagement / year of publication	0.34	112	≤ 0.01
Frequency of engagement / frequency of participation	0.34	112	≤ 0.01
Frequency of involvement / frequency of participation	0.41	112	≤ 0.01
Frequency of consensus/ frequency of involvement	0.28	112	≤ 0.01
Frequency of consensus/ public participation level	0.24	112	≤ 0.01
Frequency of consensus/ year of publication	-0.17	112	≤ 0.01
Public participation level/ year of publication	-0.05	112	≤ 0.01

There is a significant positive association between the year of the publication and the frequency of the term "engag*", *(r=0.34, n=112, p ≤ 0.01)* indicating that the term "engag*" has been increasingly used in recent years. The frequency of "paticipa*" has also a significant correlation with two factors, namely the frequency of "engag*" *(r=0.34*[2]*, n=112, p ≤ 0.01)*, and frequency of "involve*" *(r=0.41, n=112, p ≤ 0.01)*. It can be concluded that studies repeating the concept of participation more frequently tend to use more different terms for the concept. Moreover, there are significant positive associations between the frequency of consensus and two factors, frequency of "involve*" *(r=0.28, n=112, p ≤ 0.01)*, and participation level *(r=0.24, n=112, p ≤ 0.01)*.

Given the above analysis, the difference between the terms is that "participation" is the most common and frequent one, "engagement" has been more used recently, and "involvement" is the most correlated with consensus. The level of participation and consensus have a positive correlation, which means that the more a project seeks consensus by involving participants in decision-making, the higher the level of participation. Lastly, there is a significant negative association between the year of publication and the level of public participation *(r=-0.05, n=112, p ≤ 0.01)* as well as the frequency of the term consensus *(r=-0.17, n=112, p ≤ 0.01)*.

2 r is the Spearman's rank correlation coefficient, n is the sample number, p is the difference between the two ranks of each observation

Relation between the factors revealed that besides consensus-building, the interaction between the actors plays an important role in the public participation level. Accordingly, successful experiences focused on consensus-building while providing space for interaction between participants, and between participants and the executive team. Finally, the Spearman correlation analysis showed that despite the increasing studies on the topic in the last years, the revealed level of public participation and consensus-building have not been evolving as much.

2.3.5 Participatory practices in urban planning, and heritage planning: a theoretical framework

This research inductively identified and categorized the common factors and sub-factors that can be applied in public participatory planning studies: 1) public participation: actor, method, and level, 2) consensus: approach, conflict. The literature also conveys the relations between these sub-factors. Figure 2.4 is a theoretical framework depicting the sub-factors and their relations extracted from the literature. The solid lines are relations mentioned in the literature and the dashed lines are those found through the statistical analysis (explained in the result section). The framework shows the close relations between the sub-factors. In other words, participatory practices can be shaped by any of the factors, and changing each factor can affect the other and the whole process.

Regarding the literature, on actors, it is important to consider interest groups' selection methods and actors' roles. Among different actors, the roles of city planners and policymakers are accordingly to embrace conflicts among diverse actors and to balance power and manage conflicts. Besides, conflict and consensus have a close relation to the concept of diversity of actors and minority groups (broadly explained in section 3.2 Consensus). Often, a consensus is positioned as a goal of the public participation process, which can be achieved in different degrees depending on the project's level of participation and methods. Accordingly, conflict is mostly considered a challenge of consensus-building which can be overcome through three steps: identification, assessment, and resolution. Still, limited studies explicitly mention conflict as relevant as consensus, highlighting the importance of conflictual perceptions of minority groups. Accordingly, even a high level of public participation which leads to consensus-building will not guarantee an inclusive decision in which the perceptions of minority groups are reflected.

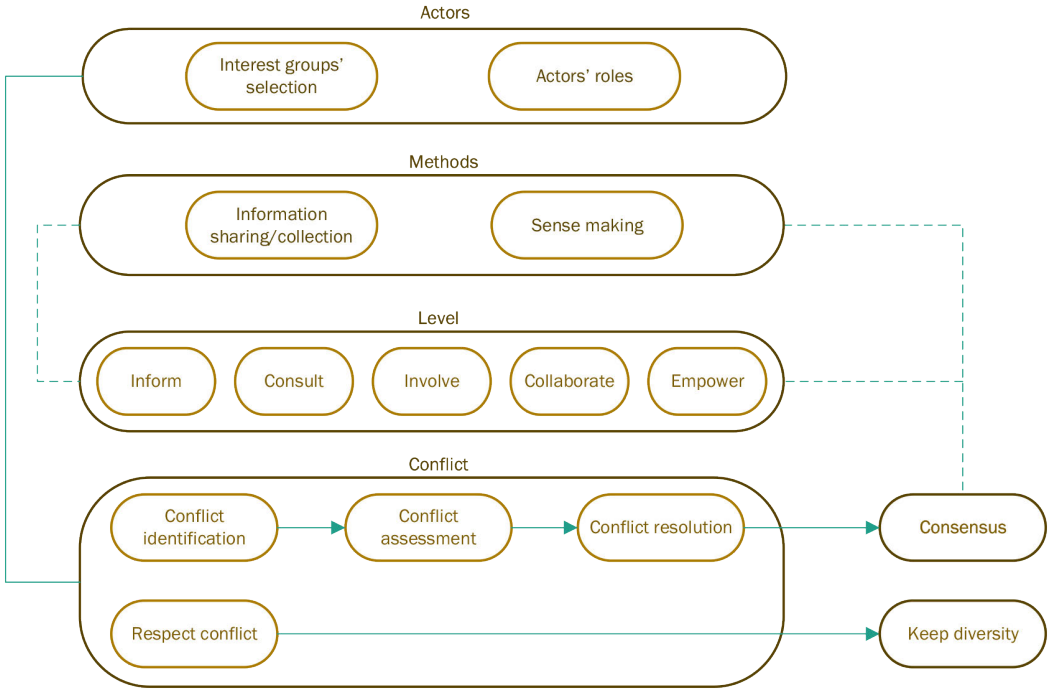

FIG. 2.4 Theoretical Framework of factors (and sub-factors) in participatory practices processes
(Solid lines: relations directly mentioned; Dashed lines: relations derived through statistical analysis)

Statistics showed that case studies using a combination of quantitative and qualitative, and both analog and digital methods tend to focus on consensus more than the others and have a higher level of participation. Besides, a positive correlation was revealed between the level of participation and consensus, which means that the more a project seeks consensus by involving participants in decision-making, the higher the level of participation (broadly explained in section 3.3. Relation between the factors).

Hence, the proposed framework aims at facilitating the identification of factors affecting the implementation of a public participation process and the potential assessment criteria of case studies. One of the limitations of this framework is that only one bibliographic database (Scopus) was used, which may have suppressed other relevant studies. For example, there were other factors not explored in this paper because they were only mentioned in a few papers (e.g., the contextual and political nature of public participation: Jaasma, et.al., 2017; Hansson and Ekenberg, 2016; Beaumont and Nicholls, 2008). Besides, this framework does not propose the issues that result in a successful project because not enough material was found in the assessment of the case studies' success. The contextual and political nature of public participation makes it difficult to assess a project's success based on fixed factors.

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Further research is needed to review this framework with more bibliographical search engines. They can complement the presented framework with other factors, sub-factors, and new relations that were not found in the analyzed literature. Besides, it would be very helpful to further develop this study, exploring the relations between the framework and projects' success. We hope that the presented framework nourishes conversations about factors influencing consensus-building in public participation in both urban planning and heritage planning.

2.4 Discussion and Conclusion

This research conducted a systematic literature review, to organize existing literature on urban planning and heritage planning from a participatory planning perception and develop a theoretical framework on consensus-building for heritage planning building on the insights gained in this process. This research showed the literature is rich in the application of various approaches to public participation, including innovative technological methods that reduce costs, upscale the actors involved and speed the process. Even though case studies were from different countries worldwide, this review revealed varied common factors and sub-factors among the case studies that influence consensus-building in a public participatory process. We explained these factors under two overall themes: 1) public participation: actors, methods, and levels, 2) consensus: approaches, and conflicts.

Further analysis showed the close relations between these influencing factors. Therefore, considering one factor at a time for the design or assessment of a participatory practice is not enough. On the contrary, the factors used in the design of a participatory practice affect each other, and they should be considered altogether, as proven in this paper. For example, the choice of the actors affects the process (method and level of public participation), and the desired outcome of the participation process (conflict resolution/keeping diversity). Given that, specifying actors without considering the other factors may lead to a participatory process with different actors that initially agreed, or it may lead to an inequivalent process for all the actors. We, therefore, suggest that the design of a participatory process should be more iterative to take into account all these factors. In addition to its theoretical contributions, the present study provides useful knowledge for practitioners. Our framework allows practitioners to consider and specify various factors and sub-factors that we identified before the beginning of each project.

Participatory heritage planning aims for safeguarding attributes and values which are important for various ranges of stakeholders, not only experts. This will not be possible without careful consideration of the factors and sub-factors and their relations (as revealed in our study) in urban planning and heritage planning. Especially, innovative digital methods of public participation used in urban planning can be applied to heritage planning. Digital methods can facilitate a high level of public participation and so inclusive consensus-building which is the aim of participatory heritage planning. It is important to note that, while this will be a good achievement in its own right, this will not guarantee an inclusive decision in which minority groups' values are fully reflected in the decisions. Because through consensus-building some minority groups' perceptions can be ignored.

The results imply that consensus-building through public participation is a complex multi-factor process. Therefore, the policies and practices intending to assure a successful process may consider such complexity upfront to approach them more holistically. Still, there is a lack of research on consensus-building on values and attributes in participatory heritage planning from multi-stakeholder perceptions. Moreover, it was found that despite the increased number of studies on public participation, the level of public participation and focus on consensus-building had not increased over time. This confirms the need for further research, primarily on the following gaps identified: 1) studies on public participation in the higher level of public participation (namely collaboration and empowerment); 2) comparative analysis of different methods and tools, their limitations and opportunities; 3) contextual and political nature of public participation. Results confirm the lack of studies on the high level of public participation practices, to empower. Besides, while the method of public participation is the most elaborated factor in the literature, there is a lack of comparative analysis that would reveal which methods can best be applied to which (step of the) process.

Urban planning and management fields have a long tradition of participatory practices. Heritage planning can gain knowledge and skills from such fields, specifically related to moving from an expert-dominated perception to greater social diversity and inclusion, using a range of quantitative and qualitative methods and tools. This research undertook initial steps to elaborate a working theoretical framework to support this need by specifying the relevant factors and their relations. This framework has the potential to be applied to other case studies both to assess projects before and after implementation. Further research is needed to validate this framework widely in terms of factors and their relations with additional bibliographical search engines. Besides, future studies can adopt this framework to facilitate consensus-building in participatory heritage planning. This can contribute to understanding if and how consensus building in participatory heritage planning differs from urban planning and how to integrate them.

References

Achig-Balarezo, M. C., Vázquez, L., Barsallo, M. G., Briones, J. C., & Amaya, J., 2017. Strategies for the management of built heritage linked to maintenance and monitoring. Case study of the San Roque Neighborhood, Cuenca, Ecuador. ISPRS - International Archives of the Photogrammetry Remote Sensing and Spatial Information Sciences, XLII-2/W5(10), 755–761. https://doi.org/10.5194/isprs-archives-XLII-2- W5-755-2017.

Aigwi, I. E., Egbelakin, T., Ingham, J., Phipps, R., Rotimi, J., and Filippova, O. 2019. A performance-based framework to prioritise underutilised historical buildings for adaptive reuse interventions in New Zealand. Sustainable Cities and Society, 48(April), 101547. https://doi.org/10.1016/j.scs.2019.101547.

Amado, M.P., 1970. The operative process in sustainable urban planning. WIT Transactions on Ecology and the Environment, 84, pp.181-191.

Arnstein, S. R. 1969. A Ladder Of Citizen Participation. Journal of the American Institute of Planners, 35(4), 216-224. https://doi.org/10.1080/01944366908977225

Artusi, R., Verderio, P. and Marubini, E., 2002. Bravais-Pearson and Spearman correlation coefficients: meaning, test of hypothesis and confidence interval. The International journal of biological markers, 17(2), pp.148-151.

Boland, A., Cherry, G. and Dickson, R. eds., 2017. Doing a systematic review: A student's guide.

Arciniegas, G., and Janssen, R. 2012. Spatial decision support for collaborative land-use planning workshops. Landscape and Urban Planning, 107(3), 332–342. https://doi.org/10.1016/j.landurbplan.2012.06.004

Bailey, K., Blandford, B., Grossardt, T. and Ripy, J., 2011. Planning, technology, and legitimacy: structured public involvement in integrated transportation and land-use planning in the United States. Environment and Planning B: Planning and Design, 38(3), pp.447-467.

Balug, K., and Vidart-Delgado, M. 2015. Imagine! You Have Nothing to Lose: Collaboration and Play in Urban Development. Critical Sociology, 41(7–8), 1027–1044. https://doi.org/10.1177/0896920513519138

Baránková, Z.U.Z.A.N.A., Dobrovodská, M.A.R.T.A., Štefunková, D.A.G.M.A.R., Babicová, D.A.N.I.E.L.A., Moyzeová, M.I.L.E.N.A. and Petrovič, F.R.A.N.T.I.Š.E.K., 2011. Participation of local people on identifying the landscape values and future development in historical agricultural landscapes. Ekológia (Bratislava), 30(2), pp.216-228.

Baumann, C. and White, S., 2012. Making better choices: a systematic comparison of adversarial and collaborative approaches to the transport policy process. Transport Policy, 24, pp.83-90.

Beatley, T., Brower, D.J. and Lucy, W.H., 1994. Representation in comprehensive planning: An analysis of the Austinplan process. Journal of the American Planning Association, 60(2), pp.185-196.

Beaumont, J. and Nicholls, W., 2008. Plural governance, participation and democracy in cities. International Journal of Urban and Regional Research, 32(1), pp.87-94.

Beekman, G.B., 2002. Social change and water resource planning and development. International journal of water resources development, 18(1), pp.183-195.

Bentrupperbäumer, J.M., Day, T.J. and Reser, J.P., 2006. Uses, meanings, and understandings of values in the environmental and protected area arena: A consideration of "World Heritage" values. Society and Natural Resources, 19(8), pp.723-741.

Bergeron, J., Paquette, S. and Poullaouec-Gonidec, P., 2014. Uncovering landscape values and micro-geographies of meanings with the go-along method. Landscape and Urban Planning, 122, pp.108-121.

Bertolinelli, M., Guzzoni, L., Masseroni, S., Pinti, L., and Utica, G. 2018. Innovative participatory evaluation processes: The case of the ministry of defense real-estate assets in Italy. In Green Energy and Technology (pp. 547–557). Springer Verlag. https://doi.org/10.1007/978-3-319-78271-3_43

Beyea, W., 2009. Place making through participatory planning. In Handbook of research on urban informatics: The practice and promise of the real-time city (pp. 55-67). IGI Global.

Biedenweg, K., Williams, K., Cerveny, L. and Styers, D., 2019. Is recreation a landscape value?: Exploring underlying values in landscape values mapping. Landscape and Urban Planning, 185, pp.24-27.

Bieling, C., 2014. Cultural ecosystem services as revealed through short stories from residents of the Swabian Alb (Germany). Ecosystem Services, 8, pp.207-215.

Biondi, L., Demartini, P., Marchegiani, L., Marchiori, M. and Piber, M., 2020. Understanding orchestrated participatory cultural initiatives: Mapping the dynamics of governance and participation. Cities, 96, p.102459.

Blečić, I., Cecchini, A., and Pusceddu, C. 2007. Constructing strategies in strategic planning: A decision support evaluation model. Proceedings of 10th International Conference on Computers in Urban Planning and Urban Management, CUPUM 2007, 1–13. https://doi.org/10.1007/s12351-008-0014-6.

Blokhuis, E.G.J., Snijders, C.C.P., Han, Q. and Schaefer, W.F., 2012. Conflicts and cooperation in brownfield redevelopment projects: Application of conjoint analysis and game theory to model strategic decision making. Journal of Urban Planning and Development, 138(3), pp.195-205.

Borona, G., & Ndiema, E., 2014. Merging research, conservation and community engagement: Perceptions from TARA's rock art community projects in Kenya. Journal of Cultural Heritage planning and Sustainable Development, 4(2), 184–195. https:// doi.org/10.1108/JCHMSD-04-2013-0012.

Brown, G. and Donovan, S., 2014. Measuring change in place values for environmental and natural resource planning using public participation GIS (PPGIS): results and challenges for longitudinal research. Society and Natural Resources, 27(1), pp.36-54.

Brown, G. and Raymond, C.M., 2014. Methods for identifying land-use conflict potential using participatory mapping. Landscape and Urban Planning, 122, pp.196-208.

Brown, G. and Weber, D., 2012. Measuring change in place values using public participation GIS (PPGIS). Applied Geography, 34, pp.316-324.

Bruku, S., 2015. Community engagement in historical site protection: Lessons from the Elmina Castle project in Ghana. Conservation and Management of Archaeological Sites, 17(1), 67–76. https://doi.org/10.1179/1350503315Z.00000000094.

Caponio, T. 2018. Immigrant integration beyond national policies? Italian cities' participation in European city networks. Journal of Ethnic and Migration Studies, 44(12), 2053–2069. https://doi.org/10.1080/1369183X.2017.1341711

Carlson, C., Canty, D., Steiner, F. and Mack, N., 1989. A path for the Palouse: an example of conservation and recreation planning. Landscape and urban planning, 17(1), pp.1-19.

Cecchini, A. and Trunfio, G.A., 2007. Supporting urban planning with CAGE: a software environment to simulate complex systems. Advances in Complex Systems, 10(supp02), pp.309-325.

Cerveny, L.K., Biedenweg, K. and McLain, R., 2017. Mapping meaningful places on Washington's Olympic Peninsula: toward a deeper understanding of landscape values. Environmental management, 60(4), pp.643-664.

Chen, W.Y. and Hua, J., 2015. Citizens' distrust of government and their protest responses in a contingent valuation study of urban heritage trees in Guangzhou, China. Journal of environmental management, 155, pp.40-48.

Chen, Y., Parkins, J.R. and Sherren, K., 2018. Using geo-tagged Instagram posts to reveal landscape values around current and proposed hydroelectric dams and their reservoirs. Landscape and Urban Planning, 170, pp.283-292.

Cheng, Y., 2013. Collaborative planning in the network: Consensus seeking in urban planning issues on the Internet—the case of China. Planning Theory, 12(4), pp.351-368.

Chinyele, B. J., & Lwoga, N. B., 2018. Participation in decision making regarding the conservation of heritage resources and conservation attitudes in Kilwa Kisiwani, Tanzania. Journal of Cultural Heritage planning and Sustainable Development, (5), 184–5198. https://doi.org/10.1108/JCHMSD-05-2017-0019.

Chipangura, N., Chiripanhura, P., & Nyamagodo, S., 2017. Policy formulation and collaborative management: The case of ziwa site, eastern Zimbabwe. Museum International, 69(3–4), 118–127. https://doi.org/10.1111/muse.12177.

Cho, K. W., and Jung, K. 2018. From collaborative to hegemonic water resource governance through dualism and Jeong: Lessons learned from the Daegu-Gumi water intake source conflict in Korea. Sustainability (Switzerland), 10(12). https://doi.org/10.3390/su10124405

Clemetsen, M. and van Laar, J., 2000. The contribution of organic agriculture to landscape quality in the Sogn og Fjordane region of Western Norway. Agriculture, ecosystems and environment, 77(1-2), pp.125-141.

Collier, M.J. and Scott, M., 2009. Conflicting rationalities, knowledge and values in scarred landscapes. Journal of Rural Studies, 25(3), pp.267-277.

Conforti, M. E., Fernández-Lomana, J. C. D., Mariano, M., Endere, M. L., & Romero Alonso, A. J. (2015). World Heritage and the local community: The case of Atapuerca (Burgos, Spain). Conservation and Management of Archaeo

da Silva, A.T.P., Nevzgodin, I., da Cunha Ferreira, T.F. and Roders, A.P., 2021. Bridging Heritage Conservation and Urban Development Planning Policies: Exploring Research Methodologies in the Literature. In LDE Heritage International Conference on Heritage and the Sustainable Development Goals (pp. 430-438). TU Delft Open.

Daly, J., Kellehear, A. & Gliksman, M. , 1997. The public health researcher: A methodological approach. Melbourne, Australia: Oxford University Press.

Damay, L. and Delmotte, F., 2010. The 'structure plans' in Brussels: from participatory planning to urban governance, a first assessment about a new tool. Urban Research and Practice, 3(3), pp.257-274.

Den, W., 2014. Community empowerment and heritage conservation: The experience of beitou district in Taipei City, Taiwan. The Historic Environment: Policy and Practice, 5(3), pp.258-274.

Diaz, J. M., Webb, S. T., Warner, L. A., and Monaghan, P. 2018. Barriers to community garden success: Demonstrating framework for expert consensus to inform policy and practice. Urban Forestry and Urban Greening, 31, 197–203. https://doi.org/10.1016/j.ufug.2018.02.014

Dolff-Bonekämper, G., 2010. Cultural Heritage and Conflict: the view from Europe. Museum International, 62(1-2), pp.14-19.

Dragouni, M. and Fouseki, K., 2018. Drivers of community participation in heritage tourism planning: an empirical investigation. Journal of Heritage Tourism, 13(3), pp.237-256.

Engberg, L. A. 2018. Climate adaptation and citizens' participation in Denmark: Experiences from Copenhagen. In Urban Book Series (pp. 139–161). Springer. https://doi.org/10.1007/978-3-319-65003-6_8

Fahmi, F. Z., Prawira, M. I., Hudalah, D., and Firman, T. 2016. Leadership and collaborative planning: The case of Surakarta, Indonesia. Planning Theory, 15(3), 294–315. https://doi.org/10.1177/1473095215584655

Ferretti, V. and Comino, E., 2015. An integrated framework to assess complex cultural and natural heritage systems with Multi-Attribute Value Theory. Journal of Cultural Heritage, 16(5), pp.688-697.

Finka, M., Ondrejička, V., Jamečný, Ľ., and Husár, M. 2017. Public Participation Procedure in Integrated Transport and Green Infrastructure Planning. IOP Conference Series: Materials Science and Engineering, 245(5). https://doi.org/10.1088/1757-899X/245/5/052054

Forester, J., 1999. The Deliberative Practioner, Encouraging Participatory Planning Processes. Boston: Massachusetts Institute of Technology Press.

Fung, A., 2006. Varieties of Participation in Complex Governance. Public Administration Review, 66, 66-75. https://doi.org/10.1111/j.1540-6210.2006.00667.x

García, G., Amaya, J. and Tenze, A., 2019. Cultural Significance: Linking Actors and Methods. In Structural Analysis of Historical Constructions (pp. 2053-2061). Springer, Cham.

Garcia, X., Benages-Albert, M. and Vall-Casas, P., 2018. Landscape conflict assessment based on a mixed methods analysis of qualitative PPGIS data. Ecosystem services, 32, pp.112-124.

Garcia, X., Benages-Albert, M., Pavón, D., Ribas, A., Garcia-Aymerich, J. and Vall-Casas, P., 2017. Public participation GIS for assessing landscape values and improvement preferences in urban stream corridors. Applied Geography, 87, pp.184-196.

Gerasidi, A., Apostolaki, S., Manoli, E., Assimacopoulos, D., and Vlachos, E. 2009. Towards the formulation of a new strategy of water resource management for urban areas achieved through participatory processes. Urban Water Journal, 6(3), 209–219. https://doi.org/10.1080/15730620902781442

Ghavami, S.M., Taleai, M. and Arentze, T., 2017. An intelligent spatial land-use planning support system using socially rational agents. International Journal of Geographical Information Science, 31(5), pp.1022-1041.

Golobiĉ, M. and Maruŝiĉ, I., 2007. Developing an integrated approach for public participation: a case of land-use planning in Slovenia. Environment and planning B: planning and design, 34(6), pp.993-1010.

Grant, M. and Barton, H., 2013. No weighting for healthy sustainable local planning: evaluation of a participatory appraisal tool for rationality and inclusivity. Journal of environmental planning and management, 56(9), pp.1267-1289.

Gray, S., Singer, A., Schmitt-Olabisi, L., Introne, J., and Henderson, J. 2017. Identifying the Causes, Consequences, and Solutions to the Flint Water Crisis Through Collaborative Modeling. Environmental Justice, 10(5), 154–161. https://doi.org/10.1089/env.2017.0016

Habermas, J., 1987. The Theory of Communicative Action. Cambridge: Polity Press.

Halla, F., 2005. Critical elements in sustaining participatory planning: Bagamoyo strategic urban development planning framework in Tanzania. Habitat International, 29(1), 137–161. https://doi.org/10.1016/S0197-3975(03)00077-8

Hamilton, A., Trodd, N., Zhang, X., Fernando, T. and Watson, K., 2001. Learning through visual systems to enhance the urban planning process. Environment and Planning B: Planning and Design, 28(6), pp.833-845.

Hanna, K.S., 2000. The paradox of participation and the hidden role of information: A case study. Journal of the American Planning Association, 66(4), pp.398-410.

Hansson, K. and Ekenberg, L., 2016. Managing deliberation: tools for structuring discussions and analyzing representation. Transforming Government: People, Process and Policy.

Hardoy, J., Gencer, E. and Winograd, M., 2019. Participatory planning for climate resilient and inclusive urban development in Dosquebradas, Santa Ana and Santa Tomé. Environment and Urbanization, 31(1), pp.33-52.

Harmon, B. and Viles, H., 2013. Beyond geomorphosites: trade-offs, optimization, and networking in heritage landscapes. Environment Systems and Decisions, 33(2), pp.272-285.

Harrison, F., Lloyd, E. and Suhrbier, J.H., 1983. The Downtown Hartford Transportation Project: Public/private Collaboration on Transportation Improvements. Cambridge Systematics.

Healey, P., 1997. Collaborative Planning: Shaping Places in Fragmented Societies. Vancouver: UBC Press.

Healey, P., 2006. Relational complexity and the imaginative power of strategic spatial planning. European Planning Studies, 14(4), pp.525-546.

Henningsson, M., Blicharska, M., Antonson, H., Mikusiński, G., Göransson, G., Angelstam, P., Folkeson, L. and Jönsson, S., 2015. Perceived landscape values and public participation in a road-planning process–a case study in Sweden. Journal of Environmental Planning and Management, 58(4), pp.631-653.

Heras, V.C., Cordero, M.S.M., Wijffels, A., Tenze, A. and Paredes, D.E.J., 2019. Heritage values: towards a holistic and participatory management approach. Journal of Cultural Heritage planningand Sustainable Development.

Hosagrahar, J., Soule, J., Girard, L.F. and Potts, A., 2016. Cultural heritage, the UN sustainable development goals, and the new urban agenda. BDC. Bollettino Del Centro Calza Bini, 16(1), pp.37-54.

Hopkins, D., 2010. Planning a City through 'dialogue': deliberative policy-making in action in Western Australia. Urban Policy and Research, 28(3), pp.261-276.

Human, H., 2015. Democratising World Heritage: The policies and practices of community involvement in Turkey. Journal of Social Archaeology, 15(2), 160–183. https://doi.org/10.1177/1469605314566557.

Hung, M.L., Ma, H.W. and Yang, W.F., 2007. A novel sustainable decision making model for municipal solid waste management. Waste management, 27(2), pp.209-219.

Innes, J.E. and Booher, D.E., 1999. Consensus building and complex adaptive systems: A framework for evaluating collaborative planning. Journal of the American planning association, 65(4), pp.412-423.

Innes, J. & Booher, D. (2004) Reframing public participation: strategies for the 21st century, Planning Theory & Practice, 5(4), pp. 419–436.

International Association of Public Participation [IAP2]. 2007. IAP2 Spectrum of Public Participation. Retrieved from http://c.ymcdn.com/sites/www.iap2.org/resource/resmgr/imported/IAP2%20Spectrum_verti cal.pdf.

Ives, C.D., Gordon, A., Oke, C., Raymond, C.M., Hehir, A. and Bekessy, S.A., 2018. Spatial scale influences how people value and perceive green open space. Journal of Environmental Planning and Management, 61(12), pp.2133-2150.

Jaasma, P., Frens, J., Hummels, C., and Wolters, E. 2017. [X]Changing perceptions: Enriching multi-stakeholder deliberation with embodiment in participatory society. Proceedings of the 7th International Conference for E-Democracy and Open Government, CeDEM 2017, 147–156. https://doi.org/10.1109/CeDEM.2017.31

Janssen, M.A., Goosen, H. and Omtzigt, N., 2006. A simple mediation and negotiation support tool for water management in the Netherlands. Landscape and urban planning, 78(1-2), pp.71-84.

Jayasooriya, V. M., Ng, A. W. M., Muthukumaran, S., and Perera, B. J. C. 2019. Multi Criteria Decision Making in Selecting Stormwater Management Green Infrastructure for Industrial Areas Part 1: Stakeholder Preference Elicitation. Water Resources Management, 33(2), 627–639. https://doi.org/10.1007/s11269-018-2123-1

Jung, T., Lee, J., Yap, M., and Ineson, E. 2015. The role of stakeholder collaboration in culture-led urban regeneration: A case study of the Gwangju project, Korea. Cities, 44, 29–39. https://doi.org/10.1016/j.cities.2014.12.003.

Kaliampakos, D., Mavrikos, A., and Menegaki, M. 2011. Construction industry and archaeology: a land-use conflict on the island of Andros, Greece. International Journal of Mining, Reclamation and Environment, 25(2), 152-160.

Kato, H., Shiroyama, H., and Fukayama, T. 2008. Process management in public transit planning: Case study of introduction project of light rail transit in Toyama, Japan. Transportation Research Record, 2042, 33–40. https://doi.org/10.3141/2042-04

Kaya, I.A. and Erol, N.K., 2016. Conflicts over locally unwanted land-uses (LULUs): Reasons and solutions for case studies in Izmir (Turkey). Land-use Policy, 58, pp.83-94.

Kee, T., 2015. Cultivating a participatory design practice in architecture: a case study of Hong Kong Housing Authority. The International Journal of Architectonic, Spatial, and Environmental Design, 8(3), p.13.

Klamer, A., 2014. The values of archaeological and heritage sites. Public Archaeology, 13(1-3), pp.59-70.

Kupidura, A., Łuczewski, M., Home, R. and Kupidura, P., 2014. Public perceptions of rural landscapes in land consolidation procedures in Poland. Land-use policy, 39, pp.313-319.

Kurki, V. and Katko, T.S., 2015. Groundwater as a Source of Conflict and Cooperation: Towards Creating Mutual Gains in a Finnish Water Supply Project. Water Alternatives, 8(3).

Landorf, C., 2009. A framework for sustainable heritage planning: A study of U.K. industrial heritage sites. International Journal of Heritage Studies, 15(6), 494–510. https://doi.org/10.1080/13527250903210795.

Laurini, R., 1998. Groupware for urban planning: an introduction. Computers, Environment and Urban Systems, 22(4), pp.317-333.

Le Pira, M., Marcucci, E., Gatta, V., Ignaccolo, M., Inturri, G., and Pluchino, A. 2017. Towards a decision-support procedure to foster stakeholder involvement and acceptability of urban freight transport policies. European Transport Research Review, 9(4). https://doi.org/10.1007/s12544-017-0268-2

Lebeau, P., Macharis, C., Van Mierlo, J., and Janjevic, M. 2018. Improving policy support in city logistics: The contributions of a multi-actor multi-criteria analysis. Case Studies on Transport Policy, 6(4), 554–563. https://doi.org/10.1016/j.cstp.2018.07.003.

Lekakis, S. (2013). Distancing and rapproching: Local communities and monuments in the Aegean Sea - A case study from the Island of Naxos. Conservation and Management of Archaeological Sites, 15(1), 76–93. https://doi.org/10.1179/1350503313Z. 00000000048.

Lewis, J., 2015. Preserving and maintaining the concept of Letchworth Garden City. Planning Perceptions, 30(1), 153–163. https://doi.org/10.1080/02665433.2014. 971127.

Li, J., Krishnamurthy, S., Roders, A.P. and van Wesemael, P., 2020. Community participation in cultural heritage planning: A systematic literature review comparing Chinese and international practices. Cities, 96, p.102476.

Li, K.W., Levy, J.K., Buckley, P.H. and Belec, J., 2007, October. A multiple-criteria group decision support system for risk reduction and community resilience in the fraser lowlands eco-region. In 2007 IEEE International Conference on Systems, Man and Cybernetics (pp. 1794-1799). IEEE.

Liberati, A., Altman, D.G., Tetzlaff, J., Mulrow, C., Gøtzsche, P.C., Ioannidis, J.P., Clarke, M., Devereaux, P.J., Kleijnen, J. and Moher, D., 2009. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. Journal of clinical epidemiology, 62(10), pp.e1-e34.

Lin, Y. and Geertman, S., 2015. Smart governance, collaborative planning and planning support systems: A fruitful triangle?. In Planning Support Systems and Smart Cities (pp. 261-277). Springer, Cham.

Lo, A.S. and Lee, C.Y., 2011. Motivations and perceived value of volunteer tourists from Hong Kong. Tourism management, 32(2), pp.326-334.

Mackay, R., & Johnston, C., 2010. Heritage planning and community connections - On the Rocks. Journal of Architectural Conservation, 16(1), 55–74. https://doi.org/10. 1080/13556207.2010.10785062.

Maginn, P.J., 2007. Towards more effective community participation in urban regeneration: The potential of collaborative planning and applied ethnography. Qualitative research, 7(1), pp.25-43.

Manzi, M., Figueiredo, G. C. dos S., Mourad, L. N., and Rebouças, T. de M. 2018. Neighbourhood planning and the right to the city: confronting neoliberal state urban practices in Salvador, Brazil. International Journal of Urban Sustainable Development, 10(1), 1–15. https://doi.org/10.1080/19463138.2018.1433677.

Marcucci, E., Le Pira, M., Gatta, V., Inturri, G., Ignaccolo, M. and Pluchino, A., 2017. Simulating participatory urban freight transport policy-making: Accounting for heterogeneous stakeholders' preferences and interaction effects. Transportation Research Part E: Logistics and Transportation Review, 103, pp.69-86.
Martinović, A. and Ifko, S., 2018. Industrial heritage as a catalyst for urban regeneration in post-conflict cities Case study: Mostar, Bosnia and Herzegovina. Cities, 74, pp.259-268.
Mayer, C.C. and Wallace, G.N., 2007. Appropriate levels of restoration and development at Copan Archaeological Park: Setting attributes affecting the visitor experience. Journal of Ecotourism, 6(2), pp.91-110.
McAlister, R., 2010. Putting the 'community' into community planning: assessing community inclusion in Northern Ireland. International Journal of Urban and Regional Research, 34(3), pp.533-547.
McCreary, S., Grifman, P. and Cowart, M., 2016. Creating Stable Agreements in Marine Policy: Learning from the C alifornia S outh C oast M arine L ife P rotection A ct I nitiative. Negotiation Journal, 32(1), pp.23-48.
McLain, R., Cerveny, L., Biedenweg, K. and Banis, D., 2017. Values mapping and counter-mapping in contested landscapes: an Olympic Peninsula (USA) case study. Human ecology, 45(5), pp.585-600.
McTague, C. and Jakubowski, S., 2013. Marching to the beat of a silent drum: Wasted consensus-building and failed neighborhood participatory planning. Applied Geography, 44, pp.182-191.
Meutia, Z.D., Akbar, R. and Zulkaidi, D., 2018, May. Heritage planning and rethinking the meaning and values of designating heritage sites in a post-disaster context: The case of Aceh, Indonesia. In IOP conference series: earth and environmental science (Vol. 158, No. 1, p. 012039). IOP Publishing.
Mirzakhani, A., Turró, M. and Jalilisadrabad, S., 2021. Key stakeholders and operation processes in the regeneration of historical urban fabrics in Iran. Cities, 118, p.103362.
Mohammadi, S. H., Norazizan, S., and Nikkhah, H. A. 2018. Conflicting perceptions of participation between citizens and members of local government. Quality and Quantity, 52(4), 1761–1778. https://doi.org/10.1007/s11135-017-0565-9
Moote M., McLaren M, Chickering M, 1997, "RESEARCH: theory in practice: applying participatory democracy theory to public land planning" Journal of EnvironmentalManagement 21 877–889
Mouat, C., Legacy, C. and March, A., 2013. The problem is the solution: Testing agonistic theory's potential to recast intractable planning disputes. Urban Policy and Research, 31(2), pp.150-166.
Mouffe C., 1994, The Return of the Political (Verso, London)
Mouffe, C., 2000, The Democratic Paradox. London: Verso
Myers, David, Stacie Nicole Smith, and Gail Ostergren, eds. 2016. Consensus Building, Negotiation, and Conflict Resolution for Heritage Place Management: Proceedings of a Workshop Organized by the Getty Conservation Institute, Los Angeles, California, 1-3 December 2009. Los Angeles: Getty Conservation Institute. http://hdl.handle.net/10020/gci_pubs/consensus_building
Nakagawa,S. 2010. Socially inclusive cultural policy and arts-based urban community regeneration. Cities,27,S16–S24.
Nic Eoin, L., Owens, E., & King, R., 2013. Memories of metolong: The challenges of archiving intangible heritage in development contexts. 2013 digital heritage international congress (Digital heritage). Marseille, France: IEEE37–44. https://doi.org/10.1109/ DigitalHeritage.2013.6744727.
Nordström, E.M., Eriksson, L.O. and Öhman, K., 2010. Integrating multiple criteria decision analysis in participatory forest planning: Experience from a case study in northern Sweden. Forest policy and economics, 12(8), pp.562-574.
Nordström, E.M., Romero, C., Eriksson, L.O. and Öhman, K., 2009. Aggregation of preferences in participatory forest planning with multiple criteria: an application to the urban forest in Lycksele, Sweden. Canadian Journal of Forest Research, 39(10), pp.1979-1992.
Noucher, M. 2009, "La donnée géographique aux frontières des organisations : approche sociocognitive et systémique de son appropriation", Laboratoire LaSIG, Thèse de doctorat, Lausanne: École Polytechnique Fédérale de Lausanne
Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. International Journal of Qualitative Methods, 16(1), 1609406917733847.
Oda, T., 2014. Preserving and revitalizing an ethnic urban neighborhood in transition: San Francisco's Japantown better neighborhood plan. Japanese Journal of Human Geography, 66(1), pp.1-15.

Oevermann, H., Degenkolb, J., Dießler, A., Karge, S., & Peltz, U., 2016. Participation in the reuse of industrial heritage sites: The case of Oberschöneweide, Berlin. International Journal of Heritage Studies, 22(1), 43–58. https://doi.org/10.1080/ 13527258.2015.1083460.
Olivier, A., 2017. Communities of interest: Challenging approaches. Journal of Community Archaeology and Heritage, 4(1), pp.7-20.
Opdam, P., Westerink, J., Vos, C. and De Vries, B., 2015. The role and evolution of boundary concepts in transdisciplinary landscape planning. Planning Theory and Practice, 16(1), pp.63-78.
O'Rourke, M.J., 2018. The map is not the territory: Applying qualitative Geographic Information Systems in the practice of activist archaeology. Journal of Social Archaeology, 18(2), pp.149-173.
Pérez-Soba, M., Paterson, J., Metzger, M. J., Gramberger, M., Houtkamp, J., Jensen, A., Murray-Rust, D., and Verkerk, P. J. 2018. Sketching sustainable land-use in Europe by 2040: a multi-stakeholder participatory approach to elicit cross-sectoral visions. Regional Environmental Change, 18(3), 775–787. https://doi.org/10.1007/s10113-018-1297-7
Peltonen, L. and Sairinen, R., 2010. Integrating impact assessment and conflict management in urban planning: Experiences from Finland. Environmental Impact Assessment Review, 30(5), pp.328-337
Peltonen, L. and Kangasoja, J. 2009. Konfliktien kartoitus suunnittelun apuvälineenä. (In Finnish). Yhdyskuntasuunnittelu 47(4): 88-97
Pereira Roders, A., 2019. The Historic Urban Landscape approach in action: Eight years later. In Reshaping Urban Conservation (pp. 21-54). Springer, Singapore.
Petrušonis, V. 2018. Symbolic potential of place and its modelling for management needs. Landscape Architecture and Art, 13, 39–48. https://doi.org/10.22616/J.LANDARCHART.2018.13.04
Poulios, I., 2014. Discussing strategy in heritage conservation: Living heritage approach as an example of strategic innovation. Journal of Cultural Heritage planning and Sustainable Development, 4(1), 16–34. https://doi.org/10.1108/JCHMSD-10-2012- 0048.
Publications, S., and Kee, T. 2015. Vocational Training Council VTC Institutional Repository Cultivating a participatory design practice in architecture: a case study of Hong Kong Housing Authority. http://repository.vtc.edu.hk/thei-fac-de-sp
Puolamäki, L., 2017. Tracing Cultural Landscape Values of Children with Participatory Geographic Information System. European Countryside, 9(2), pp.375-396.
Puolamäki, L., 2012. Individual views and shared landscapes of folklore in Reykholtsdal, Iceland. European Countryside, 4(2), pp.162-178.
Purbani, K., 2017. Collaborative planning for city development. A perception from a city planner. Przegląd Naukowy. Inżynieria i Kształtowanie Środowiska, 26(1 [75]).
Raynor, K.E., Doyon, A. and Beer, T., 2017. Collaborative planning, transitions management and design thinking: Evaluating three participatory approaches to urban planning. Australian Planner, 54(4), pp.215-224.
Regan, H. M., Colyvan, M., and Markovchick-Nicholls, L., 2006. A formal model for consensus and negotiation in environmental management. Journal of Environmental Management, 80(2), 167–176. https://doi.org/10.1016/j.jenvman.2005.09.004
Rice, P., & Ezzy, D., 1999. Qualitative research methods: A health focus. Melbourne: Oxford University Press.
Ross, A. and Willson, V.L., 2017. Independent samples T-test. In Basic and advanced statistical tests (pp. 13-16). SensePublishers, Rotterdam.
Rouwette, E., Bleijenbergh, I. and Vennix, J., 2016. Group model-building to support public policy: addressing a conflicted situation in a problem neighbourhood. Systems Research and Behavioral Science, 33(1), pp.64-78.
Sagaris, L., 2018. Citizen participation for sustainable transport: Lessons for change from Santiago and Temuco, Chile. Research in transportation economics, 69, pp.402-410.
Sánchez, M.L., Cabrera, A.T. and Del Pulgar, M.L.G., 2020. Guidelines from the heritage field for the integration of landscape and heritage planning: A systematic literature review. Landscape and Urban Planning, 204, p.103931.
Sasaki, M., 2010. Urban regeneration through cultural creativity and social inclusion: Rethinking creative city theory through a Japanese case study. Cities, 27, pp.S3-S9.Sedgwick, P., 2010. Independent samples t test. BMJ, 340, p.c2673.
Schadewitz, N. and Jachna, T., 2007. Comparing inductive and deductive methodologies for design patterns identification and articulation.

Shen, Z. and Kawakami, M., 2010. An online visualization tool for Internet-based local townscape design. Computers, Environment and Urban Systems, 34(2), pp.104-116.
Shen, Z., and Kawakami, M., 2007. Study on Visualization of Townscape Rules Using VRML for Public Involvement. Journal of Asian Architecture and Building Engineering, 6(1), 119–126. https://doi.org/10.3130/jaabe.6.119
Shen, Z., Kawakami, M., and Kishimoto, K. 2012. Web-based multimedia and public participation for green corridor design of an urban ecological network. In Advances in Geographic Information Science (Issue 9783642135583, pp. 185–204). Springer Heidelberg. https://doi.org/10.1007/978-3-642-13559-0_9
Siguencia Avila, M.E. and Rey Perez, J., 2016. Heritage values protection, from the monument to the urban dimension. Case study: the historic centre of Santa Ana de los Ríos de Cuenca, Ecuador. The Historic Environment: Policy and Practice, 7(2-3), pp.164-176.
Song, D., 2001. A Socio-cultural Interpretation on the Conservation Policies of Urban Symbolic Space: A Case Study of Kahoe-Dong District, Seoul. International Journal of Urban Sciences, 5(1), pp.29-40.
Sorvari, J. and Seppälä, J., 2010. A decision support tool to prioritize risk management options for contaminated sites. Science of the Total Environment, 408(8), pp.1786-1799.
Starkl, M., Brunner, N., López, E., and Martínez-Ruiz, J. L. 2013. A planning-oriented sustainability assessment framework for peri-urban water management in developing countries. Water Research, 47(20), 7175–7183. https://doi.org/10.1016/j.watres.2013.10.037
Stephens, J., 2014. 'Fifty-two doors': identifying cultural significance through narrative and nostalgia in Lakhnu village. International Journal of Heritage Studies, 20(4), pp.415-431.
Sujarwo, W. and Caneva, G., 2016. Using quantitative indices to evaluate the cultural importance of food and nutraceutical plants: Comparative data from the Island of Bali (Indonesia). Journal of Cultural Heritage, 18, pp.342-348.
Sullivan, E., 2016. (Un) Intentional Community: Power and Expert Knowledge in a Sustainable Lifestyle Community. Sociological Inquiry, 86(4), pp.540-562.
Susskind, L.E., McKearnen, S. and Thomas-Lamar, J., 1999. The consensus building handbook: A comprehensive guide to reaching agreement. Sage publications.
Taylor, K., 2004. Cultural heritage planning: A possible role for charters and principles in Asia. International Journal of Heritage Studies, 10(5), pp.417-433.
Tewdwr, M (2002) Personal dynamics, distinctive frames and communicative planning. In Allmendinger, P, Tewdwr, M (eds) Planning Futures: New Directions for Planning Theory. London; New York: Routledge, 65–92.
Thomas, M., Partridge, T., Pidgeon, N., Harthorn, B. H., Demski, C., and Hasell, A. 2018. Using role play to explore energy perceptions in the United States and United Kingdom. Energy Research and Social Science, 45, 363–373. https://doi.org/10.1016/j.erss.2018.06.026
Thomas, R. 2008. 'Archaeology and Authority in the Twenty-fi rst Century', in Schofi eld, J., Fairclough, G., Harrison, R., & Jameson Jnr, J. H. (eds) The Heritage Reader (New York: Routledge), pp. 139– 148, at 144.
Tudor, C. A., Iojă, I. C., Pătru-Stupariu, I., Nită, M. R., and Hersperger, A. M. 2014. How successful is the resolution of land-use conflicts? A comparison of cases from Switzerland and Romania. Applied Geography, 47, 125–136. https://doi.org/10.1016/j.apgeog.2013.12.008
Vakhitova, T.V., 2015. Rethinking conservation: managing cultural heritage as an inhabited cultural landscape. Built Environment Project and Asset Management.
Van Assche, K. and Duineveld, M., 2013. The good, the bad and the self-referential: Heritage planning and the productivity of difference. International Journal of Heritage Studies, 19(1), pp.1-15.
van der Hoeven, A., 2020. Valuing urban heritage through participatory heritage websites: Citizen perceptions of historic urban landscapes. Space and culture, 23(2), pp.129-148.
Van Empel, C. 2008. The effectiveness of community participation in planning and urban development. WIT Transactions on Ecology and the Environment, 117, 549–556. https://doi.org/10.2495/SC080521
van Ewijk, H., 2011. Collaboration in community research: Samenwerking in buurtonderzoek. European Journal of Social Work, 14(1), pp.41-52.
Veldpaus, L., 2015. Historic urban landscapes: framing the integration of urban and heritage planning in multilevel governance.

Vlachokostas, C., Achillas, C., Moussiopoulos, N. and Banias, G., 2011. Multicriteria methodological approach to manage urban air pollution. Atmospheric Environment, 45(25), pp.4160-4169.

Walsh, M. and Burch, S., 2012. Communities at the Crossroads: Using MetroQuest to Help Communities Create Consensus Around a Vision of the Future. In The Future of cities and regions (pp. 45-64). Springer, Dordrecht.

Wells, J.C. and Lixinski, L., 2016. Heritage values and legal rules: Identification and treatment of the historic environment via an adaptive regulatory framework (part 1). Journal of Cultural Heritage planningand Sustainable Development.

Wilson, K. and Desha, C., 2016. Engaging in design activism and communicating cultural significance through contemporary heritage story telling. Journal of Cultural Heritage planningand Sustainable Development.

Woodley, C., Marshall, S., Taylor, S., & Fagan, S. (2013). Technologies, indigenous cultural heritage and community capacity building. Paper Presented at 2013 IEEE Global Humanitarian Technology Conference (GHTC) (pp. 406–410). . https://doi.org/10. 1109/GHTC.2013.6713720.

Yu, T., Liang, X., Shen, G. Q., Shi, Q., and Wang, G. 2019. An optimization model for managing stakeholder conflicts in urban redevelopment projects in China. Journal of Cleaner Production, 212, 537–547. https://doi.org/10.1016/j.jclepro.2018.12.071

Zhang, Y., Shen, Z., Wang, K., Kobayashi, F. and Lin, X., 2017. Cloud-based Virtual Reality Integrated Automatic Presentation Script for Understanding Urban Design Concepts in the Consensus Process A Case Study of One Foundation's Disaster Prevention Park in China. International Review for Spatial Planning and Sustainable Development, 5(1), pp.29-44.

Zhou, Q.B., Zhang, J., Zhang, H. and Li, X.R., 2018. Is all authenticity accepted by tourists and residents? The concept, dimensions and formation mechanism of negative authenticity. Tourism Management, 67, pp.59-70.

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3 Capturing Users' Voices

Capturing Public Voices: The Role of Social Media in Heritage Planning

This chapter is based on the following journal paper:
Foroughi, M., de Anderade, B. and Roders, A.P., 2023. Capturing Public Voices: The Role of Social Media in Heritage Planning. Habitat International (under revision).

ABSTRACT Social media platforms have been increasingly used by locals and tourists to express their perceptions about buildings, cities, and built heritage. Most recently, scholars have been using social media to conduct innovative research on built heritage and heritage planning. Still, the application of artificial intelligence (AI) methods to analyze social media data for heritage planning is seldom explored. This paper investigates the potential of short texts (sentences and hashtags) shared through social media as a data source and artificial intelligence methods for data analysis for revealing the cultural significance (values and attributes) of built heritage. The city of Yazd, Iran was taken as a case study, with a particular focus on windcatchers, key attributes conveying outstanding universal values, as inscribed on the UNESCO World Heritage List. This paper has three subsequent phases: 1) state of the art on the intersection of public participation in heritage planning and social media research; 2) methodology of data collection and data analysis related to coding people's voices from Instagram and Twitter into values of windcatchers over the last ten-years; 3) preliminary findings on the comparison between perceptions of locals and tourists, sentiment analysis, and its association with the values and attributes of windcatchers. Results indicate that the age value is recognized as the most important value by all interest groups, while the political value is the least acknowledged. Besides, the negative sentiments are scarcely reflected (e.g., critiques) in social media. Results confirm the potential of social media for heritage planning in terms of

(de)coding and measuring the cultural significance of built heritage for windcatchers and also other attributes in Yazd and other case studies and scales.

KEYWORDS public participation, cultural significance, heritage, social media, sentiment analysis

3.1 Introduction

Radical developments in information and communication technologies (ICT) including social media have widely affected urban sectors, particularly cultural heritage (Panagiotopoulou, et al., 2020). Online communities have been increasingly using social media platforms to share their perceptions about their environment and built heritage in particular. These short texts (sentences and hashtags) shared through online conversations in combination with smart technologies (e.g., artificial intelligence) and techniques (e.g., Natural Language Processing) provide opportunities to capture and decode public voices, at an unprecedented pace, which can dynamize the dominant planning power structure (Tayebi, 2013). Besides, social media can reduce costs and increase stakeholders' involvement in urban planning (Kleinhans et al., 2015; Monteiro et al., 2015; Chen et al., 2019; Ye et al., 2021).

Varied scholars have been using social media to conduct innovative research to engage people and interpret their perceptions and sentiments. Chen et al. (2019) investigated spatial structures and analyzed social media data to provide insights into urban planning regarding human activities contributing to the comprehension of the relationship between social activities and urban space. Afzalan and Muller (2014) investigated the potential of social media (particularly Facebook and Twitter) to facilitate discourses among online participants in participatory green infrastructure planning in the city of Lawrence, Kansas. Das and Zubaidi (2021) analyzed peoples' emotions and politeness in transit-related tweets, assessing peoples' perceptions of the transit system in New York and California. Abdul-Rahman et al. (2021) presented a framework including topic modeling and sentiment analysis to use Twitter to investigate the spatiotemporal dynamism of community challenges (e.g., high rental prices, and noise pollution). Alizadeh et al. (2019) performed cluster and sentiment analysis of Twitter posts on specific urban projects to identify citizen concerns on urban issues (e.g., equality, health).

Social media platforms have also been used for participatory heritage planning (Silberman et al., 2012; Giaccardi, 2012; Monteiro et al., 2015). Decoding cultural significance, by distinguishing attributes (resources to be conserved) and values (the reasons to conserve the resources) is a growing issue in attention by both research and practice, as recommended by UNESCO (UNESCO, 2011). Ginzarly et al. (2019) revealed the cultural significance of the city of Tripoli, Lebanon, attributes (e.g., street, sky) and values (e.g., social, economic) together, when analyzing the geo-tagged photos and tags, shared through Flickr, by online communities. Van der Hoeven (2019) revealed the diverse layers of heritage values attributed to the urban landscapes in 19 Dutch heritage projects and organizations by a qualitative content analysis of the social media activities and policy documents. His research revealed the potential of social media to involve people in heritage planning providing insight into the attachments that citizens have to their urban environment.

Social media and artificial intelligence (AI) are yet to be further explored for participatory heritage planning. There is a lack of literature on heritage-specific tools targeting the cultural significance of built heritage, distinguishing and relating attributes and values (Bai et al., 2021). In addition, literature often focuses on the scale of country, city, and neighborhood (e.g., Monachesi, 2020; Ginzarly et al., 2019; Alizadeh et al., 2019), rather than specific attributes in the city, such as the windcatchers. Hence, this paper aims to address the following question: What are the values and attributes defining the cultural significance of heritage according to users?

To answer this research question, this research investigates the potential of social media as a data source and artificial intelligence methods for data analysis for revealing peoples' feelings and perceptions about the cultural significance (values and attributes) of built heritage to ultimately facilitate inclusive heritage planning. The city of Yazd, Iran was taken as a case study, with a particular focus on windcatchers, key attributes conveying outstanding universal values, as inscribed on the UNESCO World Heritage List.

3.2 Methodology

The process followed in this research entailed four steps. Accordingly, data acquisition, data pre-processing, data analysis, and results (see Figure 3.1).

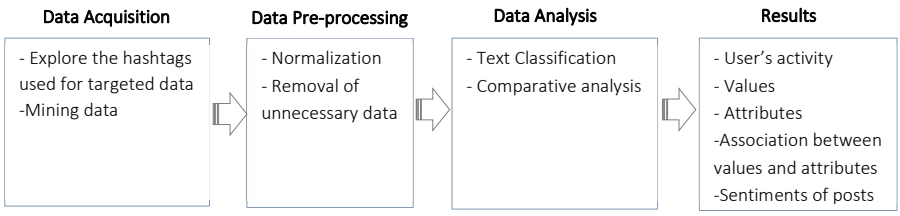

FIG. 3.1 Overview of the methodological framework.

3.2.1 Data Acquisition

All the common social media platforms used in Iran are considered as potential data sources for this research. After an initial investigation to find the relevant data on these platforms, it is revealed that Instagram and Twitter contain the main relevant posts. Given that, posts shared on Instagram or Twitter about windcatchers of Yazd were collected using several Persian and English terms (used as hashtags) referring to windcatchers, namely "badgir", "wind-catcher", "windcatcher", "wind-tower", "windtower",بادگیر»، «باد-گیر»، «بادگیرها»، «بادگیرهای» «بادگیر_یزد»، «بادگیرهای_یزد.

This research only collects and analyses the textual data due to the research time limitation. Only a few photographs are used in this paper to clarify some aspects of the case study or to support an argument developed in the text. These photographs are reproduced with permission from the photographers.

The content of the data includes user name, post content, time (time posted), and users' biographies. The data do not cover the demographic characteristic of users, including age, gender, education, and professional status, because mostly these are not provided by the users. In addition to the above statement, this research considers the ethical issues by only processing the hashtags and comments expressing heritage values and attributes and not using or storing any sensitive personal data. Hence, personal data is not disclosed at any stage of the research, and the users' identities will remain anonymous unless permission is asked.

3.2.2 Data Cleaning and Pre-processing

This step took place automatically using Python programming language. All the posts were translated to English using Google API to facilitate the analysis process. The gathered posts which do not mention the words “windcatcher” and “Yazd”, in their variations, were excluded. To find these posts, all variations of these two words were normalized to “windcatcher” and “Yazd” (both in Persian and English such as “Yazd”, “Yazd”, ” یزد”). Moreover, the text cleaning included the removal of unnecessary data (e.g., stop words, personal mentions, emojis, punctuation marks, and website links) to facilitate data analysis. After the exclusion, 3,346 sentences and 12,646 unique hashtags were analyzed Which were mentioned by 2,628 unique users!.

3.2.3 Data Analysis

After data cleaning and pre-processing, the dataset was ready for automatic classification analysis. The data analysis process was conducted in two steps. First, users were classified by nationality (Iranian or foreigner); and by type (general and tourism professionals). The nationality and type of users are considered as independent variables, to better understand the diversity of the interest groups associating the cultural significance (attributes and values) with the windcatchers of Yazd. Each post’s content (sentences and hashtags) was analyzed and assessed through automatic quantitative content analysis and qualitative categorical analysis. The quantitative analysis revealed the most and least used words and hashtags in the sum of posts, and help to identify patterns. The qualitative analysis revealed how users refer to windcatchers and their cultural significance.

3.2.3.1 User Analysis

The nationality of each user is determined based on the language of posts and biographies, and also the user’s living location (if provided in users’ biographies). If users’ location and language do not match, the location will prevail. Besides, users are classified as general or tourism professionals by analyzing the names and biographies of users. Users with any of the words “travel”, “trip”, “tour”, “hotel”, “Yazd”, “Persia”, and “Iran” in their usernames or the term “travel”, “trip”, “tour”, and “hotel” in their biographies are considered as tourism professionals. The rest of the users are regarded as general users. The accuracy of the classifications were validated by manually classifiying 25 percent of the data.

Cultural significance analysis

To reveal the cultural significance, two theoretical frameworks were applied to decode the attributes and values (see appendix A for more details) conveyed in the posts, conducting a multi-label text classification analysis (see Figure 3.2), using a) the values system developed by Pereira Roders (2007) and b) the attributes ontology by Veldpaus (2015). The general analysis of attributes and values was undertaken using Python libraries, including Numpy (for calculation analysis), Pandas (for research on the data frame), and Bert model (for word embedding). As labels' distribution in the available train dataset was distinct drastically, and there were not enough trained datasets available, this research used the cosine similarity method[3] for the multi-label text classification of the heritage values (see appendix B for more details). The most frequent attributes were classified manually as the accuracy of the cosine similarity method for this classification was not good enough probably because of the numerous categories of the attribute's framework.

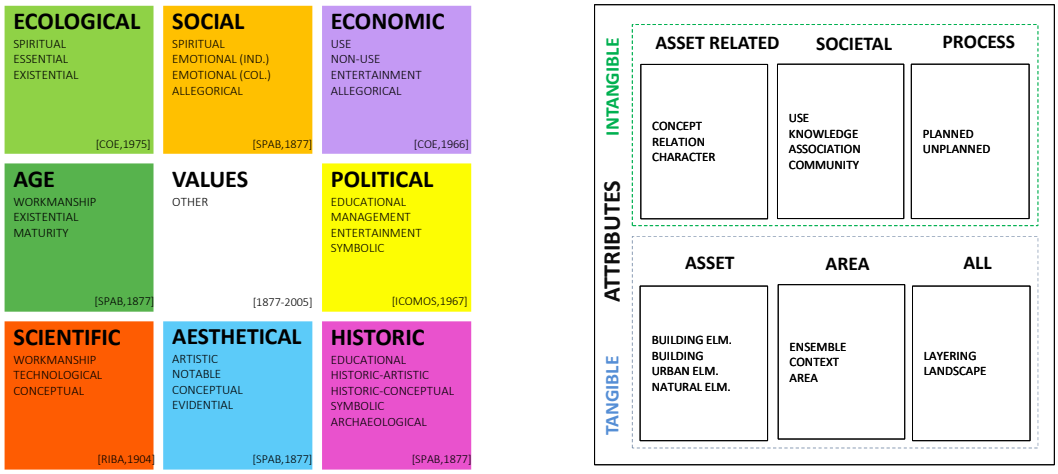

FIG. 3.2 Theoretical frameworks on cultural significance; values (Pereira Roders, 2007) and attributes (Veldpaus, 2015)

3 **Cosine similarity** is one of the most widely used and powerful similarity measures in Data Science. This study uses this method because it does not consider the length of the vector. In other words, the frequency of the word is not taken into account.

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Analysis of feelings

Posts were then analyzed to assess their overall sentiment on five scales, from very positive to very negative. The sentiment analysis was performed using the transformers library to load a pre-trained transformer model, specifically, the BERT model developed by Devlin et al. (2018) and use it to provide the embedding for text. Word embedding encodes the word's meaning so that the terms that are closer in the vector space are expected to be similar in meaning. The embedding fed into the gated recurrent unit (GRU) model to predict sentiment. Despite the algorithmic limitations, the reliability of the results was confirmed (accuracy: 94%, precision_ value: 72%, and F-measure: 77%[4]).

3.3 Results

3.3.1 The Activity of the Interest Groups in the Last Decade

The number of posts and active users increased steadily from 2012 until 2019, with a sudden jump in 2017, the same year when the Historic City of Yazd was inscribed on the UNESCO World Heritage List (see figure 3.3). The numbers dropped drastically in 2020 when the COVID-19 virus spread widely around the world. Still, the numbers of posts and active users in 2020 were higher than in 2016. The average number of posts per year is 496. It is worth noting that Instagram was launched in 2010 and the low number of posts from 2012 until 2014 can be because Instagram was not yet popular.

4 Accuracy : (TruePositives_1 + TruePositives_2)+(TrueNegative_1 + TrueNegative_2) / ((TruePositives_1 + TruePositives_2) + (FalsePositives_1 + FalsePositives_2) +(TrueNegative_1 + TrueNegative_2)+(FalseNegative_1 + FalseNegative_2)Precision_value : (TruePositives_1 + TruePositives_2) / ((TruePositives_1 + TruePositives_2) + (FalsePositives_1 + FalsePositives_2))F-measure : (2 * Precision * Recall) / (Precision + Recall)

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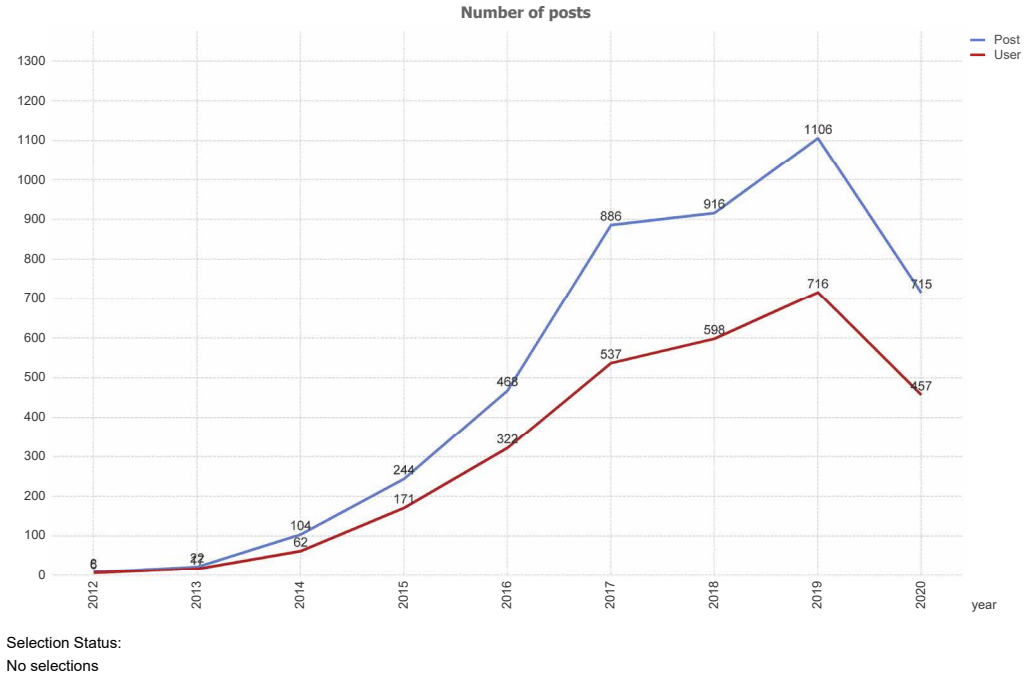

FIG. 3.3 Total number of posts and active users in each year

3.3.2 Cultural Significance Analysis

3.3.2.1 Values of Windcatchers in Yazd

Concerning the cultural significance of the windcatchers in Yazd, and in particular the values, around two-thirds of the posts (66%) conveyed at least one value. The most frequent values are respectively age (26%), historic (18%), social (16%), aesthetical (14%), economic (10%), ecological (8%), scientific (7%), and political (1%). The frequency of all values grows steadily with the growth of posts over time. While the frequency of political (1%) and scientific (7%) values remained quite stable, the other values' frequency changed over time (see Figure 3.4). The historic value reached its maximum (23%) in 2017, then dropped and remained constant in the following years, even if with a higher share than before 2017. In other words, the historic value was discussed more frequently during and after the same

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period of the city's inscription on UNESCO's World Heritage List. On the contrary, the age value declined steadily since 2015, except for 2019. The social value also decreased in 2016 and stayed steady afterward. The aesthetical value grew slowly since 2014 (12%), reaching its peak in 2016 (20%), and then declining slightly in 2020 (to 12%). The economic and ecological values have a lower frequency in 2014 compared to the following years, in which they played a quite constant role, except for a peak in ecological values in 2018 and economic values in 2020.

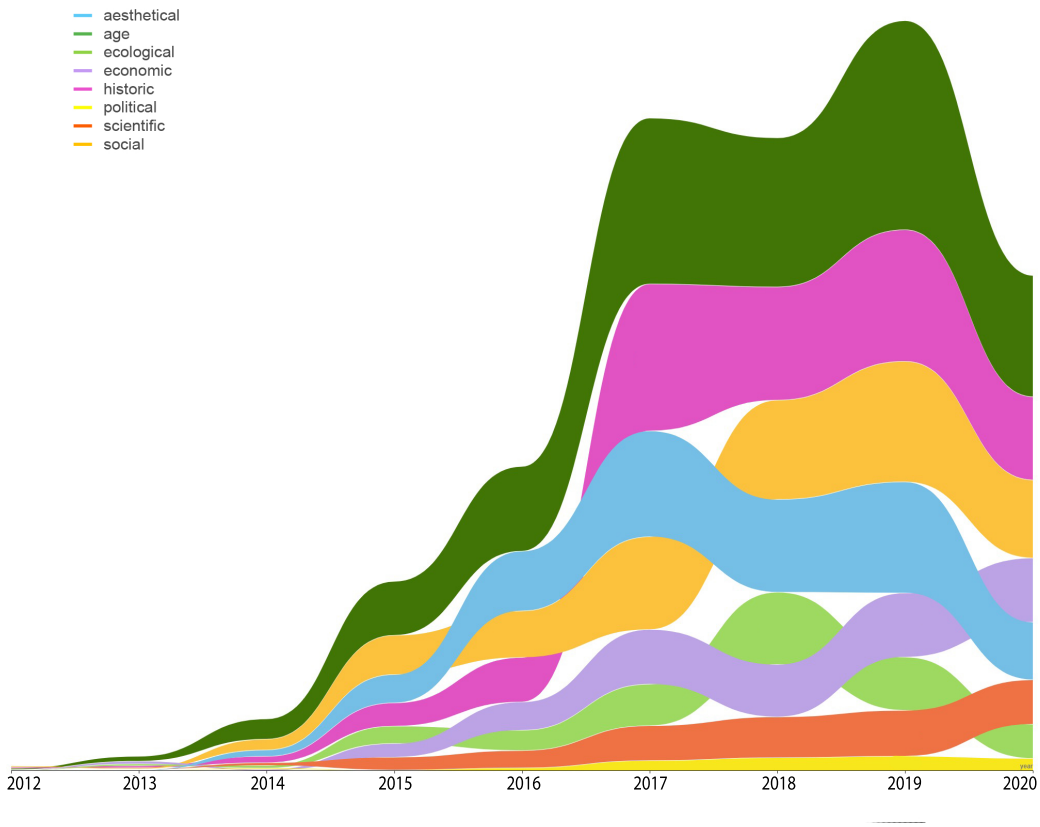

FIG. 3.4 The frequency of values in each year

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Concerning overlaps, both interest groupings (Iranians vs foreigners; general vs tourism professionals) mentioned all eight values, at least one time (see Figure 3.5). Ranging from the age (26%) value as the most referenced, to the scientific (7%) and political (1%) values as the least referenced. However, there are also differences. While Iranians convey historic values the most, foreigners address age and economic values the most (figure 3.6). Besides, while general users convey social and age values the most, tourism professionals convey historic values the most. This might mean that Iranian and tourism professionals are more familiar with (or interested in) historic values.

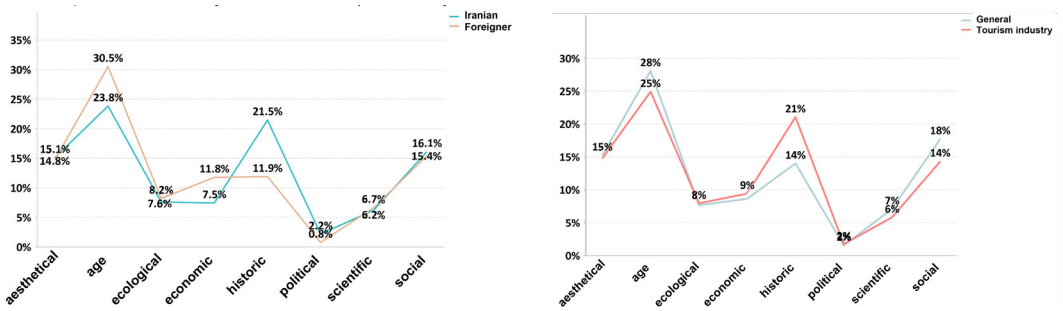

FIG. 3.5 Comparison between the percentages of various values referred by target groups.

3.3.2.2 Attributes of Windcatchers in Yazd

Concerning the cultural significance of the windcatchers of Yazd, and the related attributes in particular (e.g., city, building, architectural element), results reveal that the referenced attributes are mostly tangible. These tangible attributes mostly belong to the asset class, namely the building (house, building, mansion, etc.), the building element (tower, roof, window, etc.), and the natural element (wind, garden, air, etc.). Nonetheless, also intangible attributes are addressed, including architecture and tallest. The intangible attributes mostly belong to the asset-related class, which includes the character (height, size, etc.), concept (architecture, art, etc.), and relation (tallest, small, view, direction, skyline, etc.). Besides, the result shows that users mention these attributes mostly without addressing their values.

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3.3.2.3 Association Between the Values and Attributes

This sub-item explores addressed attributes in connection to windcatchers in terms of the values of those attributes, and the relations between those attributes and windcatchers. The frequency analysis between the values and attributes associated with windcatchers in Yazd revealed two clusters. While the aesthetical, age and historic values of the windcatchers are mostly associated with the “city” scale; the age, ecological, scientific, and economic values are mostly associated with the “building” scale (Figure 3.6).

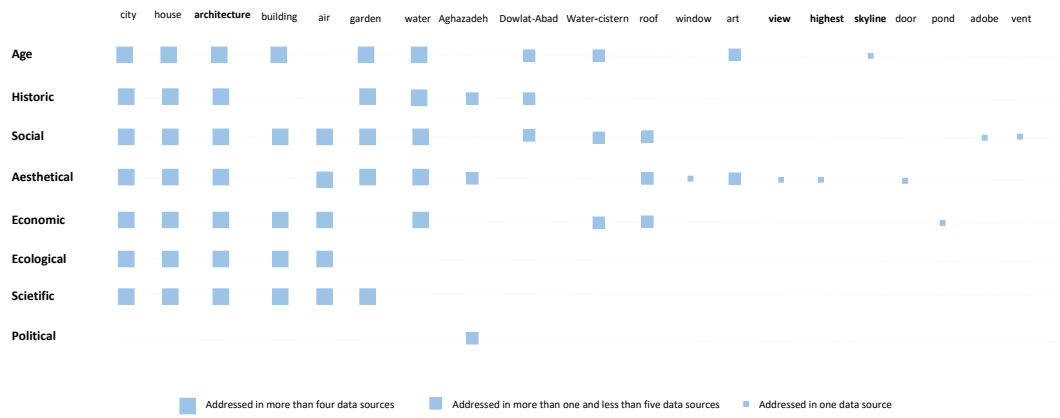

FIG. 3.6 The first 20 frequent attributes associated with categories of values (tangible: normal font style, intangible: bold font style)

Besides, while some of the most frequent attributes are associated with all eight values (city, house, architecture, and wind) except for the political value, there are attributes associated only with one value (view, tallest, skyline, and pond). View and tallest are only mentioned frequently in posts conveying aesthetical value. Skyline and pond are only mentioned frequently in posts respectively assigning age and economic values.

This relation can be more evident when referring to specific posts (Table 1). For example the following post, conveys the aesthetical value of windcatchers concerning the city (Figure 3.7). Respectively, the aesthetical value of windcatchers was found related to the view of the city with its tall windcatchers, while standing on the rooftop of buildings. This can be interpreted from the words “tallest”, “view”, and “roof”, which are among the most frequent attributes, found in posts conveying aesthetical values (see Table 3.1).

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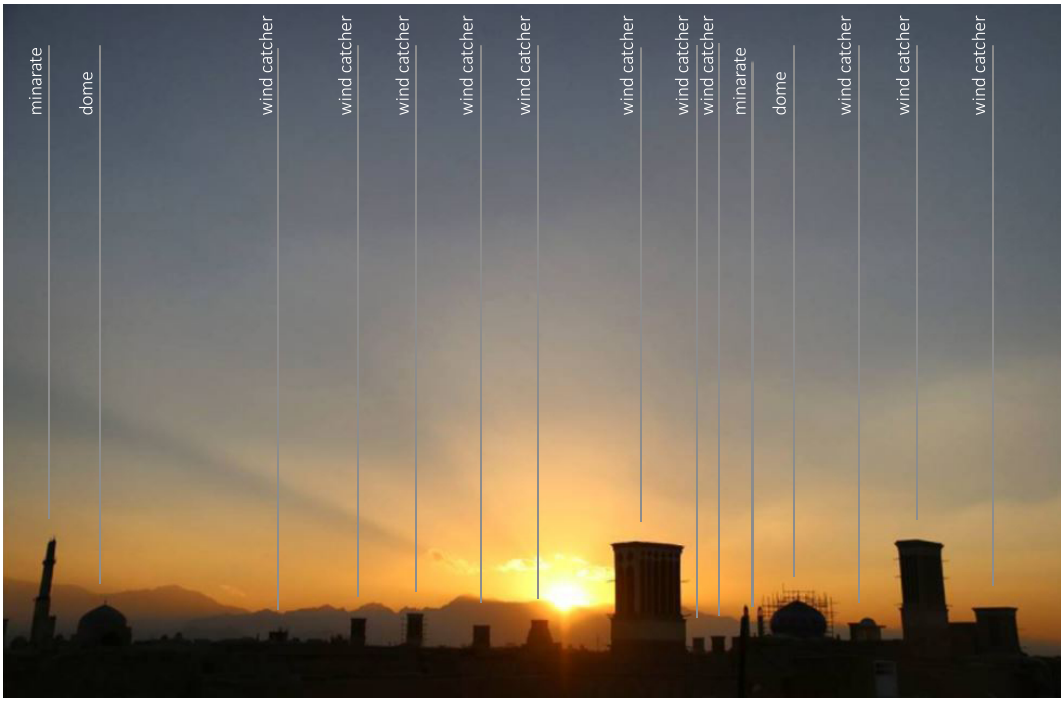

FIG. 3.7 The picture of a post conveying the aesthetical values of windcatchers concerning the city of Yazd, (Adapted from ali. sheibani.en (2016), introducing the lines and description of building elements)

…. Beautiful view of windcatchers and Jame mosque of Yazd with a fall sunset in the background …

TABLE 3.1 Exemplary quotes and conveyed values and attributes.

Exemplary quotes	Values	AI logics	Attributes
We're visiting one of the most beautiful viewpoints in the world! From #arthouseyazd, you can see a panoramic view of #yazd and it's magic #windcatcher and #dome! #tourguide#privatetour #traveltoiran #privateguidedtours	aesthetical	beautiful (aesthetical)	viewpoint, panoramic view, Yazd, windcatcher, dome
On the rooftop in my old city, "Yazd", a wind tower above the roof watching the whole yard & house & city, … Beautiful view!	aesthetical, age	old (age) beautiful (aesthetical)	rooftop, city, Yazd, roof, yard, house, view
Beautiful rooftop view of the old part of Yazd, with all its badgirs (windcatchers) and blue domes.	aesthetical, age	beautiful (aesthetical) old (age)	Rooftop, view, part of Yazd, windcatchers, blue domes
… The traditional wind catchers are visible across the skyline providing natural ventilation for those living inside. …	social, age, ecological, economic	traditional (social, age), natural (ecological), ventilation (economic)	wind catchers, skyline
Aghazadeh Mansion and its windcatcher were built during the Qajar Dynasty and are located in Abarkooh, Iran. The windcatcher in this mansion is one of the most original and beautiful windcatchers in Iran and all over the world.	political, historic aesthetical	Qajar Dynasty (political, historic), beautiful (aesthetical)	Aghazadeh mansion, windcatcher, Abarkooh, original,
… Windcatchers are historic towers that have been built on the roofs of houses in the hot and desert areas of the center of Iran. …	historic	historic (historic)	Windcatchers, towers, roofs of houses
BĀDGĪR(wind-tower), literally "wind catcher," is a traditional structure used for passive air-conditioning of buildings.	social, age, ecological, economic	traditional (social, age), passive (ecological), air-conditioning (economic)	badgir, structure, buildings
… #Badgir is a #traditional #handmade engineering architectural #masterpiece to deal with the unbearable heat of the central #Iranian desert. …	social, age, scientific	traditional (social, age), engineering (scientific)	badgir, engineering, architectural masterpiece

There are two well-known building complexes with windcatchers mentioned frequently in the posts. These are the Aghazadeh mansion in Abarkuh, Yazd (printed in Iranian cash), and Dolat Abad Garden in Yazd (the tallest windcatcher in Iran). They mostly convey aesthetical, historic, and political values (see Table 3.1).

More generally, "home" is frequently stated in posts, when conveying aesthetical and historic values. It indicates that these two values are conveyed to both typical and renowned buildings and confirms its relation to the city as a whole, rather than individual buildings.

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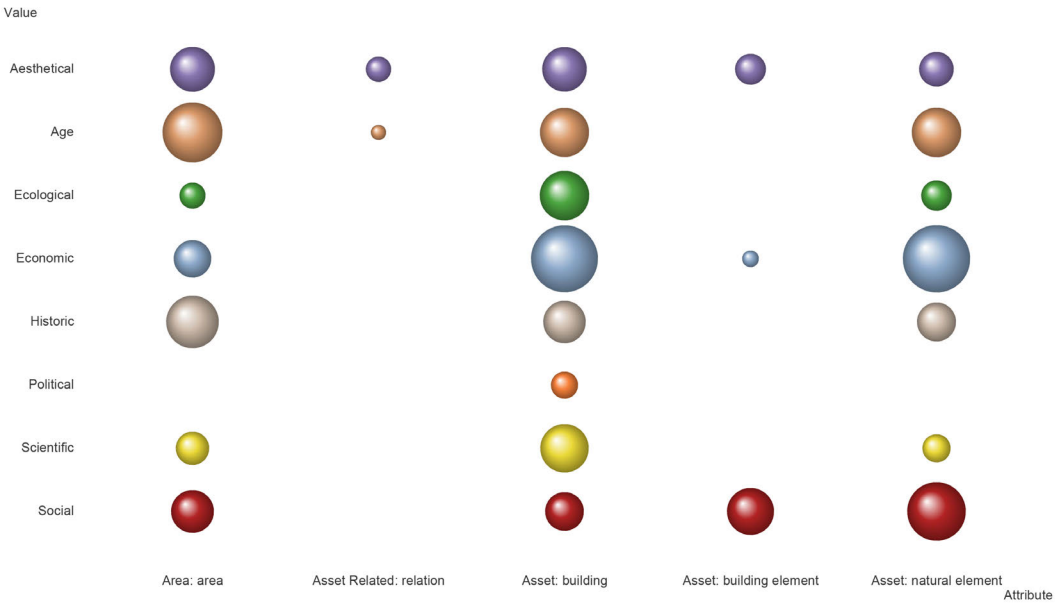

FIG. 3.8 Matrix of categories of values associated with the most frequent categories of attributes. The bigger the sphere, the higher the number of occurrences.

While all categories of values were found conveyed in the collected data, only a few categories of attributes are mentioned (tangible: asset, area; and intangible: asset-related) (see Figure 3.8). Several categories of values and attributes have stronger associations, namely the age value with the area, the social value with the natural elements, and the economic value with the building and the natural elements. Moreover, while all the categories of values have associations with three or four categories of attributes, political value is associated only with the building.

3.3.3 Sentiment Analysis

As mentioned earlier, the sentiment analysis of the posts was conducted on five scales, from very positive to very negative. Very positive and positive posts were the dominant feelings (86%) expressed in the posts written by all the users. The rest of the posts described neutral (14%), and only 14 posts showed negative feelings. This showed a different perception to what some scholars indicate in the literature, that people often use social media to vent out, complain, and generally be pessimistic about urban issues (Resch, Summa, Zeile, & Strube, 2016).

As posts with negative feelings were obscured by posts with positive feelings in the last items of this paper, this item focuses on analyzing posts with negative sentiments. The topics of these posts relate to the conflict over the ownership of windcatchers, the lack of interest in using windcatchers, and worn-out windcatchers.

Some of the posts with negative feelings express their concern about the recent activity of the United Arab Emirates (UAE) and Dubai, which involves using windcatchers. They believe that windcatchers are the symbol of Iranian identity, and the UAE is trying to take ownership of windcatchers:

… But right now some new 49 years old country called "UAE" is constructing copies of the same Iranian wind catchers for its tourism goals and trying to introduce themselves as the first designers and builders of the Iranian ancient wind catchers thanks to their effective global advertisement capabilities and their petro dollars! Can't the @unesco really distinguish the differences between an old country with a very rich history from some new and young small country?!Good people of Iran, please wake up. … (fatemezahramam, 2019; see Figure 3.9, right)

FIG. 3.9 Photos related to posts with negative sentiment, left photo posted by fatemezahramam (2019), right photo posted by dehghani.pic (2016)

Only a few posts were found stating that windcatchers do not play their original function in Yazd anymore and the reasons behind it. This indicates that the residents and users of windcatchers do not use social media to explain their critical perceptions about windcatchers' functions. The demolishment and lack of interest in using windcatchers are discussed in the following posts:

Fahadan house was renovated according to its new function as a hotel. Some of the changes are the following: Given the technological development and invention of ventilation systems, the windcatchers will not be used. Another reason for the lack of interest in using windcatchers is the dramatic change in people's perceptions of thermal comfort. In other words, people prefer to live more comfortably. Another reason for not using windcatchers is climate change. In the past, there were four seasons, but now there are only two seasons: longer and warmer summers and warmer winters than last years. Probably windcatchers can not function properly as a traditional architectural element.

Windcatchers which are gone with the wind (dehghani.pic, 2016; see Figure 3.9, left).

Overall, the result item shows that both Instagram and Twitter users have been actively sharing their perceptions about how windcatchers are significant (or not). This was made possible by decoding their views into values, attributes, and sentiment classification. The values of windcatchers addressed by different groups of users (Iranian/foreigner; general users/tourism professionals) were analyzed using Pereira Roders' framework (2007). General users working in the Tourism profession referred to the historic value most frequently than other users, which might be related to their knowledge and expertise. A more profound analysis was done to investigate the other attributes associated with windcatchers and their values. This analysis showed the importance of the relation between windcatchers and other attributes and their values for the conservation of these attributes in the historic city of Yazd. After, the sentiment analysis showed a dominance of posts with (very) positive sentiments. Complementarily, this paper explored the posts with negative sentiments, showing contrasting perceptions over the values of windcatchers. This research indicates sentiments could be at the core of value formation. If people attach negative sentiments, they probably associate negative values with attributes.

3.4 Discussion and Conclusion

The results depict a drastic jump in the number of posts in 2017 (the year of Yazd's inscription in the UNESCO list) and a drastic drop in 2020 (the beginning of the COVID-19 virus universal pandemic). This shows potential relations between the inscription of Yazd Historic City, Iran, in the UNESCO list and users' activity on social media. It seems that this relation was stronger among tourism professionals as their activity raised in 2017 more than the other users' groups. This might be

because Tourism professionals highlighted the city's inscription to attract tourists to Yazd. The drop in the number of posts of all interest groups in 2020 may be related to the COVID-19 virus pandemic. This decrease was much more among tourism professionals and foreigners compared to general users and Iranians. Given that, probably activities of tourism professionals and foreigners were more associated with tourism issues compared to the other groups. To prove these findings, additional research is necessary.

The main contribution of this paper was to reveal the potential of social media platforms to facilitate public participation in heritage planning processes through the identification and interpretation of cultural significance (values and attributes) and sentiments. Moreover, this research showed the diversity of social media users, making it possible to categorize them into different groups according to their location (Iranian and foreigners) and profession (general and tourism professionals). Additional research is needed to identify the complexity and diversity of social media users.

Machine learning and application of the artificial intelligence method were used to extract values and attributes, as well as sentiments on the posts related to the windcatchers of Yazd. Posts mostly addressed (very) positive sentiments, which showed a different perception to what the literature generally indicates that people mostly use social media to be pessimistic about urban issues. Still, a lack of posts with negative feelings does not mean that people do not attach negative feelings to windcatchers in Yazd. It may convey that people do not express the negative values of windcatchers on Instagram and Twitter.

This analysis reveals that the rate of participation is quite low when compared to the population of Yazd, yet meaningful. A very small portion of people has so far participated in online conversations about windcatchers. But the meaningful observations provided by active participants can contribute valuable insights to the decision-making process concerning windcatcher conservation.

A noteworthy feature of this endeavour lies in the development of a methodological process that can be utilized in various heritage planning case studies and at different scales. The results of the data analysis provided a better understanding of the public voices around heritage values and attributes of windcatchers in Yazd, Iran. The future steps of this research will be to analyze data from other data sources (including academic literature) representing other stakeholders and later facilitate a direct interaction among multiple stakeholders in Yazd, Iran.

While this research illustratess the potential benefits of using AI in recognizing cultural heritage and understanding users' perceptions to promote inclusive heritage planning, it is essential to acknowledge the disadvantages and challenges associated with this approach. These are: 1. Limited Contextual Understanding: AI models, such as multi-label text classification, may struggle to fully grasp the nuanced cultural and historical context of heritage sites. They may miss out on important cultural details that human experts can discern, potentially leading to misinterpretations; 2. Bias in Data: AI models heavily rely on the data they are trained on. If the training data contains biases or lacks diversi-ty, the AI may perpetuate and amplify those biases, potentially overlooking or misrepresenting certain cultural aspects; 3. Inaccuracy in Cultural Significance Assessment: AI models may not always accurate-ly assess the cultural significance of heritage properties. They might misclassify or misinterpret cultural elements, which can lead to incorrect conclusions about their value; 4. Privacy Concerns: When using social media platforms and other information repositories, there are significant privacy concerns re-lated to the collection and analysis of user-generated data. Ensuring the ethical use of such data in AI applications is a critical challenge; 5. Algorithmic Transparency and Accountability: Ensuring transpar-ency and accountability in AI models used for heritage planning is crucial. It can be challenging to ex-plain the decision-making processes of complex AI algorithms to stakeholders, potentially leading to mistrust; 6. Loss of Human Connection: The human aspect of participatory heritage, which involves face-to-face interactions, dialogue, and shared experiences, may be diminished when AI plays a more prominent role.

Future studies in social media data analytics should explore real-time data analysis to promptly inform relevant authorities and the general public about the immediate effects of their actions and necessary interventions. Additionally, expanding the scope of research to include a larger network of authorities in different historic cities would allow for wider dissemination of findings. Preliminary results indicate the potential for passive public participation via social media platforms, enhancing understanding of cultural significance as perceived by online communities. By establishing a broader network, incorporating diverse cities and regions, heritage decision-making can be more responsive and inclusive, considering the concerns and priorities of various stakeholders expressed online. This approach enables explicit online participatory heritage planning that is socially responsible and respects the multitude of voices expressed in the digital realm.

References

Abdul-Rahman, M., Chan, E. H., Wong, M. S., Irekponor, V. E., & Abdul-Rahman, M. O. (2021). A framework to simplify pre-processing location-based social media big data for sustainable urban planning and management. Cities, 109, 102986.

Afzalan, N. and Muller, B., 2014. The role of social media in green infrastructure planning: A case study of neighborhood participation in park siting. Journal of Urban Technology, 21(3), pp.67-83.

Alizadeh, T., Sarkar, S., & Burgoyne, S. (2019). Capturing citizen voice online: Enabling smart participatory local government. Cities, 95, 102400.

Bai, N., Luo, R., Nourian, P., Roders, A. P. (2021). WHOSe Heritage: Classification of UNESCO World Heritage" Outstanding Universal Value" Documents with Smoothed Labels. arXiv preprint arXiv:2104.05547.

Chen, T., Hui, E.C., Wu, J., Lang, W. and Li, X., 2019. Identifying urban spatial structure and urban vibrancy in highly dense cities using georeferenced social media data. *Habitat International*, *89*, p.102005.

Chen, Y., Song, Y. and Li, C., 2020. Where do people tweet? The relationship of the built environment to tweeting in Chicago. Sustainable Cities and Society, 52, p.101817.

Das, S. and Zubaidi, H.A., 2021. City Transit Rider Tweets: Understanding Sentiments and Politeness. Journal of Urban Technology, pp.1-16.

Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2018). Bert: Pre-training of deep bidirectional transformers for language understanding. arXiv preprint arXiv:1810.04805.

El-Diraby, T., Shalaby, A. and Hosseini, M., 2019. Linking social, semantic and sentiment analyses to support modeling transit customers' satisfaction: Towards formal study of opinion dynamics. Sustainable Cities and Society, 49, p.101578.

Giaccardi, E. ed. (2012). Heritage and social media: Understanding heritage in a participatory culture. Routledge.

Ginzarly, M., Roders, A. P., & Teller, J. (2019). Mapping historic urban landscape values through social media. Journal of Cultural Heritage, 36, 1-11.

Kleinhans, R., Ham, M. V., & Evans-Cowley, J. (2015). Using social media and mobile technologies to foster engagement and self-organization in participatory urban planning and neighbourhood governance. Planning Practice & Research, 30(3), 237–247.

Monachesi, P. (2020). Shaping an alternative smart city discourse through Twitter: Amsterdam and the role of creative migrants. Cities, 100, 102664.

Monteiro, V., Painho, M. and Vaz, E., 2015. Is the heritage really important? A theoretical framework for heritage reputation using citizen sensing. Habitat International, 45, pp.156-162.

Panagiotopoulou, M., Somarakis, G. and Stratigea, A., 2020. Smartening up participatory cultural tourism planning in historical city centers. Journal of Urban Technology, 27(4), pp.3-26.)

Pereira Roders, A. (2007). RE-ARCHITECTURE: Lifespan rehabilitation of built heritage, Eindhoven: Eindhoven University of Technology, 2007.

Rodrigues, L., Gillott, M., Waldron, J., Cameron, L., Tubelo, R., Shipman, R., Ebbs, N. and Bradshaw-Smith, C., 2020. User engagement in community energy schemes: A case study at the Trent Basin in Nottingham, UK. Sustainable Cities and Society, 61, p.102187.

Roy, P.K., Kumar, A., Singh, J.P., Dwivedi, Y.K., Rana, N.P. and Raman, R., 2021. Disaster related social media content processing for sustainable cities. Sustainable Cities and Society, 75, p.103363.

Silberman, N., Purser, M. (2012). Collective Memory as Affirmation: People-Centered Cultural Heritage in a Digital Age, in: E Giaccardi (Ed.), Heritage and Social Media, Routledge, London; New York, pp. 13–39.

Tayebi, A. (2013). Planning activism: using social media to claim marginalized citizens' right to the city. Cities, 32, 88-93.

UNESCO, in: Recommendation on The Historic Urban Landscape, UNESCO World Heritage Center, Paris; France, (2011) (http://www.stellenboschheritage. co.za/wp-content/uploads/UNESCO-Historic-Urban-LandscapesRecommendation-Short-Nov2011.pdf; accessed 15 September 2021).

Van der Hoeven, A., 2019. Historic urban landscapes on social media: The contributions of online narrative practices to urban heritage conservation. City, Culture and Society, 17, pp.61-68.

Van Zanten, B. T., Van Berkel, D. B., Meentemeyer, R. K., Smith, J. W., Tieskens, K. F., & Verburg, P. H. (2016). Continental-scale quantification of landscape values using social media data. Proceedings of the National Academy of Sciences, 113(46), 12974-12979.

Veldpaus, L., 2015. Historic urban landscapes: framing the integration of urban and heritage planning in multilevel governance.
Yao, F. and Wang, Y., 2020. Towards resilient and smart cities: A real-time urban analytical and geo-visual system for social media streaming data. Sustainable Cities and Society, 63, p.102448.
Ye, X., Li, S., & Peng, Q. (2021). Measuring interaction among cities in China: A geographical awareness approach with social media data. Cities, 109, 103041.
Yigitcanlar, T., Kankanamge, N. and Vella, K., 2021. How are smart city concepts and technologies perceived and utilized? A systematic geo-Twitter analysis of smart cities in Australia. Journal of Urban Technology, 28(1-2), pp.135-154.

4 Capturing Experts' Voices

Capturing Experts' Voices: Applications of Artificial Intelligence for Heritage Planning

This chapter is based on the following journal paper:
Foroughi, M., de Anderade, B. and Roders, A.P., 2023. Capturing Experts' Voices: Applications of Artificial Intelligence for Heritage Planning. Journal of Cultural Heritage (under revision).

ABSTRACT

Experts have always played an important role in heritage planning, practice, and theory. There is a wealth of literature published every year regarding heritage and its cultural significance. Experts also contribute to heritage planning and developing policy documents. Still, literature is rarely used as a source of primary research to systematically reveal and compare experts' perceptions of the cultural significance of built heritage. Analyzing them as a whole is costly and time-consuming, especially on built heritage, when much has been written about. While the automated methods have proven to mitigate such restrictions in other fields, such as digital humanities, their application in heritage planning is still scarce. Hence, this paper aims to investigate the potential of an AI model in analyzing scientific documents, revealing the cultural significance (values and attributes) of built heritage. This was done to better understand the differences and similarities between the experts' perceptions. Yazd, Iran, is taken as a case study, with a particular focus on windcatchers, a key attribute conveying outstanding universal value due to its inscription on the UNESCO World Heritage List. This paper has three subsequent phases: 1) state of the art on the application of AI in heritage planning; 2) methodology of data collection and data analysis related to coding values and attributes of windcatchers, addressed in relevant documents; 3) preliminary findings on experts' perceptions over values and attributes of windcatchers. Results contribute to the scientific discussion, revealing the cultural significance of windcatchers of Yazd from experts' point of view.

Besides, the potential of AI for heritage planning is revealed in terms of (de) coding and measuring the cultural significance of built heritage from the available documents, showing the perceptions of experts with various backgrounds. This model can be applied to other key attributes in Yazd and other case studies and scales to support heritage planning, practice, and theory.

KEYWORDS expert, cultural significance, value, attribute, text classification, natural language processing

4.1 Introduction

Experts have always been important stakeholders in heritage planning. Most studies considered experts' perceptions using interviews (e.g., Khatami, 2022; D'Alpaos, 2021; Katelieva, et al., 2020; Mushtaha, et al., 2020; O'Dwyer,2020). Only a few studies explored experts' perceptions in a more active and peer review way such as collective mapping, participatory walks, expert meetings (e.g., Gkoltsiou, 2021), and Delphi (D'Alpaos, 2021).

Often, selected experts are involved in heritage planning leading to the restriction of conflictual perceptions and ignoring marginalized groups' perceptions (Sabri, 2019). This is while the necessity of inclusivity has been recognized more than ever in heritage planning (Mirzakhani et al., 2021; Li et al., 2020). The growing number of publications considering wider groups of experts' perceptions of heritage planning has been an indication of this shift.

Nevertheless, literature is barely used directly in heritage planning as a data source on experts' perceptions. Digital tools which could help quickly review the literature, such as Artificial Intelligence (AI), are yet a knowledge gap to be further explored in participatory heritage planning. For example, there is a lack of literature on digital tools targeting the identification of the cultural significance of built heritage, in particular distinguishing and relating heritage attributes and values (Bai et al., 2021).

4.2 Research aim

While artificial intelligence has proven to mitigate such restrictions in other fields, such as digital humanities, their application in heritage planning is still scarce. This paper aims to contribute to this knowledge gap by addressing the following question: What are the values and attributes defining the cultural significance of heritage, according to experts?

To answer this research question, this chapter investigates the potential of AI methods to reveal the perceptions of wide groups of experts about the cultural significance conveyed to heritage using the literature (as a data source). The city of Yazd, Iran, was chosen as a case study, with a particular focus on windcatchers, which are key attributes conveying outstanding universal values, as inscribed on the UNESCO World Heritage List.

4.3 Methodology

The process followed in this research entailed four steps. Accordingly, data acquisition, data pre-processing, data analysis, and results (see Figure 4.1).

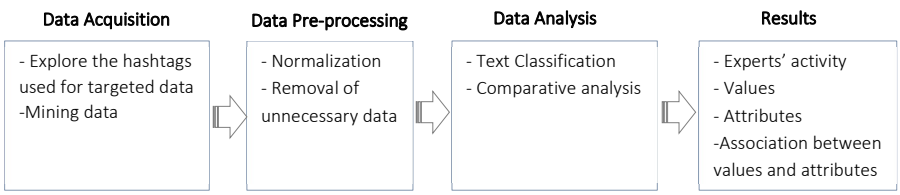

FIG. 4.1 Overview of the methodological framework.

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4.3.1 Data acquisition

Three peer-reviewed academic databases - Scopus, Sciencedirect, and Sid - were taken as data sources. All the literature that referred to windcatchers and Yazd in their title, abstract, or keywords was considered. Papers use different Persian and English terms to refer to windcatchers, namely “badgir”, “wind-catcher”, “windcatcher”, “wind-tower”, “windtower”,بادگیر”. All these terms were included in the search terms. To find more papers, the snowball method was used, using the references of the identified papers (e.g., Vahdatpour and Ariaei, 2020; Asadi et al., 2016). Overall, one book and 94 papers (2 Persian sources and 93 English sources, mostly written by Iranians) were found, including 10 papers inaccessible. All the sentences in these papers addressing windcatchers were extracted to be analyzed. Finally, the sentences that refer to the windcatchers of Yazd (use variants of windcatchers and Yazd) were structured and analyzed.

4.3.2 Data cleaning and pre-processing

All variations of “windcatcher” and “Yazd” were normalized to “windcatcher” and “Yazd” (both in Persian and English e.g., “Yazd”, “yazd”, ”یزد”). Moreover, the text cleaning included the removal of unnecessary data (e.g., stop words, references, punctuation marks, and website links) to facilitate data analysis. After the exclusion, 231 sentences were analyzed.

4.3.3 Data analysis

After data cleaning and pre-processing, the dataset was ready for automatic classification analysis. Each sentence was analyzed and assessed through automatic quantitative content analysis and qualitative categorical analysis. The quantitative analysis revealed the most and least frequent attributes and values in the sum of posts, and, identified patterns of the relation between attributes and values.

Cultural significance analysis. To reveal cultural significance, two theoretical frameworks were used to decode the attributes and values (see Figure 4.2) conveyed in the literature. Conducting a multi-label text classification analysis, using a) the theoretical framework on cultural significance (see appendix B for more details), broken down in values, as developed by Pereira Roders (2007), and b) attributes as developed by Veldpaus (2015). The general analysis of attributes and values was

undertaken using Python libraries, including Numpy (for calculation analysis), Pandas (for research on the data frame), and Bert model (for word embedding). As labels' distribution in the available train dataset was distinct drastically and there were not enough trained datasets available, this research used the cosine similarity method for the multi-label text classification of the heritage values (see appendix B for more details). Despite the algorithmic limitations, the reliability of the results was confirmed (accuracy: 92%, precision_value: 81%, and F-measure: 68%). The cosine similarity method had low reliable results for attribute classification probably because of the numerous categories of the attributes framework. As a result, the most frequent attributes were classified manually.

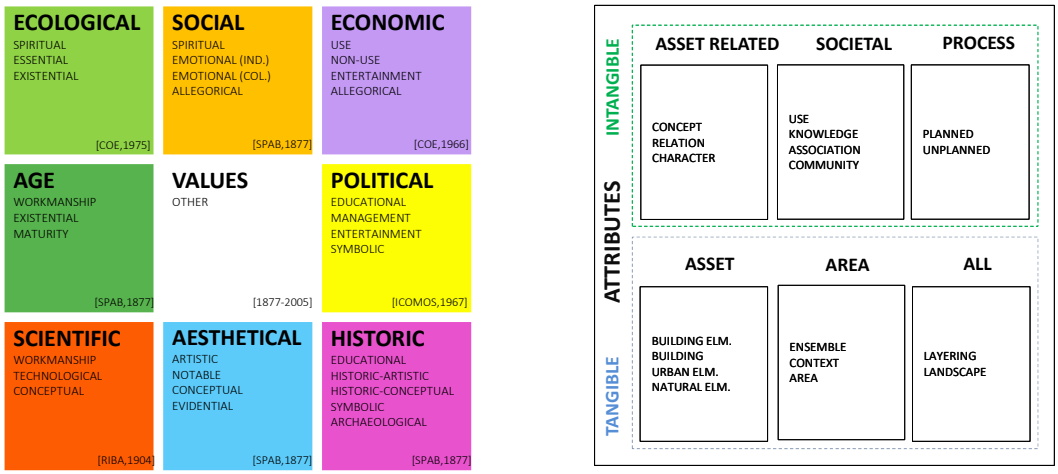

FIG. 4.2 Theoretical frameworks on cultural significance; values (Pereira Roders, 2007) and attributes (Veldpaus, 2015)

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4.4 Results

4.4.1 The activity of the scholars

The literature referencing the windcatchers of Yazd has a time frame for publication from 1978 until 2021. While in some years there were no publications, in other years, namely 2009, 2011 until 2016, and 2021, more than 10 papers were published (see Figure 4.3). Generally compared to the large amount of literature on windcatchers in different contexts (e.g., Alsailani et al., 2021; Esfeh et al., 2012; Bahadori, 1978), the number of literatures on windcatchers of Yazd remains quite limited.

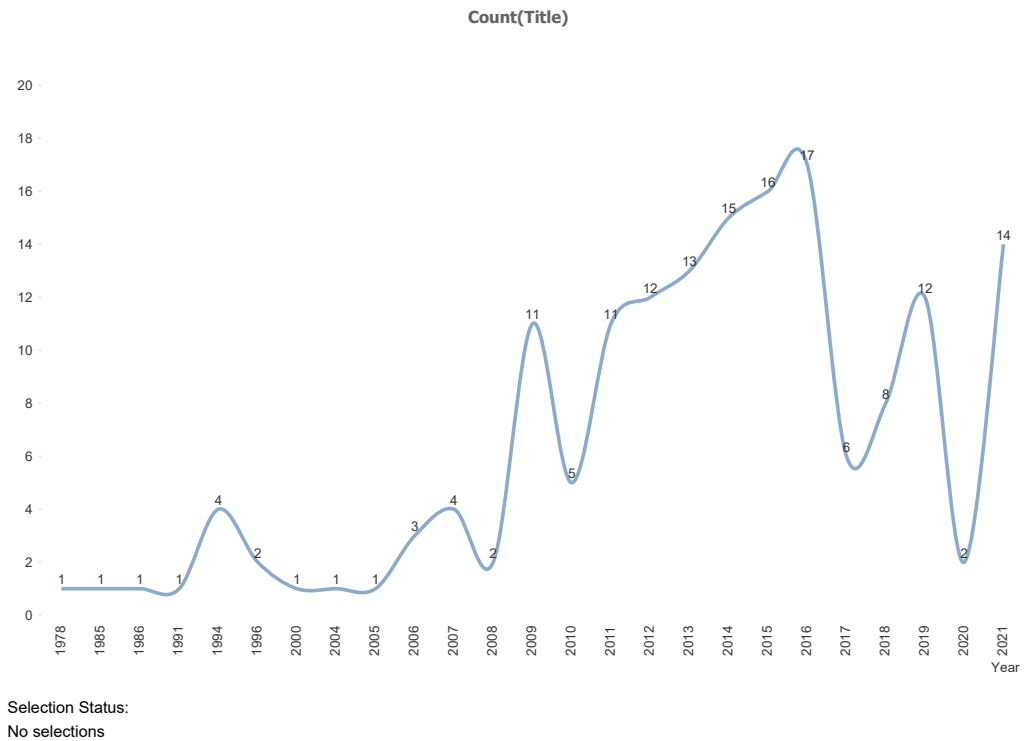

FIG. 4.3 Total number of literatures related to windcatchers of Yazd published in each year.

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4.4.2 Cultural significance analysis

4.4.2.1 Values of windcatchers in Yazd

Concerning the cultural significance of the windcatchers in Yazd, and in particular the values, around two-thirds of the posts (64%) conveyed at least one value. The most frequent values are respectively economic (40%), ecological (19%), scientific (18%), age (7%), social (7%), historic (4%), aesthetical (3%), and political (2%) values (see Figure 4.4). All the values are conveyed in different years and their frequency changes over time except for political and aesthetical values. Political values are only mentioned once in 2013. Aesthetical values are mentioned once in 2005 and seventh times in 2013.

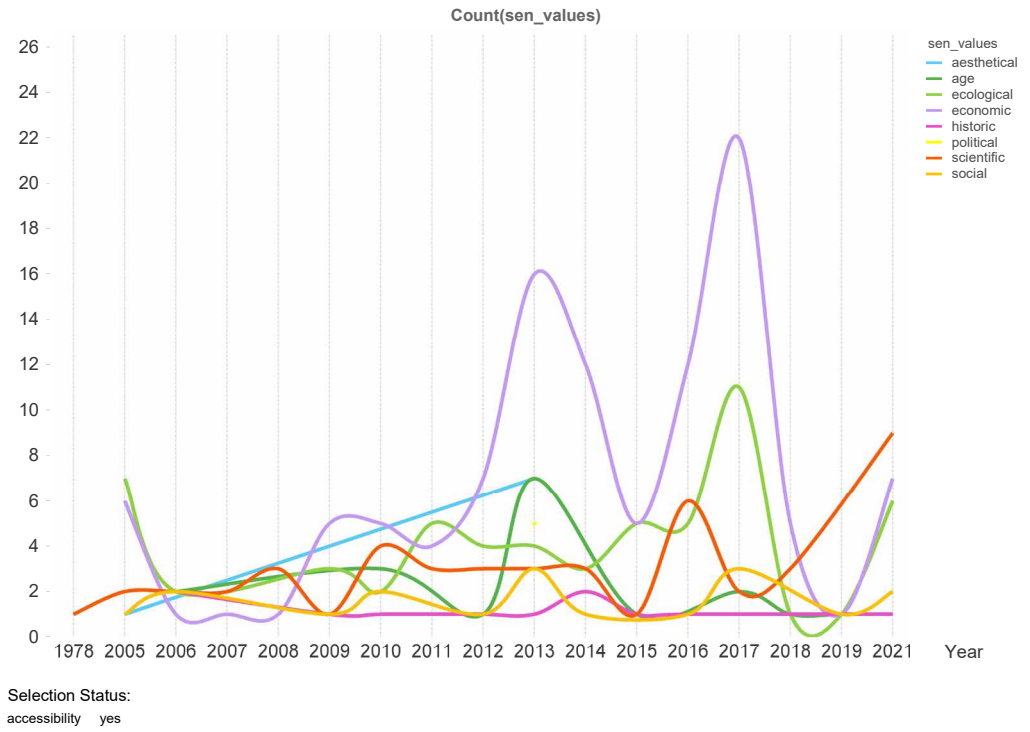

FIG. 4.4 The frequency of values in each year

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4.4.2.2 Attributes of windcatchers in Yazd

Concerning the cultural significance of the windcatchers of Yazd, and related attributes such as city, building, ventilation, and architectural element, results reveal that the tangible attributes were referenced more frequently than the intangible ones (see figure 4.5). These tangible attributes mostly belong to the asset class, namely the building (e.g., house, building, mansion, etc.), the building element (e.g., room, window, wall, floor), and the natural element (garden, etc.).

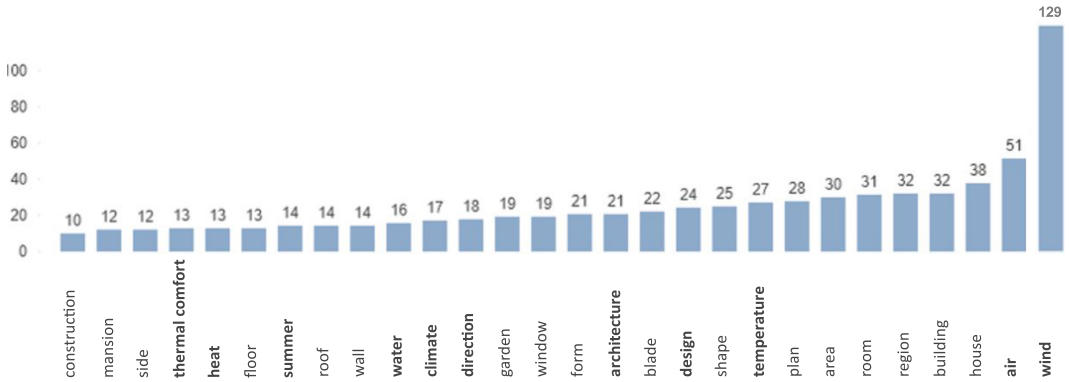

FIG. 4.5 Most frequent attributes within the whole database in decrescent order (tangible: normal font style, intangible: bold font style)

Nonetheless, also intangible attributes were addressed, including architecture and design. The referenced intangible attributes mostly belong to the asset-related class, which includes the character (e.g., temperature, climate, summer, heat, thermal comfort), concept (architecture, design), and relation (e.g., direction). To be more precise, temperature, climate, summer, and heat are natural elements and not attributes but they convey the intangible character of windcatchers. They are used in sentences addressing this intangible character of windcatchers that makes a comfortable micro-climate in hot and arid climates in summer by decreasing the temperature (see Table 4.1).

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TABLE 4.1 Several exemplary quotes conveying intangible attributes.

Highlighted Attribute	Exemplary quote
temperature/ airflow	"One of the main functions of Yazd windcatchers is to create temperature differences and cause airflow in the household. " (Sahebzadeh et al., 2017)
temperature/ climate/ air	"This research revealed that the ancient windcatchers under hot and arid climate conditions, as in the case of the Mortaz house in Yazd, perform by changing the temperature of air in and around the tower. " (Hedayat et al., 2015)
climate	"Intelligence is in agreement with the climate, you can consider it the most specific example of clean energy. " (Maleki & Shabestari, 2010)
heat/air/wind	"Because during the day, if there is wind, then cool air flows faster, and at night, with wind, it may absorb the heat of the walls, because the night wind is cool enough. " (A'zami, 2005)
wind/ heat/flow of air	"Because the prominence of domed roofs means that they are constantly exposed to the flow of air caused by the wind, it is a useful way to reduce the heat of the roof due to severe sun radiation. " (Keshtkaran, 2011)
heat	"The kind of the windcatchers' materials is important because heat transfer and saving energy in the walls of the tower depends on that. " (Kalantar, 2009)
summer	"Viability of wind towers in achieving summer comfort in hot arid regions." (Hejazi & Hejazi, 2014)
water	"This figure shows that, by using the logical amount of water in the evaporating system of the windcatcher, the temperature decreases a lot and the relative humidity increases, both of which are suitable for hot and dry regions of a city like Yazd in Iran." (Kalantar, 2009)

4.4.2.3 Associations between values and attributes of windcatchers in Yazd

This sub-item explores addressed attributes in connection to windcatchers in terms of the values of those attributes, and the relations between those attributes and windcatchers. The frequency analysis between the values and attributes associated with windcatchers in Yazd revealed that the frequency portions of attribute classes are quite similar in different value classes (see Figure 4.9). All of the most frequent attributes are associated with all eight values except for the least addressed values, namely the political and aesthetical values (see Figure 4.6).

Figure 4.7 highlights the relation between values and most frequent attributes, concerning the windcatchers in Yazd. Accordingly, the relation between the cooling character of windcatchers (intangible attribute: asset-related: character) and natural attributes, characterizing the climate of Yazd i.e. wind, air, and water. The case study reveals that cultural significance is revealed as a system of tangible and intangible attributes and values working together to ensure the ventilation of a house and to create a micro-climate (economic value of windcatchers).

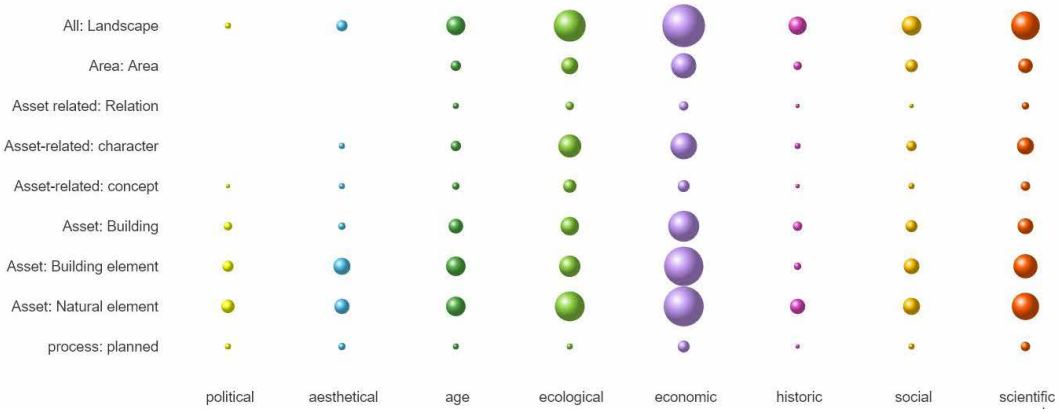

FIG. 4.6 The association between the categories of values and the most frequent attributes

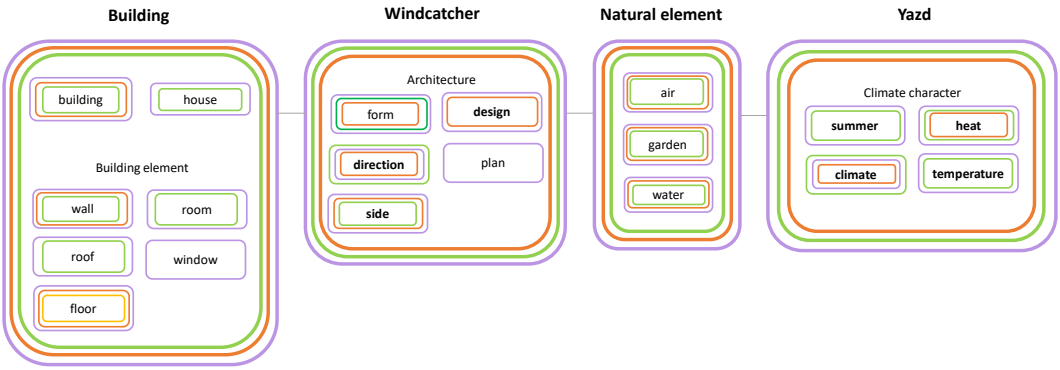

FIG. 4.7 The relation between values and most frequent attributes, concerning the windcatchers in Yazd.

The economic value was revealed in literature as the most important value of windcatchers. However, preserving the economic value is not possible by only preserving the windcatchers without considering all the other related attributes, natural elements, and climate characteristics that play a part in this system. The following examples from the literature shed light on this issue:

*" ... by using the logical amount of **water** in the evaporating system of windcatcher, the **temperature** decreases a lot and the relative humidity increases, both of which are suitable for **hot and dry regions** of a city like Yazd in Iran. ... If the **walls** of the windcatcher are insulated, the **temperature** will decrease more at the exit of the tower, and as a result, there will be a considerable decrease in the usage of **water**" (Kalantar, 2009).*

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*"Since Iran's desert regions have predetermined season **winds** and daily breezes, windcatchers are built in the **direction** of the most pleasurable and strongest **winds**. … They divide the windcatchers column s interior into 4, 6, or 8 diagonal brick partitions in a way that from whichever **direction wind** blows down, in the opposite direction, the **wind** is sucked out" (Maleki & Shabestari, 2010).*

4.5 Discussion and Conclusion

This research confirmed the assumed benefit of analyzing larger literature systematically with support of artificial intelligence models, to identify and interpret the cultural significance (values and attributes) of heritage. It confirmed the relations between diverse attributes and values associated with the windcatchers of Yazd. The research illustrated the importance of considering a system of relations of one attribute/value with other attributes/values, rather than researching them in isolation.

Machine learning and application of the artificial intelligence method were used to extract values and attributes related to the windcatchers of Yazd. Literature mainly addresses the economic, ecological, and scientific values of windcatchers. Besides, the most frequent attributes were related to the cooling character of windcatchers, including natural attributes, that characterize the climate of Yazd, and tangible attributes, that characterize the building.

This research contributes to raising the voice of experts as a group by making a wider image of experts' complimentary perceptions. This approach avoids neglecting elements in the system of values and attributes that are highly related to each other by highlighting values and attributes mentioned by different experts. Still, there are values and attributes which are barely mentioned in the analyzed literature, for instance, the importance of the windcatcher's height on an urban scale as a main landmark in Yazd, which may be referenced by other stakeholders.

An innovative aspect of this work consists in the methodology developed, which can be applied to other case studies and different scales in heritage planning. The results of the data analysis provided a better understanding of the experts' perceptions of heritage values and attributes of windcatchers in Yazd, Iran. Future research is to analyze data from other sources (e.g., policy documents) representing other stakeholders, and later facilitating a direct interaction among multiple stakeholders in Yazd, Iran.

While this research investigates AI-empowered tools for the recognition of cultural heritage and gaining insights into experts' perspectives to facilitate more inclusive heritage planning, it is imperative to recognize and address the drawbacks and obstacles associated with this approach. These challenges encompass: 1. Limited Contextual Comprehension: AI models, such as those employed in multi-label text classification, might encounter difficulties in fully grasping the intricate cultural and historical context surrounding heritage sites. Consequently, they could overlook critical cultural intricacies that human experts are adept at discerning, potentially leading to misinterpretations. 2. Data Bias: The performance of AI models heavily depends on the data they are trained on. If the training data incorporates biases or lacks diversity, AI systems may inadvertently perpetuate and amplify those biases, potentially neglecting or misrepresenting certain cultural facets. 3. Cultural Significance Assessment Inaccuracy: AI models may not consistently provide accurate assessments of the cultural significance of heritage properties. They may make errors in classifying or interpreting cultural elements, resulting in inaccurate conclusions regarding their value. 4. Data Source Concerns: The utilization of available data repositories for collecting and analyzing user-generated data can lead to ignoring the less represented groups. In this study, academic experts were studied because information repositories representing the perceptions of other experts, including practitioners, could not be found.. 5. Algorithmic Transparency and Accountability: Ensuring transparency and accountability in the AI models employed for heritage planning is of utmost importance. Explaining the decision-making processes of complex AI algorithms to stakeholders can be a daunting task, potentially giving rise to mistrust.

In light of the limitations identified in this research, future studies should prioritize refining AI models to better comprehend heritage nuances, mitigating bias through diverse data curation, enhancing cultural significance assessment accuracy, incorporating a broader range of expert perspectives, and developing transparent tools to explain AI decision-making processes. These efforts are crucial for harnessing AI's potential in cultural heritage recognition and heritage planning while ensuring reliability and inclusivity in the process.

References

Ahmadikia, H., Moradi, A. and Hojjati, M., 2012. Performance analysis of a wind-catcher with water spray. International journal of green energy, 9(2), pp.160-173.

Alsailani, M., Montazeri, H. and Rezaeiha, A., 2021. Towards optimal aerodynamic design of wind catchers: Impact of geometrical characteristics. Renewable Energy, 168, pp.1344-1363.

Asadi, S., Fakhari, M. and Sendi, M., 2016. A study on the thermal behavior of traditional residential buildings: Rasoulian house case study. Journal of Building Engineering, 7, pp.334-342.

Bahadori, M.N., 1978. Passive cooling systems in Iranian architecture. Scientific American, 238(2), pp.144-155.

A'zami, A., 2005. Badgir in traditional Iranian architecture.

D'Alpaos, C. and D'Alpaos, A., 2021. The Valuation of Ecosystem Services in the Venice Lagoon: A Multicriteria Approach. Sustainability, 13(17), p.9485.

Dehghani-sanij, A.R., Soltani, M. and Raahemifar, K., 2015. A new design of wind tower for passive ventilation in buildings to reduce energy consumption in windy regions. Renewable and Sustainable Energy Reviews, 42, pp.182-195.

Esfeh, M.K., Dehghan, A.A., Manshadi, M.D. and Mohagheghian, S., 2012. Visualized flow structure around and inside of one-sided wind-catchers. Energy and Buildings, 55, pp.545-552.

Gkoltsiou, A. and Mougiakou, E., 2021. The use of Islandscape character assessment and participatory spatial SWOT analysis to the strategic planning and sustainable development of small islands. The case of Gavdos. Land use policy, 103, p.105277.

Hedayat, Z., Belmans, B., Ayatollahi, M.H., Wouters, I. and Descamps, F., 2015. Performance assessment of ancient wind catchers-an experimental and analytical study. Energy procedia, 78, pp.2578-2583.

Hedayat, Z., Belmans, B., Ayatollahi, M.H., Wouters, I. and Descamps, F., 2017. Wind energy and natural ventilation potential of a wind catcher in Yazd–Iran (a long-term measurement). International Journal of Green Energy, 14(7), pp.650-655.

Hejazi, B. and Hejazi, M., 2014. Persian wind towers: Architecture, cooling performance and seismic behaviour. International Journal of Design & Nature and Ecodynamics, 9(1), pp.56-70.

Kalantar, V., 2009. Numerical simulation of cooling performance of wind tower (Baud-Geer) in hot and arid region. Renewable Energy, 34(1), pp.246-254.

Katelieva, M., Muhar, A. and Penker, M., 2020. Nature-related knowledge as intangible cultural heritage: Safeguarding and tourism utilisation in Austria. Journal of Tourism and Cultural Change, 18(6), pp.673-689.

Keshtkaran, P., 2011. Harmonization between climate and architecture in vernacular heritage: A case study in Yazd, Iran. Procedia Engineering, 21, pp.428-438.

Khatami, S.M. and Boujari, P., 2022. Analyzing the heritage of Tehran's urban façades in the recent century. City, Territory and Architecture, 9(1), pp.1-15.

Maleki, B.A. and Shabestari, A.F., 2010. Optimization of 'Badgir (wind tower)'in Iranian hot-arid region architecture. In Proceedings of Conference on Technology & Sustainability in the Built Environment.

Mostafaeipour, A., Bardel, B., Mohammadi, K., Sedaghat, A. and Dinpashoh, Y., 2014. Economic evaluation for cooling and ventilation of medicine storage warehouses utilizing wind catchers. Renewable and Sustainable Energy Reviews, 38, pp.12-19.

Movahed, K., 2016, August. Badgir (wind catcher) an example of traditional sustainable architecture for clean energy. In 2016 IEEE Smart Energy Grid Engineering (SEGE) (pp. 79-83). IEEE.).

Mushtaha, E., Shamsuzzaman, M., Abdouli, S.A., Hamdan, S. and Soares, T.G., 2020. Application of the analytic hierarchy process to developing sustainability criteria and assessing heritage and modern buildings in the UAE. Architectural Engineering and Design Management, 16(5), pp.329-355.

O'Dwyer, N., Young, G.W., Johnson, N., Zerman, E. and Smolic, A., 2020, July. Mixed reality and volumetric video in cultural heritage: Expert perceptions of augmented and virtual reality. In International conference on human-computer interaction (pp. 195-214). Springer, Cham.

Sabri, R. and Olagoke, O.A., 2019. Predicaments in the management of religious heritage buildings and sites in Nigeria. Conservation and Management of Archaeological Sites, 21(1), pp.45-65.

Sahebzadeh, S., Heidari, A., Kamelnia, H. and Baghbani, A., 2017. Sustainability features of Iran's vernacular architecture: A comparative study between the architecture of hot–arid and hot–arid–windy regions. Sustainability, 9(5), p.749.

Vahdatpour, S. and Ariaei, A.R., 2020. Effect of Air-Shaft Partition Walls' Arrangement on Structural Behaviour and Construction Technology of Wind Catchers in Iran. Journal homepage: http://iieta. org/journals/ijdne, 15(6), pp.793-803.

5 Capturing Policy-makers' Voices

Unveiling Cultural Significance Conveyed in Policy Documents: Applications of Artificial Intelligence in Heritage Planning

This chapter is based on the following journal paper:
Foroughi, M., de Anderade, B. and Roders, A.P., 2023. Unveiling Cultural Significance Conveyed in Policy Documents: Applications of Artificial Intelligence in Heritage Planning. Journal of Cultural Heritage (under revision).

ABSTRACT The cultural heritage planning process is slowly changing. The focus is shifting from built heritage as a whole, to the cultural significance (values and attributes) that such heritage property conveys and how to best conserve it. As such, identifying and revealing the cultural significance is recommended as a key step in supra-national policies on heritage planning and management. Policy documents at national and sub-national levels seldom detail cultural significance, in attributes and values. Although there is increasing research on disclosing and assessing cultural significance from various resources, there is little research systematically revealing and comparing the cultural significance of built heritage conveyed in policy documents. Analyzing policies is costly and time-consuming, especially on built heritage, with such a large and diverse dataset. While automated methods have proven to mitigate such restrictions in other fields, such as digital humanities, their application to heritage planning, practice, and theory is still scarce. Hence, this paper aims to investigate the potential of Artificial Intelligence (AI) in analyzing policy documents, to reveal (a) the cultural significance of built heritage and (b) the differences and similarities between them. The city of Yazd, Iran, is taken as a case study. This research focuses on the windcatchers, a key attribute conveying

cultural significance, of outstanding universal value, due to the partial inscription of Yazd on the UNESCO World Heritage List. This paper has two subsequent phases: 1) methodology of data collection and data analysis related to coding values and attributes of windcatchers; 2) preliminary findings on the values and attributes conveyed in policy documents. Results confirm the potential of AI for heritage planning to (de) code and measure the cultural significance of built heritage from policy documents. This methodology could be applied to other key attributes in Yazd and other case studies to support heritage planning, practice, and research. This research also makes recommendations for better clarification of values and attributes conveying the cultural significance of built heritage in heritage planning and policies.

KEYWORDS cultural significance, heritage, policy document, Outstanding Universal Value

5.1 Introduction

In the last decades, the cultural heritage planning process has been gradually changing. The focus is less set on the management of the heritage properties as a whole, but on the motivation (cultural significance) behind listing the asset as cultural heritage (Silva & Pereira Roders, 2012). Cultural significance includes the resources that ought to be listed as heritage (attributes) and the reasons that these resources are listed as heritage (values). Statements of (Cultural) Significance (SoS) were recommended to become the key documents in heritage planning (ICOMOS Australia, 1999). These statements of Outstanding Universal Values (OUV) became mandatory for properties that are nominated to be listed in UNESCO (UNESCO, 2005), named the Statement of Outstanding Universal Value (OUV) (UNESCO, 2008).

Although the cultural significance of heritage properties is described in various sub-national, national, and supra-national policy documents, there is seldom a defined list of values and attributes to be protected. Consequently, various policy documents may address very different attributes and values. This can risk jeopardizing the conservation of significant attributes and values. For example, mostly there are sub-national and national cultural significance not acknowledged as supra-national policy documents (including OUV), but greatly valued by domestic visitors and inhabitants (Dai et al., 2021).

Concerning the vital role of supra-national besides sub-national and national policy documents in heritage planning, clarifying the cultural significance conveyed in all these levels should be facilitated in the heritage planning system (Dai et al., 2021). Under this approach, heritage managers can strategize with a more comprehensive knowledge base for enhancing heritage conservation.

Theoretical frameworks that classify attributes and values contribute to clarifying the heritage properties' cultural significance (e.g., eight primary values: Pereira Roders, 2007; six primary attributes: Veldpaus, 2015). Besides, scholars applied different methods to elicit, asses, or/and classify heritage properties' cultural significance from various documents (e.g., Tuan et al.,2009; Ferretti et al., 2014; Xiao et al., 2023). These frameworks and methods contribute to heritage planning and assessment, decreasing the risk of jeopardizing the conservation of heritage properties and their cultural significance.

Still, eliciting and classifying the addressed attributes and values from policy documents for each heritage property with the proposed manual methods can be a difficult mission as this is time-consuming and costly. However, AI has proven to partly mitigate such restrictions in other fields, such as digital humanities (Smithies & Smithies, 2017) where AI-powered tools have facilitated faster and more extensive data analysis.

Research aim

As there is a lack of literature on digital tools targeting the identification of the cultural significance of built heritage, in particular distinguishing and relating heritage attributes and values (Bai et al., 2021), this research aims to contribute to this knowledge gap by addressing the following question: What are the values and attributes defining the cultural significance of heritage, according to the policymakers?

To answer the research question, this research investigates the potential of AI methods to compare three different levels of policy documents revealing, analyzing, and comparing cultural significance conveyed to heritage in the policy documents. The city of Yazd, Iran, was chosen as a case study, with a particular focus on windcatchers, one of the key attributes conveying outstanding universal value, as inscribed on the UNESCO World Heritage List (UNESCO, 2017).

Method

The process followed in this research included four steps. Accordingly, data collection, data pre-processing, data analysis, and results (see Figure 5.1).

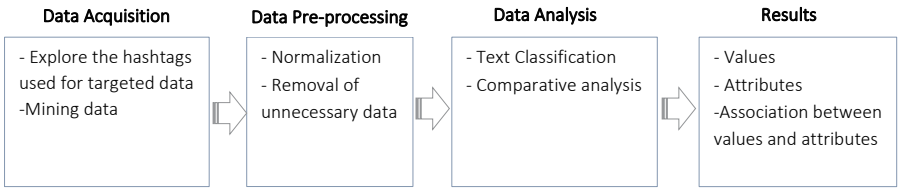

FIG. 5.1 Overview of the methodological framework.

5.1.1 Data collection

All sub-national, national, and supra-national policy documents related to the city of Yazd addressing windcatchers in any part of the whole document were collected as data sources. Overall, seven documents were used as datasets: three sub-national, one national, and three supra-national policy documents (table 5.1). All the paragraphs in these documents addressing windcatchers were elicited, structured, and analyzed.

TABLE 5.1 The policy documents and their classification analyzed and compared in this paper.

supra-national policy documents	National policy documents	sub-national policy documents
Nomination Report of The Historic City of Yazd for UNESCO, Outstanding Universal Value, ICOMOS Report on The Historic City of Yazd	Nomination Report of Windcatchers for National Heritage List	Detailed Master Plan of The City of Yazd, Conservation Plan of the Historic City of Yazd, Strategic Plan of the Historic City of Yazd

5.1.2 Data pre-processing

All variations of the key term, windcatcher, were normalized to “windcatcher” (both in Persian and English). Text cleaning was also conducted by removal of unnecessary data (e.g., stop words, references, punctuation marks, and website links) to facilitate data analysis.

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5.1.3 Data analysis

After data pre-processing, the dataset was ready for automatic classification analysis. Each paragraph was analyzed and assessed through automatic quantitative content analysis and automatic and manual qualitative categorical analysis. Through the qualitative categorical analysis, the classes of values and attributes addressed in the paragraphs were revealed. The quantitative analysis showed the most and least frequent attributes and values in all the documents and later identified the relations between attributes and values.

5.1.3.1 Cultural significance analysis

Two theoretical frameworks were used to decode attributes and values (see appendix A for more details): a) values developed by Pereira Roders (2007), and b) attributes developed by Veldpaus (2015) (see Figure 5.2). The analysis was conducted using various Python libraries, including Numpy (for calculation analysis), Pandas (for research on the data frame), and Bert model (for word embedding). As labels' distribution in the available training dataset was distinct drastically and there were not enough trained datasets available, this research applied the cosine similarity method for the multi-label text classification to reveal the values (see appendix B for more details).

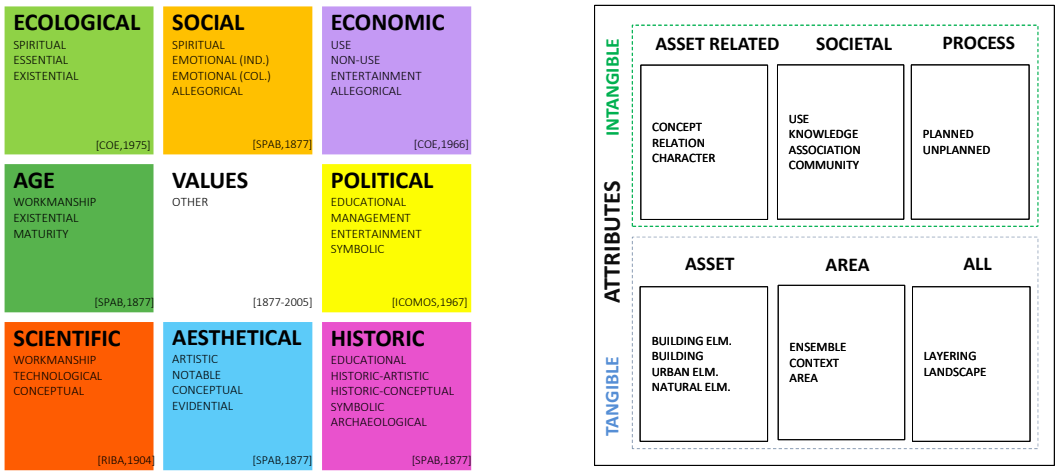

FIG. 5.2 Theoretical frameworks on cultural significance; values (Pereira Roders, 2007) and attributes (Veldpaus, 2015)

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Cosine similarity is one of the most widely used and powerful similarity measures in data science (Li & Han, 2013). The reliability of the results was tested based on accuracy, precision values, and F-measure. The cosine similarity method had low reliable results for attribute classification probably because of the numerous categories of the attributes framework. As a result, the most frequent attributes were classified manually.

5.2 Results

The reliability of the multi-label text classification model used to analyze the values was confirmed (accuracy[5]: 95%, precision value[6]: 78%, and F-measure[7]: 84%).

5.2.1 Cultural significance analysis

5.2.1.1 Values of windcatchers in Yazd

Concerning the cultural significance of the windcatchers in Yazd, and in particular the values, all the policy documents address at least four values, namely economic, ecological, historic, and age. Overall, the most frequent values are respectively economic (21%), ecological (17%), aesthetical (14%), historic (14%), age (12%), social (11%), scientific (7%), and political (4%) values (see Figure 5.3).

5 **Accuracy**: (TruePositives_1 + TruePositives_2)+(TrueNegative_1 + TrueNegative_2) / ((TruePositives_1 + TruePositives_2) + (FalsePositives_1 + FalsePositives_2) +(TrueNegative_1 + TrueNegative_2)+(FalseNegative_1 + FalseNegative_2)

6 **Precision value**: (TruePositives_1 + TruePositives_2) / ((TruePositives_1 + TruePositives_2) + (FalsePositives_1 + FalsePositives_2))

7 **F-**measure: (2 * Precision * Recall) / (Precision + Recall)

Still, the frequency of addressed values differs in various policy documents (see Figure 5.4). sub-national policy documents (namely Strategic Plan of the Historic City of Yazd, Conservation Plan of the Historic City of Yazd, and Detailed Master Plan of The City of Yazd) address aesthetical and political values more than national and supra-national policy documents, but the social value is addressed the least by these documents. The national policy document (Nomination Report of Windcatchers for the National Heritage List) conveys the least historic and aesthetical values, but economic and scientific values are above average, compared to the other documents. Lastly, the supra-national policy documents (namely ICOMOS Report on The Historic City of Yazd, Outstanding Universal Value, and Nomination Report of The Historic City of Yazd for UNESCO) address historic values more than the other documents.

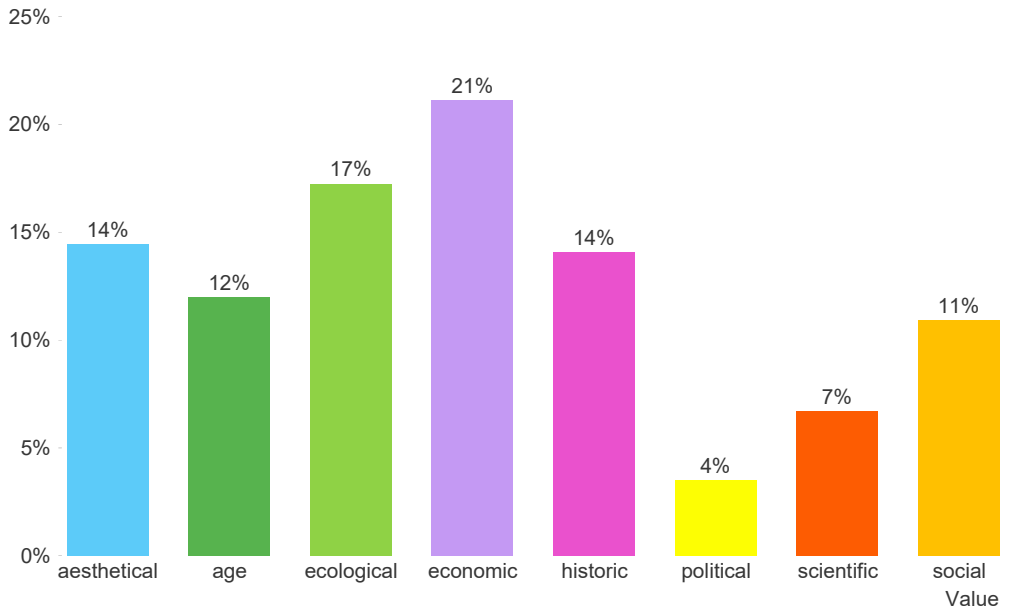

FIG. 5.3 The frequency percentage of values mentioned in all the policy documents.

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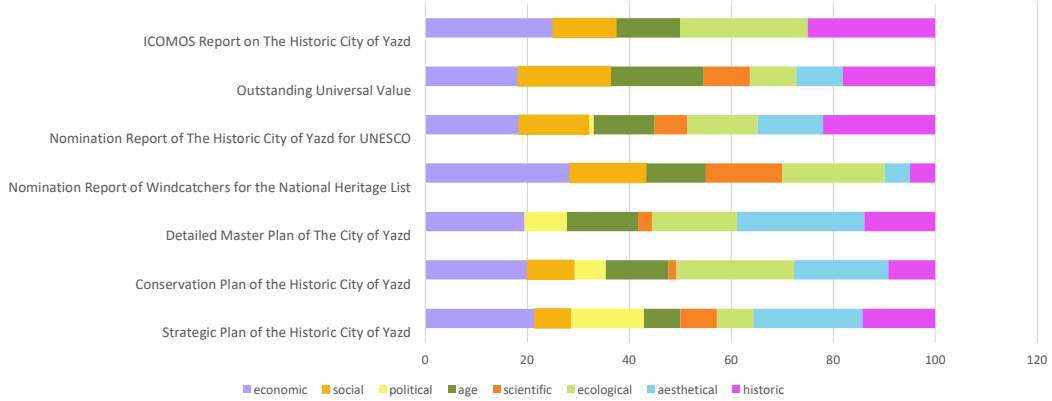

FIG. 5.4 The frequency of values mentioned in the policy documents.

5.2.1.2 Attributes of windcatchers in Yazd

Concerning the cultural significance of the windcatchers of Yazd, and related attributes such as city, building, ventilation, and architectural element, results reveal that the tangible attributes were referenced more frequently than the intangible ones (see Figure 5.5). These tangible attributes mostly belong to the asset class, namely the building (e.g., building, house, mosque, mansion, etc.), the building element (e.g., window, brick, room, roof), and the natural element (e.g., garden, courtyard).

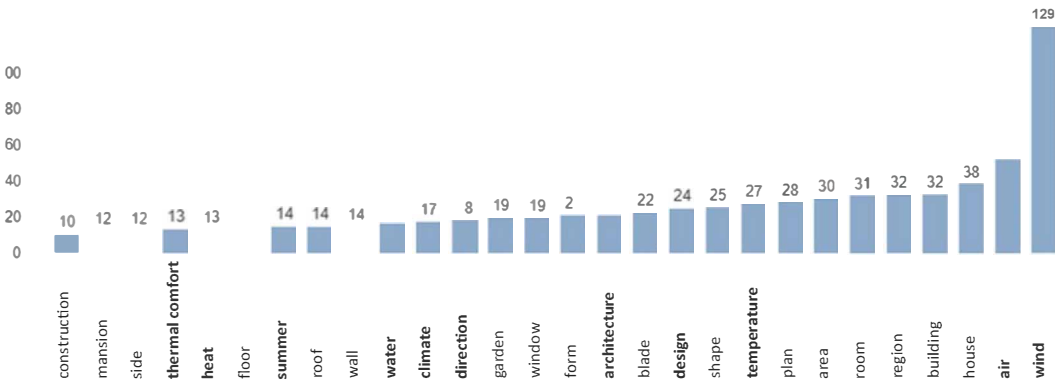

FIG. 5.5 Most frequent attributes within the whole database in decrescent order (tangible: normal font style, intangible: bold font style)

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Nonetheless, also intangible attributes were addressed, including skyline and design. The referenced intangible attributes mostly belong to the asset-related class, which includes the character (e.g., summer, heat, climate), concept (e.g., design), and relation (e.g., skyline). To be more precise, summer, heat, and climate are natural elements and not attributes but they enable the intangible character of windcatchers. They are used in sentences to express the windcatchers' intangible attribute that makes a comfortable micro-climate in hot and arid climates in summer by decreasing the temperature.

5.2.1.3 Associations between values and attributes of windcatchers in Yazd

This sub-item explores addressed attributes in connection to windcatchers in terms of the values of those attributes, and the relations between those attributes and windcatchers. The frequency analysis between the values and attributes associated with windcatchers in Yazd revealed that the frequency portions of attribute classes are quite similar in different value classes. All of the most frequent attributes are associated with all eight values except for the least addressed value: political (see figure 5.6). The cooling character of windcatchers (intangible attribute: asset-related: character) has a stronger association with ecological and economic values. The following examples from the literature shed light on this issue:

"Criterion v: …. Yazd is an outstanding example of a traditional human settlement which is representative of the interaction of man and nature in a desert environment that results from the optimal use and clever management of the limited resources that are available in such an arid setting. …" (OUV, 2017)

"Windcatchers are structures that have been used in countries with warm, dry, and humid climate for centuries in order to cool the buildings. In fact, the main function of the windcatchers is guiding the natural airflow into the inside of the buildings to relatively cool the houses and workplaces in different cities and areas. Windcatchers are used in Iran due to its climate and architecture style, especially in the southern and central deserts." (Nomination Report of Windcatchers for the National Heritage List)

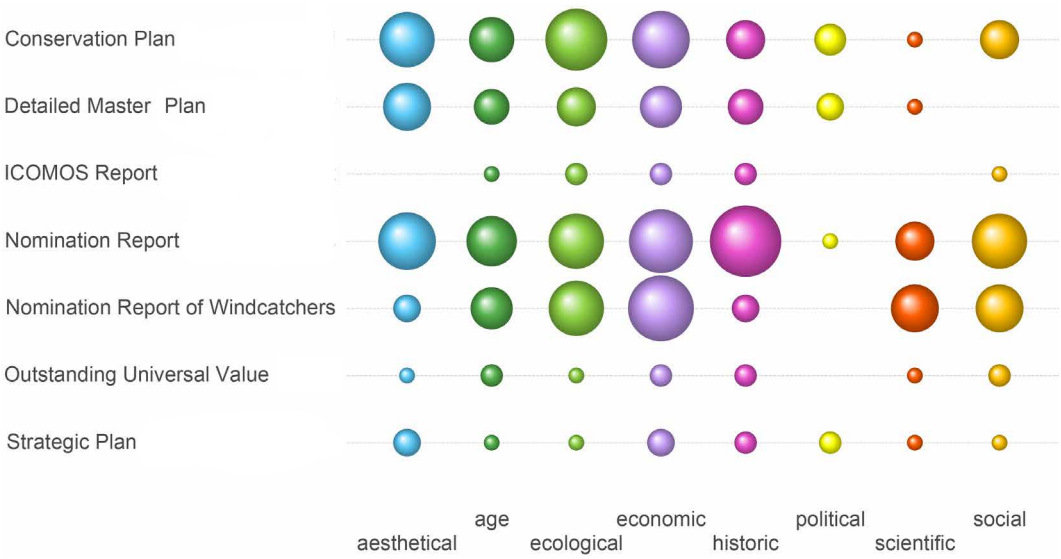

FIG. 5.6 The frequecy of the categories of values in each data sources

Figure 5.7 highlights the relation between values and most frequent attributes, concerning the windcatchers in Yazd. The policy documents not only convey windcatchers' various values but also illustrate the relation between these values and related attributes. The case study reveals that cultural significance is a system of tangible and intangible attributes and values working together. For example, some tangible and intangible attributes work together with windcatchers to ventilate the air in a building and to create a micro-climate, also to protect the building from earthquakes (economic value of windcatchers). As such, preserving certain values would not be possible by only preserving windcatchers.

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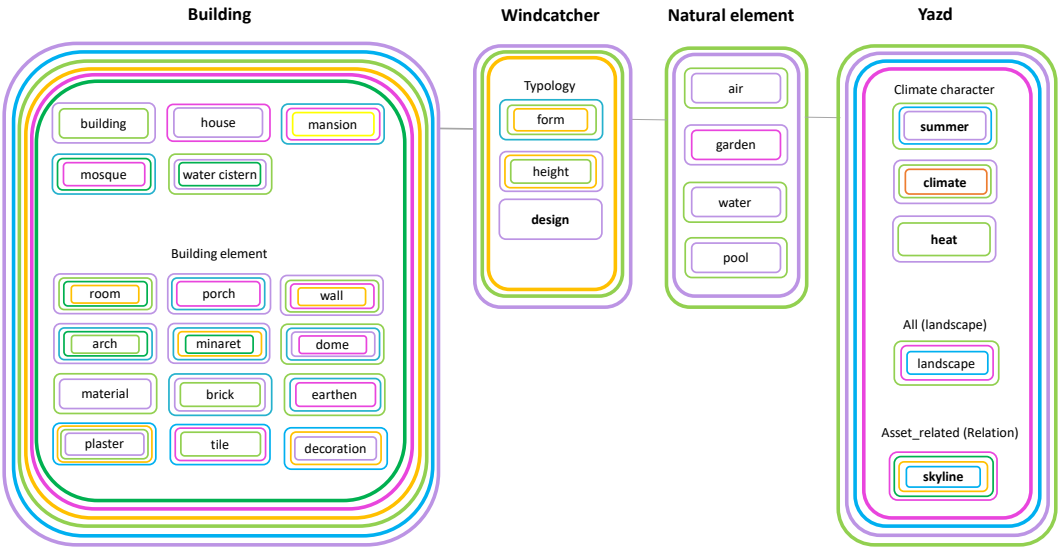

FIG. 5.7 The relation between values and the most frequent attributes, concerning the windcatchers in Yazd. Grey lines show the relations found. Colorful Lines show the values. Dashed lines use for intangible attributes.

5.2.2 Comparison analysis between OUV and the other policy documents

Statements of (Cultural) Significance (SoS) were recommended as a key document in heritage planning (ICOMOS Australia, 1999). Today, a Statement of Outstanding Universal Value (SOUV) is mandatory for every property being nominated to the UNESCO World Heritage List (UNESCO, 2005), and older nominations have been updated with the adoption of Retrospective SOUV. The cultural significance, values, and attributes, described in this document are further protected by heritage planning and management plans in particular. Therefore, they are assumed to be referenced in other policy documents, at national and sub-national levels, to enable their conservation.

The windcatchers of Yazd were found conveying all eight values, except for the political values, according to the SOUV. Most policy documents referenced these seven values, except for the ICOMOS Report on The Historic City of Yazd which does not refer to scientific and aesthetical values, and the Detailed Master Plan of The City of Yazd which does not refer to the social values.

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The most frequent attributes of windcatchers, according to the SOUV, are respectively, building, house, garden, mosque, dome, water, earthen, minaret, wall, and skyline. While the other supra-national policy documents address all these attributes frequently, national and sub-national policy documents do not reference the earthen material and Yazd skyline.

Overall, it seems that all the policy documents at sub-national, national, and supra-national levels consider seven values of windcatchers mentioned in the OUV statement although each of them highlights one or more values more than the others. Nevertheless, sub-national policy documents complement the SOUV by addressing the political values, probably conveyed at national and sub-national levels of cultural significance. sub-national policy documents also address more details about windcatchers' values beyond the SOUV. For example, in the Conservation Plan of the Historic City of Yazd, it is mentioned that the windcatcher shows the social status of its owner which is recognized by the height and decoration of the windcatcher. This refers to the social values of windcatchers, which is also mentioned in the SOUV but refers specifically to its sub-national (local) significance. As such, sub-national policy documents are proven to not only support but also complement the SOUV, integrating attributes and values, referring to supra-national, national, and sub-national levels of cultural significance. Still, a lack of reference to the attributes conveying OUV as the relations between windcatchers, earthen material, and the Yazd skyline could disable their protection and endanger their conservation.

5.3 Discussion and Conclusion

This research confirmed the benefit of using AI models to analyze policy documents, facing the changes foreseen for heritage planning and management, where cultural significance is to play a key role, and therefore, requires a clear understanding of the attributes conveying the values, to better support their conservation. It also confirmed the relations between diverse attributes and values associated with the windcatchers of Yazd. The research illustrated the importance of considering a system of relations between attributes/values, rather than researching them in isolation, already explored in literature.

Machine learning and application of the AI models were used to extract values and attributes related to the windcatchers of Yazd. Policy documents mainly address the economic and ecological values of windcatchers. Besides, the most frequent attributes were related to the cooling character of windcatchers, including natural attributes, that characterize the climate of Yazd, and tangible attributes, that characterize the building.

This research contributes to highlighting the values and attributes, defining the cultural significance conveyed to built heritage, as referenced by various sub-national, national, and supra-national policy documents. This approach avoids neglecting categories in the system of values and attributes that are highly related to each other, as the ones mentioned by different policy documents do differ, even if to a very limited extent. Still, there might be other values and attributes missing, for instance, the importance of modern ventilation facilities and their connections to windcatchers, which could be referenced by other stakeholders.

An innovative aspect of this research consists in the methodology developed, which can be applied to other case studies and different scales in heritage planning. The results of the data analysis provided a better understanding of the policy documents referencing the cultural significance, values, and attributes, of windcatchers in Yazd, Iran. Future research is to analyze data from other sources (e.g., literature, social media) representing other stakeholders, and later comparing different perceptions among multiple stakeholders.

This research reveals the importance of clarification and comparison between cultural significant conveyed in supra-national, national, and sub-national policy documents as this can indicate the differences and similarities between significant values and attributes acknowledged at different levels. This clarification and comparison can prevent sacrificing the protection of national and sub-national significant values and attributes to protect OUV or vice versa. This approach facilitates strategic heritage planning (e.g., action plan and assessment process) based on comprehensive knowledge of the cultural significance of heritage properties at different levels. Consequently, regulating this matter in heritage planning can lead to a more clear and more efficient process.

While this study mainly looks at how AI can help recognize cultural heritage and understand what people think about it to improve heritage planning, it's crucial to know about the problems and challenges: 1. Limited comprehension of context.: AI may struggle to fully understand the detailed history and culture of heritage sites. It might miss important things that human experts can understand, leading to mistakes; 2. Biased Data: AI relies on the data it's trained on. If the data has

unfairness or lacks variety, AI can make things worse by repeating those problems and not showing all cultural aspects. 3. Getting Cultural Importance Wrong: Sometimes, AI may not judge the cultural value of heritage places correctly. It might mix up or misunderstand cultural parts, giving wrong ideas about their importance. 4. Explaining AI Decisions: Ensuring transparency and accountability in AI models used for heritage planning is crucial. It can be challenging to explain the decision-making processes of complex AI algorithms to policy makers, potentially leading to mistrust.

Future studies should concentrate on refining AI's contextual understanding of heritage sites, addressing biases in training data, improving cultural assessment algorithms, enhancing transparency in AI decision-making, evaluating the generalizability of AI approaches across diverse heritage contexts, fostering interdisciplinary collaboration, and advocating for the integration of AI-driven cultural significance assessment into heritage planning policies. These efforts will contribute to the effective use of Artificial Intelligence in heritage planning, enabling more informed and culturally sensitive decision-making processes for the preservation of cultural heritage.

References

Bai, N., Luo, R., Nourian, P. and Roders, A.P., 2021. WHOSE Heritage: Classification of UNESCO World Heritage" Outstanding Universal Value" Documents with Soft Labels. Archive preprint: 2104.05547.

Dai, T., Zheng, X. and Yan, J., 2021. Contradictory or aligned? The nexus between authenticity in heritage conservation and heritage tourism, and its impact on satisfaction. Habitat International, 107, p.102307.

Silva, A., & Roders, A., 2012. Cultural heritage planning and heritage (impact) assessments. Proceedings of the Joint CIB W, 70, W092.

Dehghani-sanij, A.R., Soltani, M. and Raahemifar, K., 2015. A new design of wind tower for passive ventilation in buildings to reduce energy consumption in windy regions. Renewable and Sustainable Energy Reviews, 42, pp.182-195.

Ferretti, V., Bottero, M. and Mondini, G., 2014. Decision making and cultural heritage: An application of the Multi-Attribute Value Theory for the reuse of historical buildings. Journal of cultural heritage, 15(6), pp.644-655.

Ginzarly, M., Farah, J. and Teller, J., 2019. Claiming a role for controversies in the framing of local heritage values. Habitat International, 88, p.101982.

Ginzarly, M. and Teller, J., 2016, October. Deriving cultural heritage values: the use of social media. In VII International Conference on Old and new Media for the Landscape Image. CIRICE, Centro Interdipartimentale di Ricerca sull'Iconografia della Città Europea, Naples, Italy.

ICOMOS Australia (1999) "The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance".

Li, B. and Han, L., 2013. Distance weighted cosine similarity measure for text classification. In Intelligent Data Engineering and Automated Learning–IDEAL 2013: 14th International Conference, IDEAL 2013, Hefei, China, October 20-23, 2013. Proceedings 14 (pp. 611-618). Springer Berlin Heidelberg.

Movahed, K., 2016, August. Badgir (wind catcher) an example of traditional sustainable architecture for clean energy. In 2016 IEEE Smart Energy Grid Engineering (SEGE) (pp. 79-83). IEEE.).

Pereira Roders, A. 2007. RE-ARCHITECTURE: Lifespan rehabilitation of built heritage, Eindhoven: Eindhoven University of Technology, 2007.

Phillips, A., & Young, C. 2017. Culture and Nature – two sides of the same World Heritage coin. In J. Larwood, S. France, & C. Mahon (Eds.), Culturally natural or naturally cultural? – exploring the relationship between nature and culture through world heritage. UK: IUCN National Committee UK.

Smithies, J. and Smithies, J., 2017. Artificial intelligence, digital humanities, and the automation of labour. The Digital Humanities and the Digital Modern, pp.79-111.

Stephens, J., 2014. Fifty-two doors: identifying cultural significance through narrative and nostalgia in Lakhnu village. International Journal of Heritage Studies, 20(4), pp.415-431.

Tutchener, D., Kurpiel, R., Smith, A. and Ogden, R., 2021. Taking control of the production of heritage: Country and cultural values in the assessment of Aboriginal cultural heritage significance. International Journal of Heritage Studies, 27(12), pp.1310-1323.).

Tuan, T.H., Seenprachawong, U. and Navrud, S., 2009. Comparing cultural heritage values in South East Asia–Possibilities and difficulties in cross-country transfers of economic values. Journal of cultural heritage, 10(1), pp.9-21.

UNESCO, 2005. Operational Guidelines for the Implementation of the World Heritage Convention, Paris: United Nations Educational, Scientific and Cultural Organization.

UNESCO, 2008. Operational Guidelines for the Implementation of the World Heritage Convention, Paris: United Nations Educational, Scientific and Cultural Organization.

UNESCO, 2017, Outstanding Universal Value, Last accessed 12th January 2023: https://whc.unesco.org/en/list/1544/#:~:text=The%20City%20of%20Yazd%20is,developed%20to%20draw%20underground%20water.

Veldpaus, L., 2015. Historic urban landscapes: framing the integration of urban and heritage planning in multilevel governance.

Xiao, J., Wu, Y., Wang, M. and Zhao, Y., 2023. Using choice experiments to assess tourist values for intangible cultural heritage–the case of Changdao fishermen's work song in China. Journal of Cultural Heritage, 60, pp.50-62.

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6 Comparison Analysis

In Praise of Diversity in Participatory Heritage Planning Empowered by Artificial Intelligence: A Case Study of Windcatchers in Yazd

This chapter is based on the following journal paper:
Foroughi, M., Wang, T., and Roders, A.P., 2023. In praise of diversity in participatory heritage planning empowered by artificial intelligence: A case study of windcatchers in Yazd. Land Use Policy Journal (under revision).

ABSTRACT Heritage planning is changing, in both theory and practice. There is greater attention to the cultural significance (values and attributes) conveyed to a heritage property, rather than focusing on the property alone. As such, identifying and revealing cultural significance is becoming a key step in heritage planning. Besides, countries worldwide have been highly encouraged to involve the public in defining the cultural significance of listed heritage. However, the challenge remains on how to best involve the different stakeholders and capture the cultural significance they convey to heritage. Analyzing large datasets is costly and time-consuming, especially on built heritage, when many stakeholders are involved. Although the automated methods have proven to mitigate such restrictions in fields such as digital humanities, their application to heritage planning, practice, and theory, is still scarce. Hence, this paper aims to investigate the potential of Artificial Intelligence (AI) models (e.g., text classification analysis) by analyzing available unstructured textual data (e.g., policy documents, literature, and social media), to reveal the cultural significance conveyed to built heritage, by a varied group of stakeholders. Yazd, Iran, is taken as a case

study, with a particular focus on windcatchers, a key attribute conveying outstanding universal value, due to the inscription of Yazd on the UNESCO World Heritage List. This paper has three subsequent phases: 1) State of art on the application of AI in participatory heritage studies and value-based heritage planning, 2) methodology of data collection and data analysis related to coding and comparing values and attributes of windcatchers conveyed by different stakeholders; 2) findings on the values and attributes and their associations conveyed in the information repositories. Results from the case study confirm that similarities and differences exist on the cultural significance of windcatchers in Yazd among various stakeholders and the presented methodological framework can contribute to heritage planning in terms of (de)coding and measuring the cultural significance of built heritage, finding patterns from various stakeholders' perceptions, to identify similarities and differences, and to better align them. This model can be applied to other key attributes in Yazd and to other case studies and scales to support heritage planning, practice, and theory. Besides, the result confirms the potential of such methodologies using AI and available information repositories (e.g., social media) to support, evaluate, and reform the legislative framework, in their ambition to grow in public engagement.

KEYWORDS public participation, consensus, cultural significance, values, attributes, text classification, natural language processing

6.1 Introduction

Heritage studies are shifting from a focus on the heritage property alone to its cultural significance (Tarrafa Silva & Pereira Roders, 2012). Cultural significance includes what is motivating the listing of a particular resource as heritage (attributes) and why these resources are listed as heritage (values). In parallel, a value-based approach to heritage planning is introduced, which considers heritage planning as a "dynamic process of change management" (ICOMOS Australia 1999). Accordingly, a city is addressed as a "living heritage" with dynamic associative values which differ based on different perceptions of stakeholders (Poulios, 2014; Ginzarly et al., 2019).

This dynamic approach to heritage planning acknowledges that each community and its members can convey different meanings to heritage as a whole, even if some attributes or values could overlap (Bonet et al., 2020). Even the same community – due to aging and growth of knowledge and experiences – could

evolve in their perception of heritage. Given this diverse character of heritage, the participation of varied stakeholders, experts, and non-experts, in determining the cultural significance that is conveyed to heritage has been strongly recommended, both in academia (Yung, et al., 2017; Ginzarly, et al, 2019; Bonet, et al., 2020; Li, et al., 2020) and by international recommendations (e.g., UNESCO, 2011; UNESCO, 2016). However, what happens when communities disagree on what is significant and why? How could then, the cultural significance of heritage be defined? A broader statement, even if potentially contradictory, returning to the tradition of one narrative, only including what met consensus, or no statement at all, as full consensus could not be reached?

Participatory practices applied to heritage planning also aim for consensus-building on the cultural significance of heritage (UNESCO, 2011; Harmon and Viles, 2013; Van Assche and Duineveld, 2013; Den, 2014; Zhou, et.al., 2018; García, et.al., 2019). Consensus and conflict are intertwined concepts and cannot be addressed without each other in an inclusive decision-making process. Varied literature considers conflict as a challenge of consensus-building yet to be solved (e.g., Lin and Geertman, 2015; Kaya and Erol, 2016; Raynor et al, 2017), and that further research discussing the issues, reasons, and conflict resolution methods (e.g., mediation, facilitation, negotiation, collaboration, and consensus-building) is needed.

Still, few scholars argue that conflict is as important and beneficial as consensus in participatory practices because conflict contributes to the generation of new ideas and solutions (Bailey et al, 2011, Van Ewijk, 2011). This controversy about heritage may contribute to the formulation of more sustainable urban development and management practices (Antweiler, 1998; Corburn, 2005; Skoglund & Svensson, 2010). Accordingly, a balance between consensus and conflict is considered essential. It is the role of leaders and policymakers to demonstrate an explicitly genuine commitment to participation by embracing community diversity and conflict (Maginn, 2007; Fahmi et al., 2016; Purbani, 2017).

Some studies explore and cherish stakeholders' conflicts to reach a consensus. Yu et al. (2019) organized interviews with key stakeholders, reviewed project documents, used a model to analyze stakeholders' conflicts, and developed action schemes accordingly. Besides, García, et al. (2019) presented a methodology to consider the majorities and consensus, as well as, the minorities and controversial interests, to construct a holistic but integrated decision, in which all values are considered as equally important. As such, it is important to holistically understand the views of various types of stakeholders, to make integrated decisions.

Currently, studies that explore public participation in heritage planning are using various manual conventional methods (e.g., Bonet, et al., 2020; Li, et al., 2021). Nevertheless, this process can be costly and time-consuming, especially on built heritage, when many stakeholders are involved (Morrison & Xian, 2016; Li, et al., 2020). While automated methods have proven to mitigate such restrictions in fields such as digital humanities, their application in heritage planning, practice, and theory is still scarce. Hence, this research aims to investigate the potential of AI models (e.g., multi-label text classification analysis) in analyzing available unstructured textual data from multiple sources (e.g., policy documents, literature, and social media), to reveal values and attributes conveyed to built heritage, by different stakeholders, to build a foundation to align various values for making integrated decisions.

By comparing the different stakeholder groups' perceptions, discovered using an AI approach from multiple information repositories, this research develops an approach to reveal similarities and differences between experts, policymakers, and users to shed light on the multi-stakeholder setting and as a step further towards inclusive data-supported heritage planning. To provide empirical evidence of such an approach, this research explores various stakeholders' perceptions of the cultural significance conveyed to a specific case study, the city of Yazd, Iran. The focus of research is on windcatchers which are key attributes conveying outstanding universal value, as inscribed on the UNESCO World Heritage List (UNESCO, 2017). This research discusses similarities and differences in the attributes and values, by comparing the perceptions of policymakers, users, and experts. Based on the analysis, a critical reflection on the changes expected in heritage planning is discussed.

This study offers a comprehensive methodology with a customized AI-supported tool to detect similarities and differences in a participation process. Besides, this study reveals a critical gap that requires more reflection on the changes expected in heritage planning, by considering different stakeholder groups' contribution to the definition of cultural significance in heritage planning. Chapter 2 delves into the concepts explored in this research, such as value-based heritage planning practices, the definition of cultural significance, and how AI has been applied in participatory heritage planning.

6.2 Literature review

6.2.1 Value-based heritage planning and cultural significance

Value-based heritage planning process recognizes heritage as a whole that can be defined differently by various stakeholders (Bonet et al., 2020). Given this dynamic character of heritage, the participation of multi-disciplinary stakeholders, beyond experts, has been strongly recommended to determine the cultural significance conveyed to heritage (e.g., UNESCO, 2011; Yung, et al., 2017; Ginzarly, et al, 2019; Bonet, et al., 2020; Li, et al., 2020).

Value-based management processes are recommended to start with a cultural significance assessment (with a statement of cultural significance as outcome), followed by policy development, policy management, and vulnerability assessment of cultural significance (ICOMOS Australia, 1999; Kerr, 2000, Clark, 2001). As such, in the entire process of value-based heritage planning, the statement of cultural significance becomes the key reference (ICOMOS Australia, 1999). In specific, the Statement of Outstanding Universal Value (SOUV) (UNESCO, 2008), is the statement of cultural significance detailing the cultural significance of outstanding universal value conveyed to heritage properties, justifying the selected criteria and supporting the process of the properties' nomination for inscription in the UNESCO World Heritage List (UNESCO, 2005). As stated in the 2005 operational guidelines, the OUV and the conditions of authenticity of the properties should be maintained or enhanced from the time of inscription onwards (UNESCO, 2005). This value-based management process has been extensively applied in practice in countries such as Australia and the United Kingdom, either by changing the legislation or drafting new conservation guidelines (English Heritage 2008; Tarrafa Silva & Pereira Roders, 2012).

As mentioned earlier, cultural significance includes what is motivating the listing of a particular resource as heritage (attributes) and why these resources are listed as heritage (values). The theoretical frameworks of cultural significance used in this study are composed of a) values, as developed by Pereira Roders (2007), and by b) attributes as developed by Veldpaus (2015). Value classes presented by Pereira Roders include eight primary values and sub-classes (Tarrafa Silva and Pereira Roders, 2012). The attributes framework consists of tangible attributes (asset-related, societal, process) and intangible attributes (asset, area, all).

6.2.2 Artificial Intelligence in participatory heritage planning

AI has emerged as a valuable tool for participatory heritage planning, especially for analyzing available information repositories (e.g., social media platforms), as evidenced by previous studies (e.g., Abeysinghe et al., 2018; Afzaal et al., 2019; Qiu & Zhang, 2021). Using these tools for public participatory heritage planning has been gaining significant attention from both researchers and practitioners, in line with UNESCO's recommendations (UNESCO, 2011).

There For instance, Abeysinghe et al. (2018) introduced a social media analytics platform that utilizes machine learning techniques and a visualization tool to identify discussion pathways, aspects, and their corresponding sentiment and deeper emotions. This platform enables decision-makers to gain valuable insights into the most talked-about topics related to a particular entity. Additionally, the analysis of associated sentiments and emotions assists in identifying feedback related to these topics. Similarly, the research of Afzaal et al. in 2019 distinguishes the perceptions or sentiments of people about heritage properties. Furthermore, Qiu and Zhang (2021) conducted a study that explored the structure and connections between cognitive elements associated with intangible cultural heritage (ICH) tourism. They analyzed data from Weibo.com, a prominent social media platform in China, employing matrix construction, dimension classification, and semantic network analysis as the primary analytical processes. These scholars highlighted the potential of social media in engaging citizens and gaining insights into their emotional attachments to the urban environment.

However, the exploration of available information repositories and AI for participatory heritage planning is still in its nascent stage. Existing literature lacks heritage-specific tools that specifically address the cultural significance of built heritage and the explicit connection between attributes and values (Bai et al., 2021). Furthermore, previous studies have often focused on broader geographical scales, such as countries, cities, or neighborhoods, rather than delving into specific attributes within a city, such as windcatchers (e.g., Ginzarly et al., 2019; Van der Hoeven, 2020). Therefore, the present study aims to investigate the potential of available information repositories and employ AI methods for data analysis to uncover individuals' perceptions regarding the cultural significance (values and attributes) of built heritage on the scale of the building element, the windcatcher.

6.3 Methodology

The process followed in this research entails three steps, namely data acquisition, data pre-processing, and data analysis (see Figure 6.1).

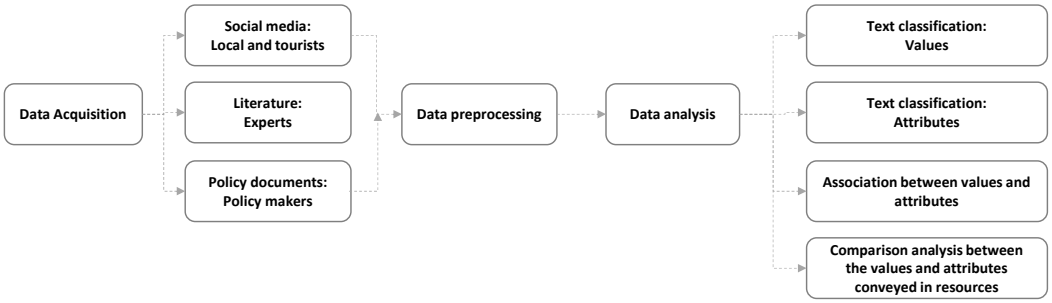

FIG. 6.1 Overview of the methodological framework

6.3.1 Data acquisition

This study reveals and compares the cultural significance conveyed by three stakeholder groups to the windcatchers. These groups are experts, policymakers, and users based on the theoretical framework by Pereira Roders (2019). The relevant resources for each stakeholder were collected from various sources (Table 6.1). They are respectively the literature, policy documents, and social media posts (Instagram and Twitter), referring to windcatchers and Yazd. All the paragraphs in these documents referencing the windcatchers of Yazd were collected and analyzed. All the data were collected manually, except for the social media data which was retrieved using Web Harvey software due to its large volume.

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TABLE 6.1 The stakeholders and relevant resources

Stakeholders	Definition	Resources
Policymakers	Those developing the plans and tools to manage local resources	Government archives: Relevant local, national, and international policy documents
Experts	Those working in academia, e.g., researchers	Academic databases: Scopus, Science direct, and Sid
Users	Community in general, e.g., local, regional, and national population, tourists, educators	Social media platforms: Instagram, and Twitter

6.3.2 Data pre-processing and data analysis

To facilitate data analysis, data pre-processing was conducted. All variations of "windcatcher" and "Yazd" were normalized to "windcatcher" and "Yazd" (both in Persian and English e.g., "Yazd", "yazd", "یزد"). Moreover, unnecessary data including stop words, references, punctuation marks, and website links) was removed. After data cleaning and pre-processing, the dataset was ready for text analysis. To reveal the cultural significance conveyed in texts, two theoretical frameworks were used to decode the attributes and values conveyed in the social media, literature, and policy documents. The theoretical frameworks of cultural significance used in this study are composed of a) values, as developed by Pereira Roders (2007), and b) attributes as developed by Veldpaus (2015).

Overall, the analysis of attributes and values was undertaken using Python libraries, including Numpy (for performing statistical computations), and Pandas (used for data manipulation and analysis on data frames). Each sentence was analyzed and assessed through quantitative content analysis and qualitative categorical analysis. The quantitative analysis revealed the most and least frequent attributes and values, and identified patterns of the relation between attributes and values. The qualitative categorical analysis showed the categories of values and attributes addressed in the texts.

The qualitative analysis in this research is a multi-label text classification task in natural language processing (NLP) where the goal is to assign multiple labels to a given text document. In this research, each label represents a specific class of values or attributes that the document can belong to. We trained the BERT (Bidirectional Encoder Representations from Transformers) model to perform multi-label text classification. The BERT model is an influential pre-trained language model developed by Google AI Language (Devlin et al., 2018). BERT has revolutionized the

field of NLP with its innovative bidirectional approach to language understanding and generation. Unlike previous models that rely on unidirectional processing, BERT leverages a bidirectional context understanding by considering both preceding and following words simultaneously (Devlin et al., 2018). Data analysis and modeling are conducted using Google Colaboratory (Colab), an online platform for collaborative coding and computation. The model has been archived in the Github repository (Foroughi, 2023). Lastly, the performance of the model was evaluated using accuracy, precision, recall, or F1 score metrics.

Overall, after acquiring the relevant data related to the three stakeholder groups, the values, and attributes conveyed by these groups were revealed and analyzed. Consequently, a comparative analysis between the information repositories was conducted based on the results found using the above methods and frameworks. This analysis reveals the similarities and differences between the perception of the stakeholder groups on windcatchers' cultural significance (values and attributes).

6.4 Results

6.4.1 Cultural significance analysis

As explained, values and attributes are revealed using two theoretical frameworks for both values and attributes. This section compares the frequency of values and attributes in all three types of sources. The reliability of the multi-label text classification model developed was tested and confirmed by the methods mentioned in Chapter 3 (accuracy: 94%, precision value: 77%, and F-measure: 76%).

6.4.1.1 Values of windcatchers in Yazd

Concerning the cultural significance of the windcatchers in Yazd, and in particular the values, the analyzed stakeholder groups referenced all eight categories of values. The most referenced are the economic values (24%), respectively following by age (15%), ecological (15%), historic (12%), social (11%), scientific (11%), aesthetical (10%), and political (3%) values (see Figure 6.2). Still, there are some differences

and similarities in the most and least addressed values, per information matrial. While economic and ecological values are the most conveyed values in both literature (experts) and policy documents (policymakers), age and historic values are the most addressed values in social media (users). Political values are the least conveyed values in all information material.

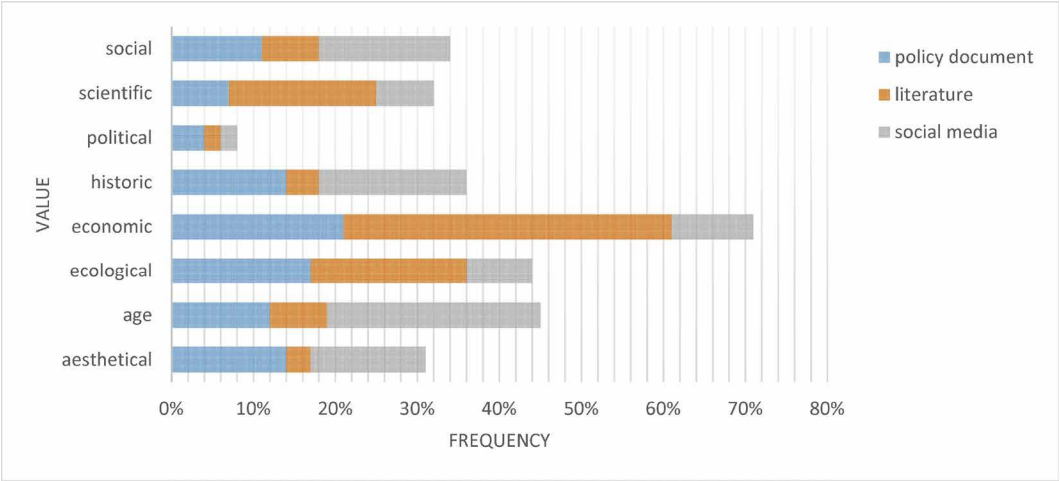

FIG. 6.2 The frequency of values conveyed in different resources.

6.4.1.2 Attributes of windcatchers in Yazd

While all the stakeholder groups address all eight categories of values, only a few categories of attributes were found to convey these values. Results reveal that the tangible attributes were referenced more frequently than the intangible attributes (see Figure 6.3). Respectively, the most frequent tangible attributes belong to the asset class, namely the building (e.g., house, building), the building element (e.g., room, window, roof), and the natural element (e.g., garden, courtyard).

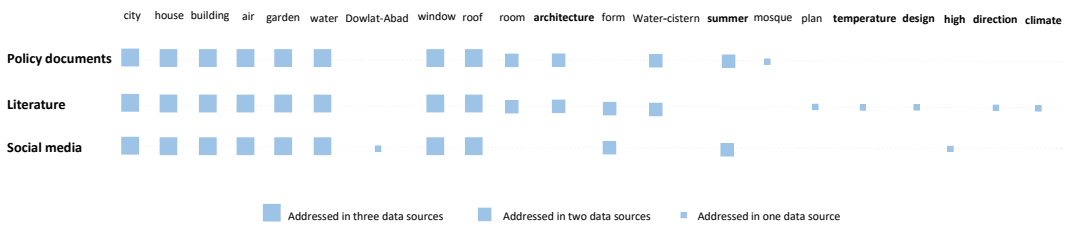

FIG. 6.3 The 20 most frequent attributes in each of the information material: The frequency decreases from left to right (tangible: normal font style, intangible: bold font style)

Nonetheless, also intangible attributes were addressed, including more generic attributes such as architecture and design. Social media data convey the most intangible attributes, followed by the literature, and lastly the policy documents. The referenced intangible attributes mostly belong to the asset-related class, which includes the character (e.g., summer, heat, temperature), concept (architecture, design), and relation (e.g., direction, high). To be more precise, temperature, climate, summer, and heat are natural elements and not attributes but they convey the intangible character of windcatchers. They are used in sentences addressing the windcatchers' intangible character that makes a pleasant microclimate in hot and arid climates in summer by decreasing the indoor temperature.

Among the twenty most frequent attributes in each information material, there are seven common attributes, namely city, house, building, water, air, garden, window, and roof. This shows the importance of the relation between the windcatchers and their buildings (houses), as well as, the city, according to all the stakeholders. Besides, the close relation between the windcatchers and water, air, garden, windows, and roofs are often mentioned, by all the stakeholders (see Table 6.2).

Still, some attributes are only frequently mentioned by specific stakeholders. The intangible attribute of windcatchers making a pleasant microclimate (e.g., temperature, climate) and the windcatchers' design concept and plan are mainly discussed by experts. The relation of windcatchers and other building elements addressing the height difference (and their role in the skyline of the city) is only addressed by users. Besides, only users mention explicit buildings with windcatchers, namely Aghazadeh and Dowlat-Abad buildings.

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TABLE 6.2 Exemplary quotes

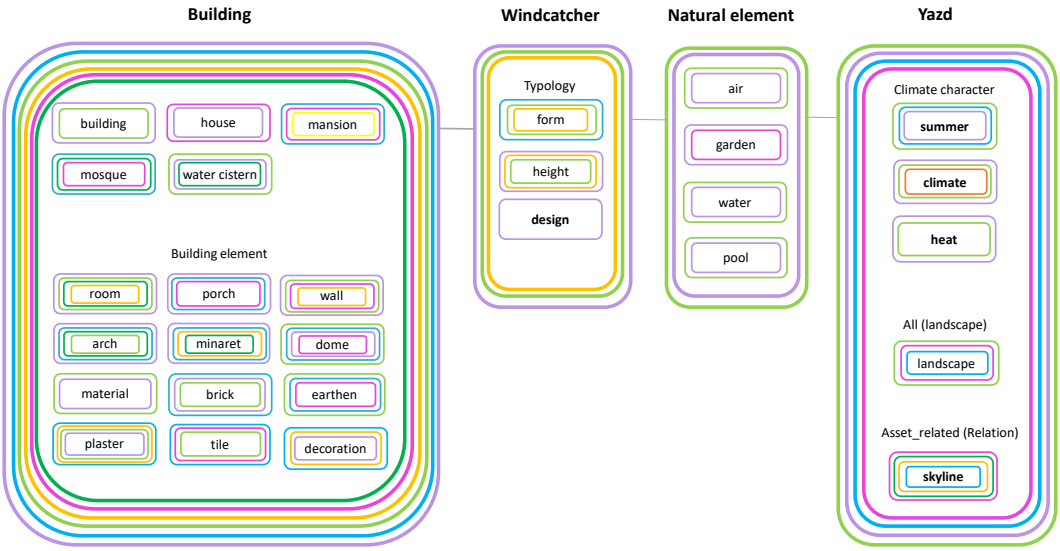
Reference	Exemplary quote
Conservation Plan of the Historic City of Yazd	"**Windcatchers** are closely connected to the **main room**, **porch**, **pool**, and **basement**, creating a condition for the **air** to **ventilate** the **building** and while the air passes by the **moisture** elements like **pool**, **garden**, **tree**, and **basement's wall**, compensate the lack of moisture in the **earth** and create a pleasant environment in **hot summer** days for residents."
Windcatcher Iranian engineering masterpiece	"**Evaporative cooling** is an important function of **windcatchers**. In Yazd, usually there is a **water pond** in one of the **rooms**, with a **windcatcher** on top of that. This **water pond** contributes to **evaporative cooling**."
Numerical simulation of cooling performance of windcatcher (Baud-Geer)	This figure shows that, by using the logical amount of **water** in the **evaporating system** of **windcatcher**, the **temperature** decreases a lot and the relative **humidity** increases, both of which are suitable **for hot and dry regions** of a city like Yazd in Iran.
ID_Post 895	… This **room** receives the **air** from the **windcatcher** above it, which pushes **air** from the surrounding environment down to the **pool**, **cooling** it. This **cooled air** is then circulated into the surrounding **rooms**, bringing the **temperatures** down. These **rooms** are beautifully decorated with coloured glass **windows** and **doors** and some of them have their own little **pools**. The **colored light** streaming from these **windows** get reflected in these **pools** and creates a visual experience that is just spellbinding. …
ID_Post 4739	… Small beautiful **windows** for **air circulation** , facing away from the **sun** . **Windcatchers** are designed in a combination with traditional **water reservoirs** on lower levels, capable of storing **water** at near freezing **temperatures** during **summer** . These are the reasons that made living in desert possible . This **cooling system** effect is strongest in **driest climate** And they have done it in the most beautiful way. …

6.4.2 Comparative analysis

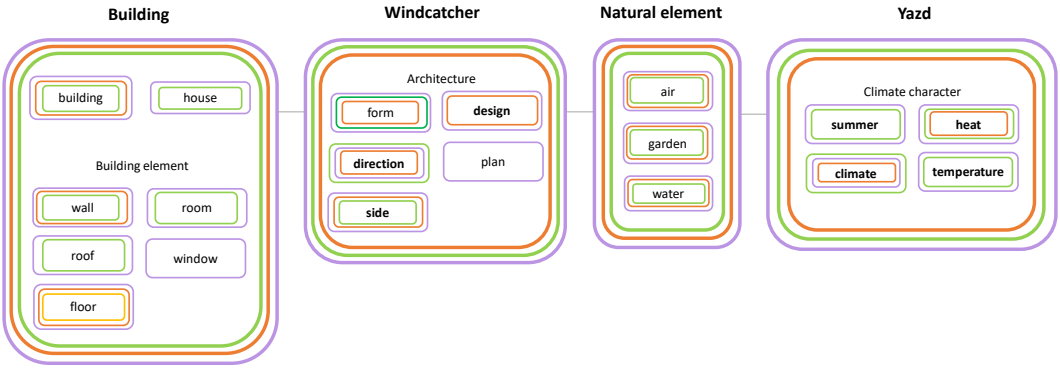
Among the twenty most frequent attributes in each information material, there are seven common attributes addressed by all the stakeholders, namely city, house, building, water, air, garden, window, and roof. Nevertheless, the stakeholders associated different values with these attributes.

Figure 6.4 highlights the relation between values and these most frequent attributes, concerning windcatchers in Yazd. Various stakeholders not only convey a great diversity of values to windcatchers but also illustrate the relationship between these values and specific attributes. The case study confirms that cultural significance is defined by a combination of tangible and intangible attributes and values and that its cultural significance is better understood when perceived as an ecosystem. For example, some tangible and intangible attributes (e.g., climate character of Yazd, garden, water, openings) work together with windcatchers to ventilate the air in a building to create a microclimate, to passively provide thermal comfort for the users, and also to protect the building from earthquakes (ecological and economic values of windcatchers). As such, preserving only windcatchers rather than the ecosystem as a whole could endanger the relevant values.

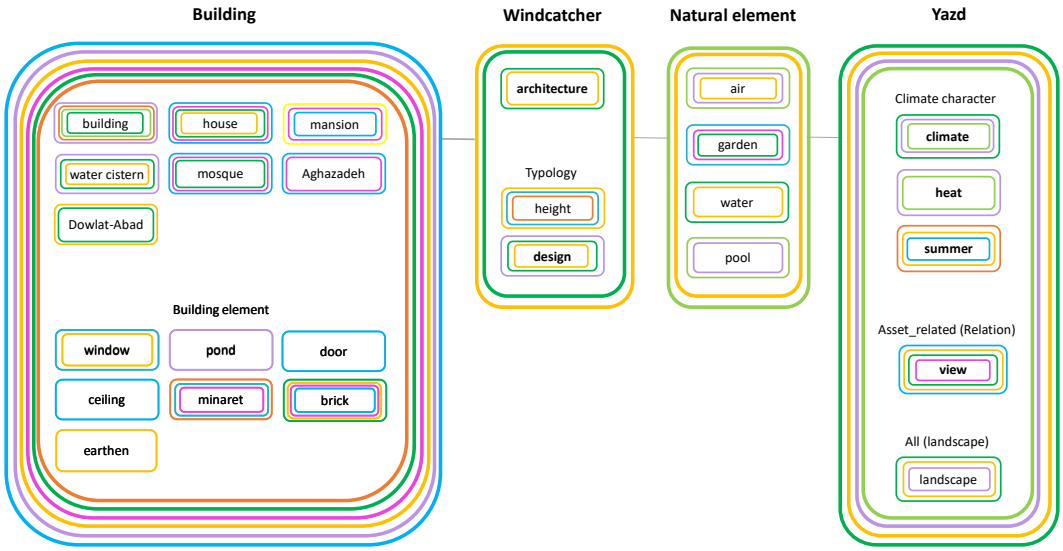
Experts highlight fewer attributes, mainly related to certain values, namely economic, ecological, and scientific values. Nevertheless, policymakers and users refer to a broader range of values and attributes. As such, while some attributes and values were already conveyed by all stakeholders, the other values and attributes mentioned by only one or two groups of stakeholders are more complementary than contradictory. For example, only users frequently refer to special buildings with unique windcatchers, namely the Aghazadeh and Dowlat-Abad buildings. Together with the policymakers, users highlight the landscape of the Historic City of Yazd, created by the urban ensemble punctuated by landmarks such as windcatchers, turquoise domes, and minarets. Lastly, the significance of decoration and decorative materials (e.g., plaster and tile) and their social values are referenced by policy documents.



a) policy documents



b) literature



c) social media

Ecological
Economic
Scientiffic
Age
Historic
Aesthetical
Social
Political

FIG. 6.4 The relation between values and the most frequent attributes concerning the windcatchers in Yazd. Colorful Lines show the values as illustrated in the legend. From top to bottom the figures represent data from a) policy documents, b) literature, and c) social media (tangible: normal font style, intangible: bold font style).

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6.5 Discussion and Conclusion

Inclusive heritage planning is crucial for accommodating the diverse cultural significance conveyed by various actors in the built heritage. Understanding and acknowledging similarities, and differences in the cultural significance is essential to foster inclusive discussions and decision-making. However, the sheer volume of data generated by these actors makes manual analysis time-consuming and impractical. To address this challenge, technologies such as AI offer promising solutions by streamlining the analysis process and potentially uncovering new insights. To empirically illustrate this research's analytical framework, windcatchers in Yazd are considered as a case study to show the similarities and differences of various stakeholders regarding windcatchers' values and attributes. AI was applied to analyze the policy documents, literature, and social media posts. The findings highlight the existence of both similarities and differences, shedding light on the various aspects of values they prioritize. This empirical foundation provides a more robust basis for inclusive discussions and facilitates the inclusive nature of the heritage planning process.

This research challenges the notion that users have little interest in windcatchers, revealing that many users hold positive values toward them. While a small number of posts expressed negative values related to their practicality in modern life, there is a consensus on the positive values associated with windcatchers. However, further research is needed to explore if there are additional negative values held by residents. The different perceptions of windcatchers' cultural significance among stakeholders can lead to conflicts over the future of built heritage. Taking into account both positive and negative values can contribute to a more inclusive and democratic approach to heritage governance and planning. Decision makers and experts need to consider negative values as a complement to the official heritage discourse, representing diversity and multiculturalism, and addressing heritage controversies and various interests. This comprehensive understanding can guide heritage managers in their efforts to conserve the cultural significance of windcatchers effectively.

We acknowledge the role that social media can play in empowering the users' community. Social media helps to materialize and foster public engagement, especially when the community is active. This research confirms the potential role that social media can play in broadening the current understanding of the cultural significance of built heritage and in allowing greater inclusiveness in heritage planning. Besides, AI makes it possible to automatically analyze stakeholders' perceptions with great speed and less cost.

This research confirmed the assumed benefit of analyzing and comparing various available data, illustrating different stakeholders' perceptions of heritage properties with the support of AI models, to identify and interpret cultural significance conveyed to heritage (values and attributes). It confirmed the relations between diverse cultural significance (attributes and values) conveyed to the windcatchers of Yazd. The research illustrated the importance of considering an ecosystem, and relations between attributes and values, rather than one attribute/value with other attributes/values, researched in isolation. This approach avoids neglecting attributes, tangible and intangible, that are highly related to each other, even when stakeholders omit their relation, and highlight only some of the attributes and values of the ecosystem. An innovative aspect of this work consists in the methodology developed, which can be applied to other case studies and different scales in heritage planning studies. Such methodologies using AI and available information repositories (e.g., social media platforms) can provide necessary information for heritage managers to enhance legislative frameworks.

Although international organizations such as UNESCO recommend greater public participation, the implementation of participation remains critical. Future studies could illustrate how heritage planning is growing in inclusiveness, by using AI and available information repositories. Besides, it is important to investigate if an exchange of heritage knowledge (cultural significance conveyed by different stakeholder groups) between policymakers, experts, and users in an inclusive heritage planning system can lead to a shared understanding of the cultural significance of heritage, and when needed, help consensus-reaching among different stakeholders.

References

Abeysinghe, S., Manchanayake, I., Samarajeewa, C., Rathnayaka, P., Walpola, M. J., Nawaratne, R., Bandaragoda, T., and Alahakoon, D. (2018). Enhancing decision making capacity in tourism domain using social media analytics. In 2018 18th International Conference on Advances in ICT for Emerging Regions (ICTer), pages 369–375. IEEE.

Afzaal, M., Usman, M., Fong, A. C., and Fong, S. (2019). Multiaspect-based opinion classification model for tourist reviews. Expert Systems, 36(2):e12371

Antweiler, C. (1998). Local knowledge and local knowing. An anthropological analysis of contested "cultural Products" in the context of development.". Anthropos, 93(4/6), 469–494. https://www.jstor.org/stable/40464844

Avrami. E, Mason, R and De La Torre, M (eds.) (2000) "Values and Heritage Conservation", Los Angeles, Getty Conservation Institute.

Bai, N., Luo, R., Nourian, P., Roders, A. P. (2021). WHOSe Heritage: Classification of UNESCO World Heritage" Outstanding Universal Value" Documents with Smoothed Labels. arXiv preprint arXiv:2104.05547.

Bailey, K., Blandford, B., Grossardt, T., & Ripy, J. (2011). Planning, technology, and legitimacy: Structured public involvement in integrated transportation and land-use planning in the United States. Environment and Planning. B, Planning & Design, 38(3), 447–467.

Bonet, L.E., Greene, M. and de Dios Ortúzar, J., 2020. Subjective valuation of tangible and intangible heritage neighbourhood attributes. Habitat International, 105, p.102249.

Clark, K (2001)" Informed Conservation", London: English Heritage.

Corburn, J. (2005). Street science: Community knowledge and environmental health justice.

Dehghani, Bahadori-nejad, 2013, Windcatcher Iranian engineering masterpiece.

Den, W. (2014). Community empowerment and heritage conservation: The experience of beitou district in Taipei City, Taiwan. The Historic Environment: Policy and Practice, 5 (3), 258–274.

Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2018). BERT: Pre-training of deep bidirectional transformers for language understanding. arXiv preprint arXiv:1810.04805.

Fahmi, F. Z., Prawira, M. I., Hudalah, D., & Firman, T. (2016). Leadership and collaborative planning: The case of Surakarta, Indonesia. Planning Theory, 15(3), 294–315. https://doi.org/10.1177/1473095215584655

Ford, Brian, 2001. "Passive downdraught evaporative cooling: principles and practice" (PDF). Architectural Research Quarterly. 5 (3)

Foroughi, M., 2023. Reveal-heritage-values-and-attributes-from-textual-data. [The Github repository]. Retrieved from https://github.com/mahdaforoughi/Reveal-heritage-values-and-attributes-from-textual-data/tree/main.

García, G., Amaya, J., & Tenze, A. (2019). Cultural significance: Linking actors and methods. In Structural analysis of historical constructions (pp. 2053–2061). Cham: Springer.

Ginzarly, M., Roders, A.P. and Teller, J., 2019. Mapping historic urban landscape values through social media. Journal of Cultural Heritage, 36, pp.1-11.

Harmon, B., & Viles, H. (2013). Beyond geomorphosites: Trade-offs, optimization, and networking in heritage landscapes. Environment Systems and Decisions, 33(2), 272–285.

ICOMOS Australia. 1999. "The Australia ICOMOS Charter for the Conservation of Places of Cultural Significance"

Jomehzadeh, F., Nejat, P., Calautit, J.K., Yusof, M.B.M., Zaki, S.A., Hughes, B.R. and Yazid, M.N.A.W.M., 2017. A review on windcatcher for passive cooling and natural ventilation in buildings, Part 1: Indoor air quality and thermal comfort assessment. Renewable and Sustainable Energy Reviews, 70, pp.736-756.

Kaya, I. A., & Erol, N. K. (2016). Conflicts over locally unwanted land-uses (LULUs): Reasons and solutions for case studies in Izmir (Turkey). Land-use Policy, 58, 83–94.

Kerr, J S (2000) "Conservation Plan ", 3 rd, Sydney: The National Trust of Australia.

Li, B. and Han, L., 2013. Distance weighted cosine similarity measure for text classification. In Intelligent Data Engineering and Automated Learning–IDEAL 2013: 14th International Conference, IDEAL 2013, Hefei, China, October 20-23, 2013. Proceedings 14 (pp. 611-618). Springer Berlin Heidelberg.

Li, L. and Mak, C.M., 2007. The assessment of the performance of a windcatcher system using computational fluid dynamics. Building and environment, 42(3), pp.1135-1141.

Li, J., Krishnamurthy, S., Roders, A.P. and van Wesemael, P., 2020. Informing or consulting? Exploring community participation within urban heritage planning in China. Habitat International, 105, p.102268.
Li, J., Krishnamurthy, S., Roders, A.P. and van Wesemael, P., 2021. Imagine the Old Town of Lijiang: Contextualising community participation for urban heritage planning in China. Habitat International, 108, p.102321.
Lin, Y., & Geertman, S. (2015). Smart governance, collaborative planning and planning support systems: A fruitful triangle?. In Planning support systems and smart cities (pp. 261–277). Cham: Springer.
Maginn, P. J. (2007). Towards more effective community participation in urban regeneration: The potential of collaborative planning and applied ethnography. Qualitative Research, 7(1), 25–43.
Mason, R. 2002. "Assessing Values in Conservation Planning: Methodological Issues and Choices", in M. de la Torre (ed.) "Assessing the Values of Cultural Heritage". Research Report, Los Angeles: The Getty Conservation Institute, 5–30.
Morrison, N., & Xian, S. 2016. High mountains and the faraway emperor: Overcoming barriers to citizen participation in China's urban planning practices. Habitat International, 57, 205–214. https://doi.org/10.1016/j.habitatint.2016.08.001
Moghaddam, E.H., Amindeldar, S. and Besharatizadeh, A., 2011. New approach to natural ventilation in public buildings inspired by Iranian's traditional windcatcher. Procedia Engineering, 21, pp.42-52.
Pereira Roders, A., 2019. The Historic Urban Landscape approach in action: Eight years later. In Reshaping urban conservation: The historic urban landscape approach in action (pp. 21-54). Singapore: Springer Singapore.
Poulios, I., 2014. Discussing strategy in heritage conservation: Living heritage approach as an example of strategic innovation. Journal of Cultural Heritage planning and Sustainable Development, 4(1), 16–34. https://doi.org/10.1108/JCHMSD-10-2012- 0048.
Purbani, K. (2017). Collaborative planning for city development. A perception from a city planner. Przegląd Naukowy. Inzynieria ˙ i Kształtowanie Srodowiska, ´ 26(1), 75.
Qiu, Q. and Zhang, M., 2021. Using content analysis to probe the cognitive image of intangible cultural heritage tourism: An exploration of Chinese social media. ISPRS International Journal of Geo-Information, 10(4), p.240.
Raynor, K. E., Doyon, A., & Beer, T. (2017). Collaborative planning, transitions management and design thinking: Evaluating three participatory approaches to urban planning. Australian Planner, 54(4), 215–224.
Saadatian, Omidreza; Haw, Lim Chin; Sopian, K.; Sulaiman, M.Y. 2012. "Review of windcatcher technologies". Renewable and Sustainable Energy Reviews. 16 (3).
Salton, G., & McGill, M. J. (1986). Introduction to Modern Information Retrieval. McGraw-Hill.
Silva, A. and Roders, A., 2012. Cultural heritage planning and heritage (impact) assessments. Proceedings of the Joint CIB W, 70, p.W092.
Skoglund, P., & Svensson, E. (2010). Discourses of nature conservation and heritage planning in the past, present and future: Discussing heritage and sustainable development from Swedish experiences. European Journal of Archaeology, 13(3), 368–385. https://doi.org/10.1177/1461957110386703.
UNESCO, 2005, Operational guidelines for the implementation of the world heritage convention. Paris: UNESCO World Heritage Centre.
UNESCO, 2011, Recommendation on The Historic Urban Landscape, UNESCO World Heritage Centre, Paris; France; Last accessed 12th January 2023: http://www.stellenboschheritage.co.za/wp-content/uploads/UNESCO-Historic-Urban-Landscapes-Recommendation-Short-Nov2011.pdf.
UNESCO, 2016, The Historic Urban Landscape Guidebook: Managing heritage in dynamic and constantly changing urban environments. Last accessed 12th January 2023: http://www.hulballarat. org.au/resources/HUL%20Guidebook_2016_FINALWEB.pdf.
UNESCO, 2017, "Outstanding Universal Value", Last accessed 12th January 2023: https://whc.unesco.org/en/list/1544/#:~:text=The%20City%20of%20Yazd%20is,developed%20to%20draw%20underground%20water.
Van Assche, K., & Duineveld, M. (2013). The good, the bad and the self-referential: Heritage planning and the productivity of difference. International Journal of Heritage Studies, 19(1), 1–15.
van der Hoeven, A. (2020). Valuing urban heritage through participatory heritage websites: Citizen perceptions of historic urban landscapes. Space and Culture, 23(2), 129–148.

van Ewijk, H. (2011). Collaboration in community research: Samenwerking in buurtonderzoek. European Journal of Social Work, 14(1), 41–52.
Yu, T., Liang, X., Shen, G. Q., Shi, Q., & Wang, G. (2019). An optimization model for managing stakeholder conflicts in urban redevelopment projects in China. Journal of Cleaner Production, 212, 537–547. https://doi.org/10.1016/j.jclepro.2018.12.071
Yung, E. H. K., Zhang, Q., & Chan, E. H. W. (2017). Underlying social factors for evaluating heritage conservation in urban renewal districts. Habitat International, 66, 135–148. https://doi.org/10.1016/j.habitatint.2017.06.004
Zafarmandi, S. and Mahdavinejad, M., 2021. Technology of modern windcatchers: A review. Int. J. Architect. Eng. Urban Plan, 31(3), pp.1-11.
Zhou, Q. B., Zhang, J., Zhang, H., & Li, X. R. (2018). Is all authenticity accepted by tourists and residents? The concept, dimensions and formation mechanism of negative authenticity. Tourism Management, 67, 59–70.

7 Conclusion

Towards Participatory Heritage Using Artificial Intelligence and Information Repositories

This chapter is based on the following conference paper:
Foroughi, M., Wang, T., and Roders, A.P., 2023. Towards Participatory Heritage Using Artificial Intelligence and Information Repositories. Faro Convention International Conference (in preparation)

7.1 Reflection on the research

This research focuses on consensus-building in participatory heritage practices, exploring the potentials of AI and information repositories, to better identify and conserve the cultural significance of built heritage. The study employed a value-based approach in heritage planning, as outlined by Taylor (2004), with a specific focus on involving multiple stakeholder groups beyond traditional experts. The information repositories capture diverse stakeholder groups' perceptions, highlighting the various cultural significances attributed to heritage according to different stakeholders. The primary objective was to identify the differences and similarities between the stakeholder groups on the cultural significance (values and attributes) conveyed to built heritage, which can be used as a source for making more integrated and informed decisions, aligned with the identified cultural significance. This resulted in the development of a comprehensive and inclusive theoretical and methodological framework, aligning with the UNESCO Recommendation on the Historic Urban Landscape (UNESCO, 2011).

In contrast to conventional expert-based investigations, which rely heavily on extrinsic expertise and years of professional knowledge (UNESCO, 1972, 2008), this research necessitated a different skill set to summarize, reveal, and analyze cultural significance from extensive information repositories. Given the vast amount of unstructured textual data, manual and qualitative processing proved impractical, thereby prompting the need for efficient and high-quality methods. Capitalizing on state-of-the-art AI models that have undergone extensive development and pre-training, which demonstrate the ability to transfer and generalize across different tasks (Pan and Yang, 2010), presented an opportunity to augment heritage studies with an inclusive approach, offering large-scale evidence that could be replicated efficiently in other contexts. This dissertation serves as one of the pioneering examples that combine knowledge from AI and information repository analysis (e.g., social media analysis), within the field of heritage studies, to facilitate consensus-building by revealing differences and similarities with the ultimate aim of promoting socially inclusive heritage planning.

The findings of this research revealed the significant factors influencing consensus-building in a participatory process, including actors involved, methods employed, levels of public participation, approaches to consensus-building, and the existence of conflicts. Additionally, the study presented and applied a methodological framework on a case study revealing the potential of employing a multi-label text classification model (an AI model) on information repositories (e.g., social media platforms, bibliographic databases, and online databases) to uncover differences and similarities among stakeholder groups on cultural significance conveyed to heritage to facilitate consensus-building in participatory heritage practices. Moreover, it is shown that a diversity of perceptions regarding the cultural significance of heritage may not necessarily be conflicting, but rather complementary.

The following paragraphs provide the answers to the questions of this doctoral research. After, there is a reflection on the research statement. Following that, the relevance of the work and its implications are explained. Lastly, the research's limitations are discussed, and recommendations for future studies are presented.

7.1.1 Overview of the research question and answers to them

The first sub-question is: **What are the critical factors affecting the public participation process to reach a consensus on values and attributes?**

This study highlights the importance of incorporating participatory practices into heritage planning, drawing from the long-standing traditions of urban planning and management fields. By utilizing quantitative and qualitative methods, it is possible to move beyond an expert-dominated approach to achieve greater social diversity and inclusion. This study presents a theoretical framework that identifies relevant factors and their relationships to support this need.

Through a systematic literature review, this study finds that the literature offers a range of approaches to public participation, including innovative technological methods that can reduce costs, expand participation, and accelerate the process. The study notes that achieving consensus-building through public participation is a complex, multi-factor process, and policies and practices must consider this complexity upfront to approach them holistically. The study identifies common factors and sub-factors that influence consensus-building in public participatory processes, which can be classified under two themes: public participation (actors, methods, and levels) and consensus (approaches and conflicts). This study also presents a methodological framework that shows that these influencing factors are closely related, and designing a public participatory process requires considering all factors together to avoid unintended consequences (see Chapter 2).

The second sub-question is: **What are the values and attributes associated with windcatchers of Yazd according to different groups of stakeholders?**

As explained widely in the introduction chapter, this study developed a methodological framework empowered by AI to reveal different stakeholder groups' perceptions and their differences and similarities using information repositories. To showcase how the framework works in practice, it was applied in a case study of Yazd, Iran. This study focuses on windcatchers, which are key attributes conveying outstanding universal value, as inscribed on the UNESCO World Heritage List. This research compares the perceptions of experts, policymakers, and users on the cultural significance of windcatchers of Yazd, to reveal differences and similarities between the three stakeholder groups (see Figure 7.1). The following paragraphs state the cultural significance of windcatchers of Yazd which was revealed using the methodological framework.

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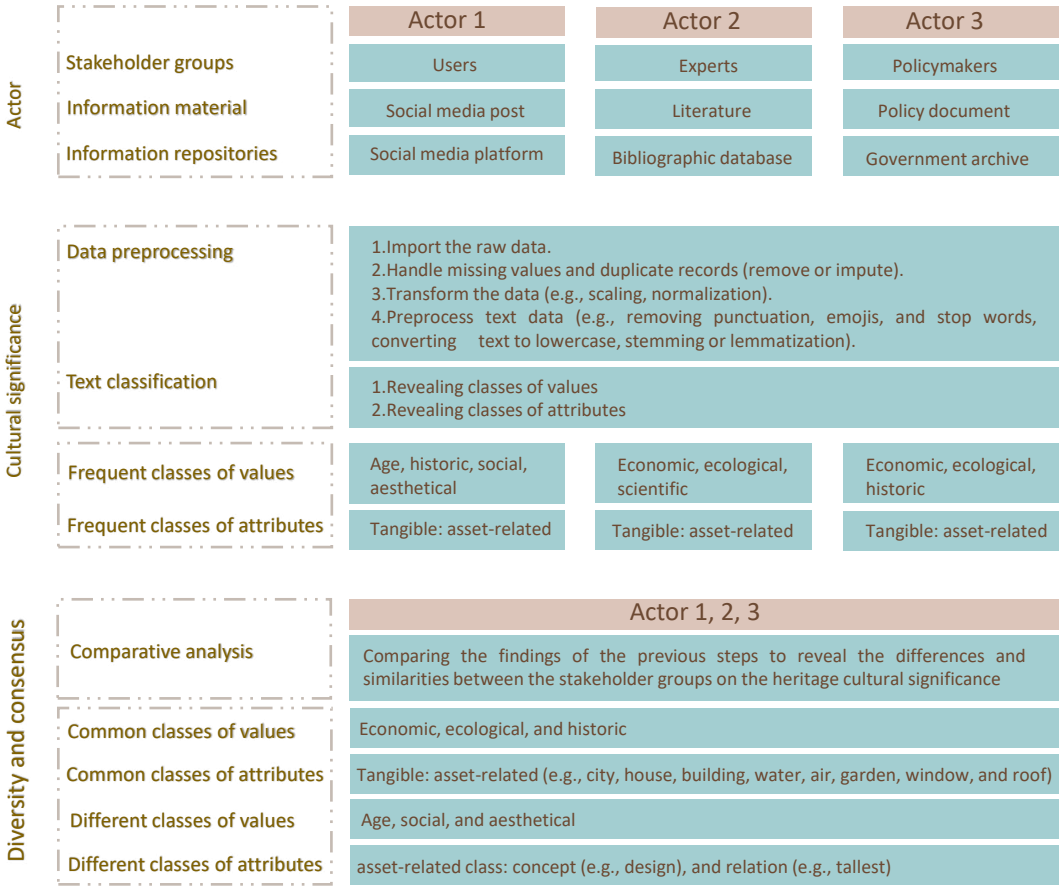

FIG. 7.1 Overview of the methodological framework. The content of this table is based on the analysis conducted through this research.

Users

Users mainly address tangible attributes regarding windcatchers of Yazd. They address a wide range of asset-related attributes from buildings (e.g., house, room) and building elements (e.g., porch, earthen material) to natural elements (e.g., air, garden). Nonetheless, also intangible attributes are addressed, including architecture and tallest. These intangible attributes mainly fall under the asset-related category, which encompasses features such as characteristics (height, size, etc.), conceptual features (architecture, art, etc.), and relational features (tallest, smallest, view, direction, skyline, etc.).

TOC

Furthermore, the findings indicate that users tend to mention these attributes without specifying their corresponding values. Still, all classes of values are addressed by users. But age is the most commonly mentioned value at 26%, followed by historic value at 18%, social value at 16%, aesthetical value at 14%, economic value at 10%, ecological value at 8%, scientific value at 7%, and finally political value at 1% (see chapter 3).

Experts

Concerning the cultural significance of the windcatchers of Yazd, and related attributes such as city, building, ventilation, and architectural element, results reveal that experts refer to the tangible attributes more frequently than the intangible ones. They mainly cover a broad spectrum of asset-related attributes ranging from buildings (e.g., house, room) and building elements (e.g., porch, earthen material) to natural elements (e.g., air, garden). The intangible attributes conveyed mainly pertain to the asset-related class, comprising characteristics (such as temperature, climate, summer, heat, and thermal comfort), concepts (such as architecture and design), and relations (such as direction). It is important to note that while temperature, climate, summer, and heat are technically not attributes, they are natural elements that convey the intangible character of windcatchers. These elements are used in sentences that describe the windcatchers' intangible features that create a comfortable microclimate during hot and arid summers by reducing the temperature.

Experts mainly highlight the economic, ecological, and scientific values of windcatchers: economic (40%), ecological (19%), scientific (18%), age (7%), social (7%), historic (4%), aesthetical (3%), and political (2%) values. Interestingly, economic value is the most important value of windcatchers according to experts (see chapter 3).

Policymakers

The findings indicate that tangible attributes were more commonly referenced than intangible ones in policy documents. These tangible attributes are mainly associated with the building, building elements, and natural elements. However, intangible attributes such as skyline and design were also addressed, which are related to the character, concept, and relation of windcatchers.

Regarding the values of windcatchers in Yazd and the associated attributes, all the analyzed policy documents highlighted at least four values: economic, ecological, historic, and age. Overall, Economic value was the most frequently mentioned (21%), followed by ecological (17%), aesthetical (14%), historic (14%), age (12%), social (11%), scientific (7%), and political (4%) values (see chapter 4).

The third sub-question is: **What are the differences and similarities in the values and attributes associated with windcatchers of Yazd according to different groups of stakeholders?**

The final step in the theoretical framework involves conducting a comparative analysis to determine the differences and similarities in the cultural significance conveyed by various stakeholders using the findings of the preceding steps. In summary, this study validates the existence of differences and similarities in the cultural significance of windcatchers in Yazd as perceived by the three stakeholder groups. By examining and comparing diverse information repositories with the aid of an AI model, this research demonstrates the anticipated benefits of understanding and interpreting the cultural significance (values and attributes) of heritage properties from different stakeholder groups' perceptions. Moreover, it confirms the interconnections between various attributes and values associated with the windcatchers of Yazd. The research emphasizes the importance of considering a relational system where attributes and values are interconnected, rather than studying them in isolation, thus preventing the oversight of closely related elements within the system. This approach sheds light on values and attributes acknowledged by different stakeholders. The subsequent paragraphs detail the differences and similarities.

Among the top 20 most frequent attributes identified in each information material, seven attributes were commonly mentioned by all stakeholders. These attributes included the city, house, building, water, air, garden, window, and roof. However, stakeholders assigned different values to these attributes.

The study found that stakeholders attributed a diverse range of values to windcatchers and highlighted the relationship between these values and specific attributes. The cultural significance of windcatchers was defined by a combination of values and tangible and intangible attributes. For instance, the climate character of Yazd, garden, water, and openings worked together with windcatchers to ventilate the air in a building, creating a microclimate, providing thermal comfort, and protecting the building from earthquakes, which reflected the ecological and economic values of windcatchers. Therefore, preserving only windcatchers without considering the other attributes playing a role in making a comfortable ecosystem could put relevant values at risk.

Experts primarily focused on economic, ecological, and scientific values and highlighted fewer attributes. However, policymakers and users referred to a broader range of values and attributes. While some values and attributes were identified by all stakeholders, others were only mentioned by one or two groups of stakeholders. For instance, users frequently mentioned special buildings with unique windcatchers, such as the Aghazadeh and Dowlat-Abad buildings. Users and policymakers highlighted the landscape of the Historic City of Yazd, punctuated by landmarks such as windcatchers, turquoise domes, and minarets. Lastly, policymakers emphasized the significance of decoration and decorative materials, such as plaster and tile, and their social values (see Chapter 5).

Overall, The differences between stakeholder groups' on the cultural significance they convey to windcatchers were more complementary than contradictory. The findings show that while stakeholders recognize various values attributed to windcatchers, a consensus prevails that these values are predominantly positive. In other words, there is a consensus on acknowledging windcatchers as a valuable attribute in Yazd although stakeholder groups assign different values to windcatchers.

7.1.2 Research statement

Despite the growing interest in participatory heritage planning in both academia and practice, there remains a knowledge gap regarding the influential factors, methods, and the utilization of AI-supported tools that rely on information repositories to enhance consensus-building in participatory practices. This research sheds light on public participatory heritage planning focusing on consensus-building on cultural significance by presenting a theoretical framework on the influencing factors on the participatory process and their relations and developing an innovative methodological framework using AI-supported tools that rely on information repositories to facilitate the participatory process. To showcase how the framework works in practice, it was applied in a case study of Yazd, Iran. The study focuses on windcatchers, which are key attributes conveying outstanding universal value, as inscribed on the UNESCO World Heritage List. Accordingly, the differences and similarities of various stakeholder groups on the cultural significance of windcatchers were revealed to raise awareness and ultimately facilitate consensus-building in a participatory process.

The theoretical framework and the methodological framework presented in this research are both in line with the latest developments in the field of heritage studies and create the basis to further reflect on the factors and the relations that should be considered for

participatory heritage planning, and how to be more innovative using AI and information repositories. The theoretical framework and the methodological framework are flexible and adaptable to different contexts, needs, and stages of intervention. For this reason, their utility goes beyond the temporal and physical boundaries of their development, with the possibility to be adopted and implemented in other case studies. At last, such flexibility and inclusivity make the theoretical framework and the methodological framework valuable shared resources for heritage practitioners to support the implementation of participatory practices and consensus-building.

This research contributes to the field of heritage planning by providing insights into the potential of using AI models to build consensus among diverse stakeholders. It also sheds light on the role of information repositories (e.g., social media platforms) in heritage planning and how they can be used to foster public participation and inclusivity, particularly when the community is active. Overall, the proposed research aims to advance knowledge in the field of heritage planning and contribute to the development of more effective and inclusive heritage planning.

7.1.3 Research relevance

This research has significant relevance in multiple aspects, namely social, digital, data, practical, and theoretical realms. Firstly, it emphasizes the importance of incorporating diverse stakeholder groups' perceptions and recognizing the differences and similarities involved in defining the cultural significance of heritage. By advocating for public participation, this study contributes to the advancement of inclusive heritage practices and empowers local communities in decision-making processes, highlighting the social relevance of the research.

Secondly, the development of a specialized AI model for heritage analysis demonstrates the digital relevance of this research. By leveraging technology, this study enhances the efficiency and scalability of heritage planning. It emphasizes the extraction and analysis of values and attributes from various data repositories, such as social media platforms and online databases. This utilization of diverse and extensive data provides profound insights into stakeholders' viewpoints and the cultural significance of heritage properties, showcasing the data relevance of the research.

Furthermore, the presentation of a methodological framework for public participation in heritage planning, empowered by AI, offers a practical tool for analyzing stakeholder groups' perceptions, identifying differences and similarities, and facilitating consensus-building processes. The successful application of this

framework in the Yazd case study demonstrates its practical usability and potential for replication in other heritage planning contexts, illustrating its practical and applied relevance. The resulting methodological framework can support and guide the work of urban heritage practitioners, cultural brokers, public officers, and policymakers, in aligning strategies, regulations, and practices to inclusive heritage planning.

Lastly, the theoretical contribution of this thesis lies in the development of a theoretical framework that explores the factors influencing consensus-building on cultural significance in public participation processes. Overall, by establishing theoretical linkages between public participation, cultural significance, consensus, AI, and information repositories, this research expands the knowledge base in heritage planning and establishes a theoretical foundation for future investigations in the field, highlighting the theoretical relevance of the study.

7.2 Research limitations and recommendations

This research undertook initial steps to elaborate a working theoretical framework to support the research gap by specifying the relevant factors and their relations. The theoretical framework presented is based on the state-of-the-art literature, a variety of existing theories, and the discourses stated in this research. The framework specifies the relevant factors and their interrelations and has the potential to be applied to case studies. In addition, this framework could be used in future studies to promote consensus-building in participatory heritage planning. However, the theoretical framework was limited to peer-reviewed articles in the Scopus database. While the framework incorporates state-of-the-art literature and a variety of existing theories, the restricted number of articles may have limited the breadth and depth of the literature review. To address this limitation, future research can aim to validate the framework by conducting a more extensive literature search using multiple bibliographical search engines, including PubMed, Web of Science, and Google Scholar. By including a wider range of scholarly resources and employing a systematic literature review approach, researchers can ensure a comprehensive understanding of the relevant factors and their interrelations, strengthening the theoretical foundation of the framework.

Besides, this dissertation presents a methodological framework using one AI model (multi-label text classification) to reveal and analyze the cultural significance conveyed in information repositories within the context of heritage planning. There are still numerous possibilities and potentials for the application of AI in this field (Condorelli et al., 2020; Matrone et al., 2020; Yuan et al., 2022). Even with a perfectly trained model, it is important to exercise caution by checking the validity, reliability, and coherence of the AI models and their interpretations. Future studies can focus on evaluating the performance and biases of the AI model used for multi-label text classification. This can be achieved through rigorous validation processes, including comparison with human expert judgments and conducting sensitivity analyses to assess the model's response to variations in input data. By addressing these concerns, researchers can ensure the accuracy and trustworthiness of the AI-based analysis and its suitability for policy decision-making in the context of World Heritage.

Moreover, the research acknowledges that relying solely on limited information repositories as primary data sources may present limitations in obtaining a comprehensive picture of cultural significance. To mitigate this limitation, future studies can employ integrated research and mixed analysis methods that combine qualitative and quantitative approaches. This could involve incorporating additional data collection and analysis methods, such as archival maps (Potdar and Verbakel, 2022), design and planning practices (Fredholm et al., 2021; Castro de Azevedo, 2023), interviews (Tarrafa Silva et al., 2023), surveys (Gonçalves et al., 2021; Ducci et al., 2023), behavioral data (Bai et al., 2023), and participatory workshops (Pintossi et al., 2023; Zheng, 2023). By integrating diverse data sources, researchers can overcome the limitations of information repositories and gain a more holistic understanding of cultural significance in heritage planning.

The methodological framework has the potential to be extended and continued in different directions. Firstly, it can be applied to other attributes in Yazd and other cities around the world. By doing so, the generalizability of the proposed framework could be tested. The second approach involves utilizing real-time data to provide relevant authorities and the general public with information on the immediate impact of their actions and the necessary measures to take. Thirdly, the application of the framework can be disseminated on a larger scale to a wider network of authorities in different historical cities. In this way, the scope goes beyond any specific case study and aims at a general rule or even a universal law about cultural significance perceived and expressed by stakeholder groups on social media platforms and other information repositories. Establishing a larger network of cities and regions could facilitate responsive heritage decision-making based on a well-informed understanding of public concerns and priorities on a broader scale. This would pave the way for explicitly online participatory heritage planning, which is socially responsible and respectful of the diversity of public voices that are increasingly being expressed online.

Lastly, although UNESCO recommends greater public participation, its implementation remains critical. Future studies could show how heritage planning is becoming more inclusive by using AI and information repositories. It is also essential to investigate whether revealing and exchanging heritage knowledge between policymakers, experts, and users in an inclusive heritage planning system can lead to a shared understanding of cultural significance conveyed to heritage and consensus among different stakeholders, especially those with conflicting interests.

References

Bai, N., Nourian, P., Pereira Roders, A., Bunschoten, R., Huang, W., and Wang, L. (2023). Investigating rural public spaces with cultural significance using morphological, cognitive and behavioural data. Environment and Planning B: Urban Analytics and City Science, 50(1):94–116.

Castro de Azevedo, A. (2023). Barriers to public participation in memorialization processes: Evidence from the dutch holocaust memorial of names. In Rodenberg, J., Wagenaar, P., and Burgers, G.-J., editors, Calling on the Community, Explorations in Heritage Studies, pages 162–188. Berghahn Books, United Kingdom. Condorelli, F., Rinaudo, F., Salvadore, F., and Tagliaventi, S. (2020). A neural networks approach to detecting lost heritage in historical video. ISPRS International Journal of Geo-Information, 9(5):297.

Ducci, M., Janssen, R., Burgers, G.-J., and Rotondo, F. (2023). Mapping local perceptions for the planning of cultural landscapes. International Journal of E-Planning Research (IJEPR), 12(1):1–27.

Fredholm, S., Dore, M., and Brorström, S. (2021). Strategic responses to wicked problems of heritage management: Experiences from the west link infrastructure project in gothenburg, sweden. Land, 10(10):1032.

Gonçalves, J., Mateus, R., Silvestre, J. D., Roders, A. P., and Bragança, L. (2021). Attitudes matter: Measuring the intention-behaviour gap in built heritage conservation. Sustainable Cities and Society, 70:102913.

Matrone, F., Grilli, E., Martini, M., Paolanti, M., Pierdicca, R., and Remondino, F. (2020). Comparing machine and deep learning methods for large 3d heritage semantic segmentation. ISPRS International Journal of Geo-Information, 9(9):535.

Pintossi, N., Kaya, D. I., van Wesemael, P., and Roders, A. P. (2023). Challenges of cultural heritage adaptive reuse: A stakeholders-based comparative study in three european cities. Habitat International, 136:102807.

Potdar, K. and Verbakel, E. (2022). Eidetic mapping: An exploration for sustainability and resilience of historic urban landscapes. In The Twelfth International Convention of Asia Scholars (ICAS 12), volume 1, pages 547–559. Amsterdam University Press.

Tarrafa Silva, A. and Pereira Roders, A. (2012). Cultural Heritage Management and Heritage (Impact) Assessments. In Joint CIB W070, W092 & TG72 International Conferenceon Facilities Management, Procurement Systems and Public Private Partnership.

Tarrafa Silva, A., Pereira Roders, A., Cunha Ferreira, T., and Nevzgodin, I. (2023). Critical analysis of policy integration degrees between heritage conservation and spatial planning in amsterdam and ballarat. Land, 12(5):1040.

Yuan, W., Yang, L., Yang, Q., Sheng, Y., and Wang, Z. (2022). Extracting spatio-temporal information from chinese archaeological site text. ISPRS International Journal of Geo-Information, 11(3):175.

Zheng, N. (2023). Coming to grips with diverse voices in participatory heritage initiatives. PhD thesis, Vrije Universiteit Amsterdam.

Appendices

APPENDIX A

Extended value and attribute typologies

The cultural significance analysis in this study is based on two theoretical frameworks: a) the values framework, developed by Pereira Roders (2007), and b) the attributes framework, developed by Veldpaus (2015). Tables APP.A.1 and APP.A. 2 briefly provide the definitions of values and attributes based on these frameworks.

TABLE APP.A.1 Extended value typology, Pereira Roders, 2007; Speckens, 2010; Tarrafa and Pereira Roders, 2011

		category	Short description	Long description
intangible	asset-related	concept	period/style	The intangible attribute is the intended idea, norms, values, expression, style in arts or architecture, and the development (phase, evolution) thereof. Often the attribute is related, or represented by, a tangible heritage asset.
		relation	relation object-object	The intangible attribute represents a relation with another connected element, location, place, or environment. Often the attribute is related, or represented by, a tangible heritage asset.
		character	image	The intangible attribute represents defining features, or a specific nature or quality. This can be related to a specific design (e.g. typology, morphology, layout, composition, proportion) or atmosphere (e.g. tranquil, lively, urban, rural)
	societal	Use	Function	The intangible attribute represents a specific (typical, common, special) use or function of a place or environment.
		knowledge	traditions, practices, or customs	The intangible attribute represents (local) practices, traditions, knowledge, or customs of a community or group. These can be phenomena associated with a place or the understanding of the world by a group of people, which are transmitted and/or repeated and experienced and/or practiced
		association	relation men-object	The intangible attribute represents human associations with a place, element, location, or environment
		community	society, individuals, and their	The intangible attribute represents a community or society itself (its members or specific individuals or groups) and/or their cultural identity or diversity.
	process	Planned	Management	The intangible attribute represents an action, change or process that is intentional and planned, determined by strategies and policies (bureaucracy). The attribute often is a more short or medium term process.
		unplanned	development or evolution	The intangible attribute represents an action, change, or process that is piecemeal, unintentional, spontaneous, and natural, without intervention of policies or strategies. The attribute is often a long-term, slow process.

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TABLE APP.A.1 Extended value typology, Pereira Roders, 2007; Speckens, 2010; Tarrafa and Pereira Roders, 2011

		category	Short description	Long description
tangible	asset	building element	part of building	The tangible attribute represents elements or parts of a building. This element can be constructive, constitutive or decorative.
		building	Whole building	The tangible attribute represents a whole building, structure, construction, edifice, or remains that host(ed) human activities, storage, shelter or other purpose.
		urban element	part in the urban landscape	The tangible attribute represents elements, parts, components or aspects of/ in the urban landscape. This can be a construction, structure, or space, which is constructive, constitutive, or decorative
		natural element	flora or fauna	The tangible attribute represents specific flora or fauna, like water elements of/ in the historic landscape produced by nature. It can be natural or designed.
	area	ensemble	group of buildings	The tangible attribute represents a group of buildings or a specific urban ensemble or configuration. The combination generates or represents specific history, coherence, variation, and significance and has recognizable relations.
		context	setting	The tangible attribute represents the buildings or elements surrounding, supporting, or contextualizing the actual heritage. It is situating, adds understanding, often though not necessarily geographical proximity
		area	district in the wider (urban) landscape	The tangible attribute represents a district in a wider (urban) landscape or a specific combination of cultural and or natural elements
	all	layering	stratigraphy	The tangible attribute represents a landscape illustrative of the evolution or development of human society and settlement over time, a diversity of manifestations of the interaction between humankind and its natural environment.
		landscape	everything based on significance	The tangible attribute represents the integrated whole, the wider (urban) cultural landscape including (indicated or located) elements, areas or attributes with various levels of significance.

SOCIAL	SPIRITUAL EMOTIONAL (IND.) EMOTIONAL (COL.) ALLEGORICAL	BELIEFS, MYTHS, RELIGIONS (ORGANIZED OR NOT), LEGENDS, STORIES, TESTIMONIAL OF PAST GENERATIONS MEMORY AND PERSONAL LIFE EXPERIENCES NOTIONS RELATED WITH CULTURAL IDENTITY, MOTIVATION AND PRIDE, SENSE OF "PLACE ATTACHMENT" AND COMMUNAL VALUE OBJECTS/PLACES REPRESENTATIVE OF SOME SOCIAL HIERARCHY/STATUS
ECONOMIC	USE NON-USE ENTERTAINMENT ALLEGORICAL	THE FUNCTION AND UTILITY OF THE ASSET, ORIGINAL OR ATTRIBUTED THE ASSET'S EXPIRED FUNCTION, WHICH HAS IT VALUE ON THE PAST, AND SHOULD BE REMAINED BY ITS EXISTENCE (OF MATERIALS), OPTION (TO MAKE SOME USE OF IT OR NOT) AND BEQUEST VALUE THE ROLE THAT MIGHT BE HAVE FOR CONTEMPORANEOUS MARKET, MAINLY FOR THE TOURISM INDUSTRY ORIENTED TO PUBLICIZING FINANCIALLY PROPERTY
POLITICAL	EDUCATIONAL MANAGEMENT ENTERTAINMENT SYMBOLIC	THE EDUCATION ROLE THAT HERITAGE ASSETS MAY PLAY, USING IT FOR POLITICAL TARGETS (E. G. BIRTH-NATIONS MYTHS, GLORIFICATION OF POLITICAL LEADERS, ETC.) MADE PART OF STRATEGIES AND POLICIES (PAST OR PRESENT) IT IS PART OF STRATEGIES FOR DISSEMINATION OF CULTURAL AWARENESS , EXPLORED FOR POLITICAL TARGETS EMBLEMATIC, POWER, AUTHORITY AND PROSPEROUS PERCEPTIONS STEM FROM THE HERITAGE ASSET
HISTORIC	EDUCATIONAL HISTORIC-ARTISTIC HISTORIC-CONCEPTUAL SYMBOLIC ARCHAEOLOGICAL	HERITAGE ASSET AS A POTENTIAL TO GAIN KNOWLEDGE ABOUT THE PAST IN THE FUTURE THROUGH QUALITY OF AN OBJECT TO BE PART OF A FEW OR UNIQUE TESTIMONIAL OF HISTORIC STYLISTIC OR ARTISTIC MOVEMENTS, WHICH ARE NOW PART OF THE HISTORY QUALITY OF AN OBJECT TO BE PART OF A FEW OR UNIQUE TESTIMONIAL THAT RETAINS CONCEPTUAL SIGNS (ARCHITECTURAL, URBAN PLANNING, ETC.), WHICH ARE NOW PART OF HISTORY FACT THAT THE OBJECT HAS BEEN PART/RELATED WITH AN IMPORTANT EVENT IN THE PAST CONNECTED WITH ANCIENT CIVILIZATIONS
AESTHETICAL	ARTISTIC NOTABLE CONCEPTUAL EVIDENTIAL	ORIGINAL PRODUCT OF CREATIVITY AND IMAGINATION PRODUCT OF A CREATOR, HOLDING HIS SIGNATURE INTEGRAL MATERIALIZATION OF CONCEPTUAL INTENTIONS (IMPLY A CONCEPTUAL BACKGROUND) AUTHENTIC EXEMPLAR OF A DECADE, PART OF THE HISTORY OF ART OR ARCHITECTURE
SCIENTIFIC	WORKMANSHIP TECHNOLOGICAL CONCEPTUAL	ORIGINAL RESULT OF HUMAN LABOUR, CRAFTSMANSHIP SKILLFULNESS ON TECHNIQUES AND MATERIALS, REPRESENTING AN OUTSTANDING QUALITY OF WORK INTEGRAL MATERIALIZATION OF CONCEPTUAL INTENTIONS (IMPLY A CONCEPTUAL BACKGROUND)
AGE	WORKMANSHIP EXISTENTIAL MATURITY	CRAFTSMANSHIP VALUE ORIENTED TOWARDS THE PRODUCTION PERIOD PIECE OF MEMORY, REFLECTING THE PASSAGE/LIVES OF PAST GENERATIONS MARKS OF THE TIME PASSAGE (PATINA) PRESENTS ON THE FORMS, COMPONENTS AND MATERIALS
ECOLOGICAL	SPIRITUAL ESSENTIAL EXISTENTIAL	HARMONY BETWEEN THE BUILDING AND ITS ENVIRONMENT (NATURAL AND ARTIFICIAL) IDENTIFICATION OF ECOLOGICAL IDEOLOGIES ON ITS DESIGN AND CONSTRUCTION MANUFACTURED RESOURCES WHICH CAN EITHER BE REUSED, REPROCESSED OR RECYCLED

TABLE APP.A.2 Extended attribute typology, Veldpaus (2015)

APPENDIX B

Classification analysis

As mentioned in the method items, this study uses the cosine similarity method for the multi-class text classification in chapters 3, 4, and 5. To replicate the model, the code is publicly available in the Github repository, an online platform (Foroughi, 2023). The words for each label are selected based on the value framework definitions (Pereira Roders, 2007) and the training dataset (2000 posts). Then three inclusion criteria were applied to these words:

1. The words for each label should only represent that label.
2. The cosine similarity of words embedding in each category should be more than 0.65
3. If the last criteria apply to all nominated words, nevertheless, there are two or more than two groups of terms with high cosine similarity in their embedding, then such words will become a sub-category.

In virtue of this calibration process, the categories and sub-categories identified are as follow:

- ‘social_spiritual’: [‘religious’, ‘spiritual’],
- ‘social_emotional’: [‘symbolic’, ‘emotion’, ‘moral’],
- ‘economic’: [‘economy’, ‘financial’, ‘commercial’],
- ‘political’: [‘political’, ‘government’],
- ‘age’: [‘old’, ‘ancient’],
- ‘scientific_workmanship’: [‘intelligent’, ‘knowledge’, ‘technical’],
- ‘scientific_technological’: [‘academic’, ‘technology’, ‘engineering’],
- ‘ecological_spiritual’’: [‘ecological’, ‘environmental’, ‘natural’],
- ‘aesthetical’: [‘beautiful’, ‘beauty’, ‘art’, ‘artistic’],
- ‘historic’: [‘historic’, ‘history’]

All words transform to their embedding by applying the Bert model. Then, the model reads word by word in each sentence of posts and calculates the distance between the word embedding and the embedding of the label (the average embedding of all the words in each label). For example, after transforming all the words to their embedding, the code specifies the label “antique” by calculating the cosine similarity of the embedding of antique with the embedding of each label. The label with the closest distance to the word will be considered as the nominated label, and if the distance between the word and the nominated label is more than 0.72, the label will be returned as the label of the word in the sentence or the hashtag. Then, the nominated label for “antique” is age as it has the highest cosine similarity, 0.74, and because this number is higher than 0.72, “age” is returned as the label of “antique.”

The distance between the two embeddings is calculated by Cosine similarity (the cosine of the angle between the two vectors). Cosine similarity is one of the most widely used and powerful similarity measures in Data Science. This study uses this method because it does not consider the length of the vector. In other words, the frequency of the word is not taken into account.

Reference

Foroughi, M., 2023. Reveal-heritage-values-and-attributes-from-textual-data. [The Github repository]. Retrieved from https://github.com/mahdaforoughi/Reveal-heritage-values-and-attributes-from-textual-data/tree/main.

APPENDIX C

Peoples' values and feelings matter

Participatory heritage management using social media

This Apppendix is based on the following book chapter:
Foroughi, M., de Andrade, B. and Roders, A.P., 2022. Peoples' values and feelings matter: participatory heritage management using social media. In Artificial Intelligence and Architectural Design: An Introduction (pp. 107-120).

ABSTRACT

Social media has been increasingly used by various communities to express their opinions, values, and feelings about cities and, in particular, built heritage. Social media platforms, interactive technologies used by virtual communities and networks became an important source for recent innovative studies on participatory heritage management. Amongst them, the application of artificial intelligence (AI) methods to analyze social media data for heritage management, in particular peoples' feelings and their relation to cultural significance (values and attributes), is seldom explored. This chapter explores the potential of social media content as a data source and artificial intelligence methods to analyze people's feelings and opinions about the cultural significance of built heritage. The city of Yazd, Iran, was taken as a case study, with a specific focus on windcatchers (architectural element used for natural ventilation), a key urban attribute also conveying outstanding universal value, ever since inscribed on the UNESCO World Heritage List in 2017. This chapter details: 1) the state of the art on participatory heritage management using social media; 2) the methodology to extract values and sentiments assigned to windcatchers on Instagram and Twitter posts over the last ten years; 3) and last, the preliminary findings on the values of windcatchers, sentiment and emotion analysis, and the association analysis between the values of windcatchers and emotions. Results indicate the most and least addressed categories of values and emotions. Moreover, some potential relations between values and emotions (e.g., economic, ecological,

and scientific values with trust) are revealed. Besides, it became proven that negative sentiments over windcatchers of Yazd are scarcely expressed (e.g., critiques) in social media. This study confirms the potential of social media for heritage management in terms of (de)coding and measuring the values of heritage attributes and related feelings. This research is useful to the windcatchers in Yazd, but also replicable to other case studies and scales.

KEYWORDS social media, artificial intelligence, public participation, cultural significance, sentiment analysis, emotions

APP.C 1 Introduction

People observe, experience, and interact with their environment, expressing their values and feelings (Pitsillides et al., 2012; Gorz, 1984). There has been a growing interest in including people's opinions in planning fields, and particularly in the heritage field, through a participatory approach (Landorf, 2009). A participatory approach is often positively associated with socially inclusive innovation processes, cultural value creation (Nakagawa, 2010; Sasaki, 2010), and a shared sense of identity (Biondi et al., 2020).

This fundamental change in the relation between heritage and the public is promoting collaboration, sharing interests, views, feelings, and sensitivities (Dodd, 1994), which reinforces their place attachment for being a member of a community, and growing ownership on heritage. Linked to a sense of living, heritage is dynamically recreated by communities in response to their interactions with nature and history, generating a sense of identity and continuity (Silberman et al., 2012).

Online communities have increasingly used social media platforms to share their opinions and create discussions over buildings and cities, particularly built heritage. The activity of diverse groups of people in social media leads to an interactive practice of 'remembering together'. It is more than simply individually sharing information because it encompasses discussing (e.g., (re)posting, responding) diverse experiences, understandings, feelings, and values about events with particular significance (Simon, R., 2012). Accordingly, van Dijck (2007) claims social media facilitates the culture of connectivity. Consequently, forming a collective memory in social media platforms offers new ways of public participation in heritage management (Simon, 2012).

In fact, social media posts shared through online conversations provide opportunities for smart technologies (e.g., Artificial Intelligence - AI) and techniques (e.g., Natural Language Processing - NPL) to capture and decode public voices at an unprecedented pace, which can potentially dynamize the dominant planning power structure (Tayebi, 2013). Besides, social media can reduce costs and upscale the involvement of stakeholders in urban planning (Ye et al., 2021; Kleinhans et al., 2015).

Social media platforms have been recently applied for participatory heritage management (Silberman et al., 2012; Giaccardi, 2012). Decoding cultural significance by distinguishing attributes (resources to be conserved) and values (the reasons to conserve the resources) is growing in attention both by research and practice, as endorsed by UNESCO Recommendation on the Historic Urban Landscape (UNESCO, 2011). Diverse scholars have been using social media to conduct innovative research to engage people and interpret their opinions and sentiments. They already analyzed people's feelings (Liang et al., 2021; Joseph, 2021; Abdul-Rahman,2021; Alizadeh et al., 2019) and their values (Ginzarly et al. 2019) related to spatial areas and heritage properties using AI models. However, no paper was found exploring the potential relations between sentiments and values.

Social media and artificial intelligence (AI) is, therefore, yet to be further explored in this topic. Even if widely addressed, there is a lack of research and heritage-specific tools to decode the cultural significance of built heritage, distinguishing and relating values (Bai et al., 2021). In addition, literature often focuses on the scale of country, city, and neighborhood (Monachesi, 2020; Ginzarly et al., 2019; Alizadeh et al., 2019), rather than specific attributes of cities, architectural elements such as the windcatchers. Hence, this chapter aims to investigate the potentials of social media as a data source and artificial intelligence methods for revealing the cultural significance (values and attributes) of built heritage: in particular, windcatchers of the city of Yazd, Iran was taken as a case study.

APP.C 2 Method

This research is conducted in four steps: data acquisition, data pre-processing, data analysis, and results (see Figure APP.C.1).

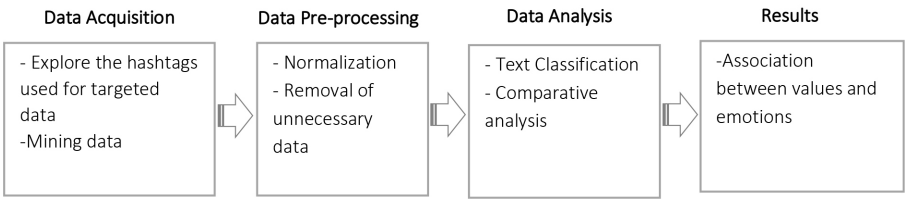

FIG. APP.C.1 Overview of the research process.

APP.C 2.1 Data acquisition

Related posts to the windcatchers of Yazd were mined from Instagram and Twitter. Various Persian and English hashtags are used referring to windcatchers including “badgir”, “wind-catcher”, “windcatcher”, “wind-tower”, “windtower”, “بادگیر”,“باد-گیر”,“بادگیرها”,“بادگیرهای”,“بادگیر_یزد”,“بادگیرهای_یزد”. This research retrieved all posts using these hashtags by WebHarvey software (23,899 posts). No time limit was applied to scoping the dataset.

The content of the data includes user name, post, time (time posted), number of likes, number of users’ posts, number of users’ followers, number of users’ followings, and users’ bio. The data do not cover the demographic characteristic of users, including age, gender, education, and professional status, because mostly these are not provided by the users. Moreover, this research considers ethical issues by only processing the comments expressing heritage cultural significance and not using or storing any sensitive personal data. Personal data will not be disclosed at any research stages, and the users’ identities will remain anonymous.

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APP.C 2.2 Data cleaning and pre-processing

The gathered posts not mentioning windcatchers and Yazd were excluded. To find these posts, the different forms of the word “Yazd” (both in Persian and English) were normalized to “yazd” with lowercase, and all posts that did not include “yazd” were excluded from the dataset. In the end, a total number of 3,346 sentences were analyzed. In addition to text normalization, unnecessary data (e.g., mentions, emojis, punctuation marks, website links) were removed to facilitate the data analysis.

APP.C 2.3 Data analysis

After the data cleaning and pre-processing, the dataset was ready for automatic content analysis. The content of each post was analyzed and assessed through automated quantitative content analysis and qualitative categorical analysis. The quantitative analysis revealed the most and least frequent words. The qualitative analysis showed how users refer to windcatchers and associate them with values and sentiments. Values are the reasons that people want to protect heritage resources. Sentiments are people’s feelings attached to heritage resources.

APP.C 2.3.1 Values analysis

The addressed values were analyzed on eight scales (see Figure APP.C.2, left) – social, economic, political, historic, aesthetical, scientific, age, and ecological – using the cultural values framework (Pereira Roders, 2007). The multi-class text classification analysis of values was undertaken using Python libraries, including Numpy (for calculation analysis), Pandas (for research on the data frame), and Bert model (word embedding). This research used the cosine similarity method for the multi-class text classification, because the distribution of labels in the available train dataset differed drastically, and there were not enough available trained datasets.

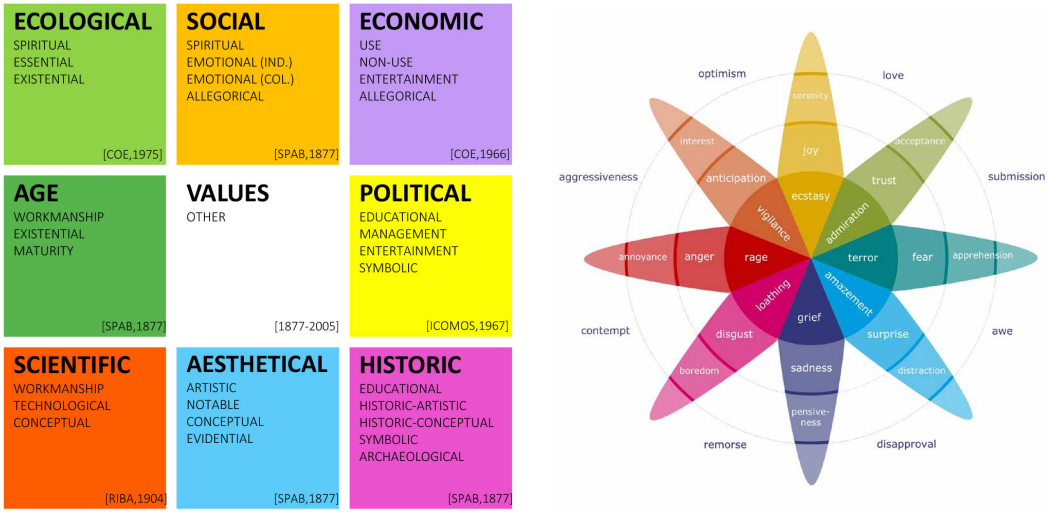

FIG. APP.C.2 Left: Cultural Values Framework (Pereira Roders, 2007); Right: Plutchik wheel of emotions (Donaldson, M., 2017)

APP.C 2.3.2 Sentiment analysis

The overall sentiment of posts was analyzed on five scales, from very positive to very negative, using the transformers library to load a pre-trained transformer model and the Bert model, developed by Devlin et al. (2018), to create the Word embedding. Word embedding encodes the words' meanings into vectors, and the terms that are closer in the vector space are expected to be similar in meaning. The embedding fed into the Gated Recurrent Unit (GRU) model to predict sentiment. Despite the algorithmic limitations, the results' reliability was confirmed (accuracy: 94%, precision_value: 72%, and F-measure: 77%[8]). To reveal more details on sentiment analysis, emotions within each group of sentiments were conducted on the data set, using Plutchik's wheel of emotions (Robert, 1980). This theoretical framework clusters emotions in eight basic emotions, which are four pairs of opposite emotions: joy and sadness; anger and fear; trust and disgust; and surprise and anticipation (see Figure APP.C.2, right).

8 **Accuracy** : (TruePositives_1 + TruePositives_2)+(TrueNegative_1 + TrueNegative_2) / ((TruePositives_1 + TruePositives_2) + (FalsePositives_1 + FalsePositives_2) +(TrueNegative_1 + TrueNegative_2)+(FalseNegative_1 + FalseNegative_2)
Precision_value : (TruePositives_1 + TruePositives_2) / ((TruePositives_1 + TruePositives_2) + (FalsePositives_1 + FalsePositives_2))
F-measure : (2 * Precision * Recall) / (Precision + Recall)

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APP.C 3 Results

APP.C 3.1 Values of windcatchers in Yazd

Most of the posts (66%) conveyed at least one of the eight values to the windcatchers of Yazd. The most frequent values are respectively age (26%), historic (18%), social (16%), aesthetical (14%), economic (10%), ecological (8%), scientific (7%), and political (1%) (see Figure APP.C.3).

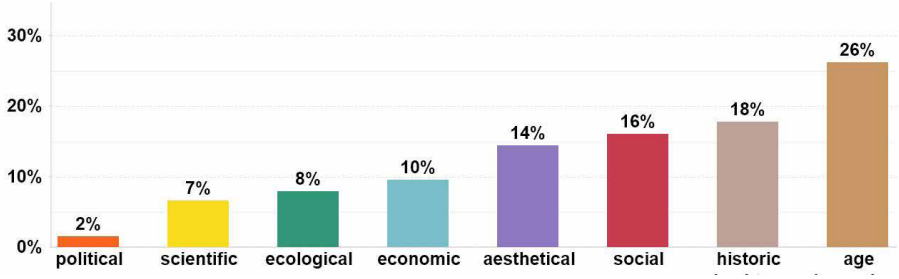

FIG. APP.C.3 The frequency of values in all the collected posts

APP.C 3.2 Sentiment analysis and relation with values

Sentiment analysis revealed the dominancy of posts with very positive and positive feelings (86%) followed by posts with neutral feelings (14%), and only 14 posts were found expressing negative feelings. These findings contradict the scholars concluding that people often use social media to complain and generally be pessimistic about urban issues (Resch, Summa, Zeile, & Strube, 2016).

To disclose more details on sentiment analysis, emotions within each group of sentiments were analyzed. The dominant emotions expressed by posts, as expected, are positive (joy, trust, surprise, and anticipation). While among these positive emotions, dominant ones are respectively joy (45%), trust (30%), and surprise (21%), anticipation is rarely addressed.

The association analysis between values and only the dominant emotions (namely joy, trust, surprise) was explored because other emotions are rarely mentioned. This analysis shows some relations, for example, While 73% (the maximum percentage in Figure APP.C.4) of posts conveying aesthetical value express joy, only 12% (the minimum percentage in Figure APP.C.4) express surprise. This can show a strong relation between aesthetical value and emotion of joy and a weak relation between aesthetical value and emotion of surprise among people posting about windcatchers of Yazd.

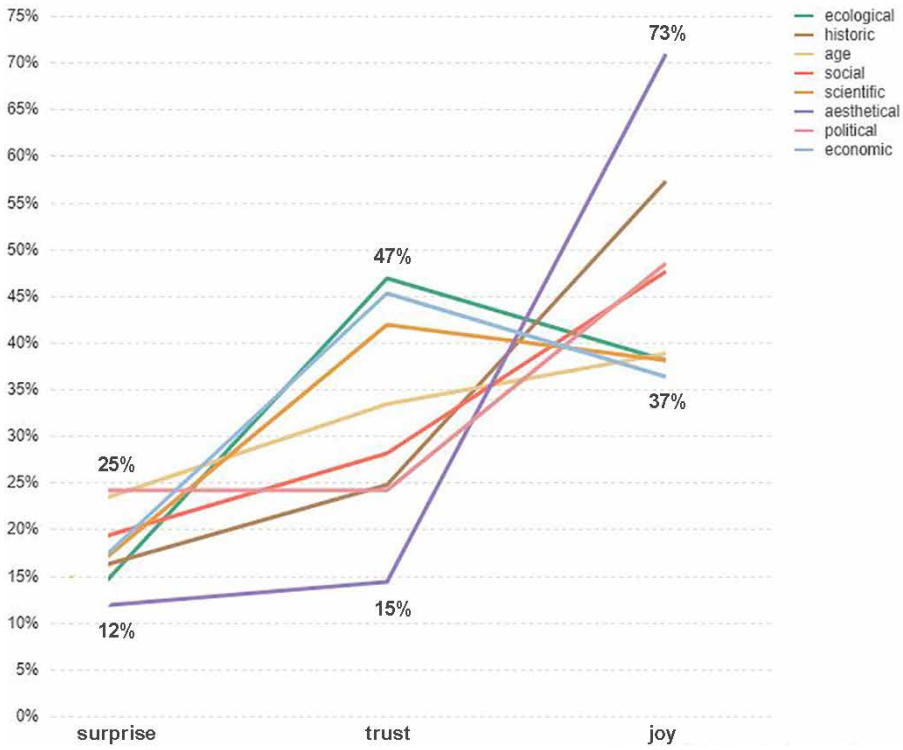

FIG. APP.C.4 The association between the dominant emotions and the values

Surprise has the minimum association with all the values among the most common emotions (e.g., “It is well known as the city of windcatcher an amazing piece of ancient tech!”) as the minimum percentage of posts refer to surprise (from 25% to 12%). Interestingly, aesthetical, historic, political, social, and age values are more linked with joy than trust (see Figure APP.C.4). For example, the word “beautiful” associated with aesthetic value conveys joy as emotion (e.g., “We loved

exploring Yazd from its secret rooftops... From there, you get a view of its beautiful windcatchers …"). On the other hand, economic, ecological, and scientific values relate more to trust than joy (e.g., "windcatchers are engineering elements used to create natural air conditioning")(see Table APP.C.1). To better understand the association between values and emotions in the analysis, more exemplary quotes are shown inTable APP.C.1.

TABLE APP.C.1 Exemplary quotes and addressed values

Exemplary quotes	Values	AI logics	Emotion
We're visiting one of the most ***beautiful viewpoint*** in the world! From #arthouseyazd you can see a panoramic view of #yazd and it's magic #windcatcher and #dome! #tourguide#privatetour #traveltoiran #privateguidedtours. (guidepersia, 2019)	aesthetical	beautiful (aesthetical),	joy
Beautiful ***historic*** city of Yazd, the Zoroastrian temple, the city of windcatchers, very ***beautiful*** and ***historic***, with hospitable people. (m.akbari2000, 2019)	historic, aesthetical	historic (historic), beautiful (aesthetical)	joy
Beautiful architecture of #dowlatabad garden and the world tallest wind tower (#badgir) in the UNESCO registered city of #yazd. (seeyouinyazd, 2019)	aesthetical	beautiful (aesthetical)	joy
We loved exploring Yazd from its secret rooftops... From there, you get a view of its ***beautiful*** windcatchers (badgir) designed to cool homes, poking out of the baked-brown labyrinth of lanes. (maryzeuk, 2016)	aesthetical	beautiful (aesthetical)	joy
This house is noteworthy in terms of using the ***traditional*** Iranian architecture … its two-floor windtower(BADGIR) is unique and awesome. The ***antiquity*** of this house dating back to ***Qajar period***. (dreamtrip2iran, 2016)	Political, historic, age	Zandieh and Qajar period (Political), history of 270 years (historic, age)	joy
Beautiful rooftop view of the old part of Yazd, with all its badgirs (windcatchers) and blue domes. (svenpunt, 2020)	social, age	traditional (social, age)	joy
windcatchers are ***engineering elements*** used to create ***natural air conditioning***. … (ifilmenglish, 2018)	aesthetical, age	beautiful (aesthetical), old (age)	joy
Badgirs are in shape of high structures designed to ***cool*** the inner environment of the houses by receiving the wind; ***cooling*** it; and directing the stream of cool wind into the inner spaces. … (khavartravel.en, 2019)	Scientific, ecological, economic	engineering elements (scientific), natural (ecological), air conditioning (economic)	trust
A windcatcher (windcatcher) is a ***traditional*** Persian ***architectural element*** to create ***natural ventilation*** in buildings. … (smm870508, 2015)	economic	cool (economic), cooling (economic)	trust
The famous Yazdi wind-catchers/badgirs, ***ancient*** system of ***natural air-conditioning*** designed to ***catch even the lightest breeze*** and ***direct it to the rooms below***. … (batakoja, 2016)	economic	traditional (social, age), architectural element (scientific), natural (ecological), ventilation (economic)	trust

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TABLE APP.C.1 Exemplary quotes and addressed values

Exemplary quotes	Values	AI logics	Emotion
… #BADGIR is a #***traditional*** #handmade ***engineering*** architectural #masterpiece to deal with the unbearable heat of the central #Iranian desert. … (who_loves_iran, 2017)	age, ecological, economic	ancient (age), natural (ecological), air-conditioning (economic)	trust
It is well known as the city of windcatcher an amazing piece of ***ancient tech***! (emmeandeffe, 2020)	social, age, scientific	traditional (social, age), engineering (scientific)	trust
Qajar and Zand governments built the world's tallest brick tower (wind catcher) the interior view of dowlat abad mansion's clay windcatcher , yazd , iran. … (handycraft, 2020)	age	ancient (age)	surprise
A windtower is one of the most famous elements in the ***traditional*** Iranian architecture. … (beautifulworldoftravel, 2020)	political	Qajar and Zand governments (political)	surprise
… The program that can be considered as "the most treacherous acting against Iran's ***national identity***" is a brazen attempt of the UAE sheikhs to inscribe "Iranian windcatcher " as " windcatcher and Arabic heritage" in the United Nations and this obvious theft is soon to be recognized. … (amlakbank, 2019)	social, age	traditional (social, age)	surprise
… Probably windcatchers cannot function properly as a ***traditional*** architectural element. (moudi.forouhi. photo, 2020)	social	national identity (social)	anger
We're visiting one of the most ***beautiful viewpoint*** in the world! From #arthouseyazd you can see a panoramic view of #yazd and it's magic #windcatcher and #dome! #tourguide#privatetour #traveltoiran #privateguidedtours. (guidepersia, 2019)	social, age	traditional (social, age)	sadness

Overall, the result item shows that both Instagram and Twitter users have been actively sharing their opinions over why windcatchers are significant (or not), assigning positive or negative feelings. This was made possible by decoding their views into classes of values and sentiments. The analysis of emotions and their associations with values is seldom investigated in the literature. This gap has started to be filled up in this research, which indicates that sentiments could be at the core of the value formation. For instance, if people attach a negative feeling to an attribute (e.g., windcatcher), they probably associate a negative value to it. Besides, some classes of values are keener to be more firmly attached to certain emotions (e.g., aesthetical value with joy, and scientific value with trust).

APP.C 4 Discussion and conclusion

Social media contributes to the act of remembering together, strengthening the sense of belonging and place attachment to the built heritage. Reaching and considering collective values and feelings about built heritage in an inclusive way contribute to the sense of identity and continuity, increasing the chances of a heritage attribute being conserved. Overall, the main contribution of this paper was to reveal the potential of applying social media analysis for participatory heritage management processes through the identification and interpretation of values and their association with sentiments and emotions.

Artificial intelligence methods were used to extract people's feelings and values assigned to windcatchers of Yazd from Instagram and Twitter over the last ten years. In contrast to some scholars' findings that people often use social media to be pessimistic about urban issues, posts rarely addressed negative sentiments over windcatchers in this research. Also, the association between values and the dominant emotions (namely joy, trust, and surprise) was analyzed, revealing some initial relations such as the relation between aesthetical values and joy, as well as, the scientific values and trust. Emotions might be related to the reasons why people convey value and how they interact with heritage and its attributes. Accordingly, this might affect how the public engages with heritage management. Still, this is just the start. Further research is needed to analyze the importance of emotions and how the relationship between emotions and value formation can be an asset for more inclusive heritage management.

The results of the data analysis provided a better understanding of the public's feelings and values assigned to windcatchers in Yazd, Iran. An innovative aspect of this research is the methodological process developed, which can be applied to other case studies with different scales.

Future studies are needed to advance social media data analytics, particularly concerning heritage management. First, social media's potential for crowdsourcing and real-time data analysis could drastically affect heritage management decision-making. The second issue is how to utilize the collective values and emotions expressed by online communities in heritage management to align with the sense of continuity and strengthen the collective memory and conservation of built heritage. Through these actions, social media and AI methods have the potential to contribute to more inclusive heritage management, bringing together a diversity of public voices in all its spectrum of positive and negative emotions and values. When better aware

of the relation between values and sentiments, policymakers can better define their strategies, triggering them to rather invest in trust when motivating residents to keep their houses' windcatchers and use them as natural ventilation systems (conveying ecological and economic values), or in joy, when motivating residents to keep windcatchers based on beauty and scenery (aesthetical values). A small but crucial difference that can ensure the success of strategic planning in heritage management.

References

Abdul-Rahman, M., Chan, E. H., Wong, M. S., Irekponor, V. E., & Abdul-Rahman, M. O. (2021). A framework to simplify pre-processing location-based social media big data for sustainable urban planning and management. Cities, 109, 102986.

Alizadeh, T., Sarkar, S., & Burgoyne, S. (2019). Capturing citizen voice online: Enabling smart participatory local government. Cities, 95, 102400.

Bai, N., Luo, R., Nourian, P., Roders, A. P., 2021. WHOSe Heritage: Classification of UNESCO World Heritage" Outstanding Universal Value" Documents with Smoothed Labels. arXiv preprint arXiv:2104.05547.

Biondi, L., Demartini, P., Marchegiani, L., Marchiori, M. and Piber, M. (2020). Understanding orchestrated participatory cultural initiatives: Mapping the dynamics of governance and participation. Cities, 96, p.102459.

Pitsillides, S., Jefferies, J., Conreen, m., 2012. Museum of the self and digital death An emerging curatorial dilemma for digital heritage In Giaccardi, E. ed., 2012. Heritage and social media: Understanding heritage in a participatory culture. Routledge.

Gorz, A. (1984) Paths to Paradise. London: Pluto

Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2018). Bert: Pre-training of deep bidirectional transformers for language understanding. arXiv preprint arXiv:1810.04805.

Dodd, J. (1994) 'Whose museum is it anyway? Museum education and the community', in E. Hooper-Greenhill (ed.) The Educational Role of the Museum, London: Routledge.

Donaldson, M., 2017. Plutchik's wheel of emotions—2017. Update.

Ginzarly, M., Roders, A. P., & Teller, J. (2019). Mapping historic urban landscape values through social media. Journal of Cultural Heritage, 36, 1-11.

Joseph, J.T. and Santiago, N., 2021, July. An Intelligent Image Based Recommendation System for Tourism. In 2021 IEEE Conference on Norbert Wiener in the 21st Century (21CW) (pp. 1-6). IEEE.

Liang, F., Pan, Y., Gu, M., Guan, W. and Tsai, F., 2021. Cultural Tourism Resource Perceptions: Analyses Based on Tourists' Online Travel Notes. Sustainability, 13(2), p.519.

Simon, R., 2012., Remembering together Social media and the formation of the historical present In Giaccardi, E. ed., 2012. Heritage and social media: Understanding heritage in a participatory culture. Routledge.

Kleinhans, R., Ham, M. V., & Evans-Cowley, J. (2015). Using social media and mobile technologies to foster engagement and self-organization in participatory urban planning and neighbourhood governance. Planning Practice & Research, 30(3), 237–247.

Landorf, C., 2009. A framework for sustainable heritage management: A study of U.K. industrial heritage sites. International Journal of Heritage Studies, 15(6), 494–510. https://doi.org/10.1080/13527250903210795.

Monachesi, P. (2020). Shaping an alternative smart city discourse through Twitter: Amsterdam and the role of creative migrants. Cities, 100, 102664.

Nakagawa,S. 2010. Socially inclusive cultural policy and arts-based urban community regeneration. Cities,27,S16–S24.

Pereira Roders, A. (2007). RE-ARCHITECTURE: Lifespan rehabilitation of built heritage, Eindhoven: Eindhoven University of Technology, 2007.

Sasaki, M., 2010. Urban regeneration through cultural creativity and social inclusion: Rethinking creative city theory through a Japanese case study. Cities, 27, pp.S3-S9.Sedgwick, P., 2010. Independent samples t test. BMJ, 340, p.c2673.

Silberman, N. and Purser, M., 2012, Collective memory as affirmation People-centered cultural heritage in a digital age In Giaccardi, E. ed., 2012. Heritage and social media: Understanding heritage in a participatory culture. Routledge.

Tayebi, A. (2013). Planning activism: using social media to claim marginalized citizens' right to the city. Cities, 32, 88-93.

UNESCO, in: Recommendation on The Historic Urban Landscape, UNESCO World Heritage Center, Paris; France, (2011) (http://www.stellenboschheritage. co.za/wp-content/uploads/UNESCO-Historic-Urban-LandscapesRecommendation-Short-Nov2011.pdf; accessed 15 September 2021).

van Dijck, J. (2007) Mediated Memories in the Digital Age, Stanford, CA: Stanford University Press.

Ye, X., Li, S., & Peng, Q. (2021). Measuring interaction among cities in China: A geographical awareness approach with social media data. Cities, 109, 103041.

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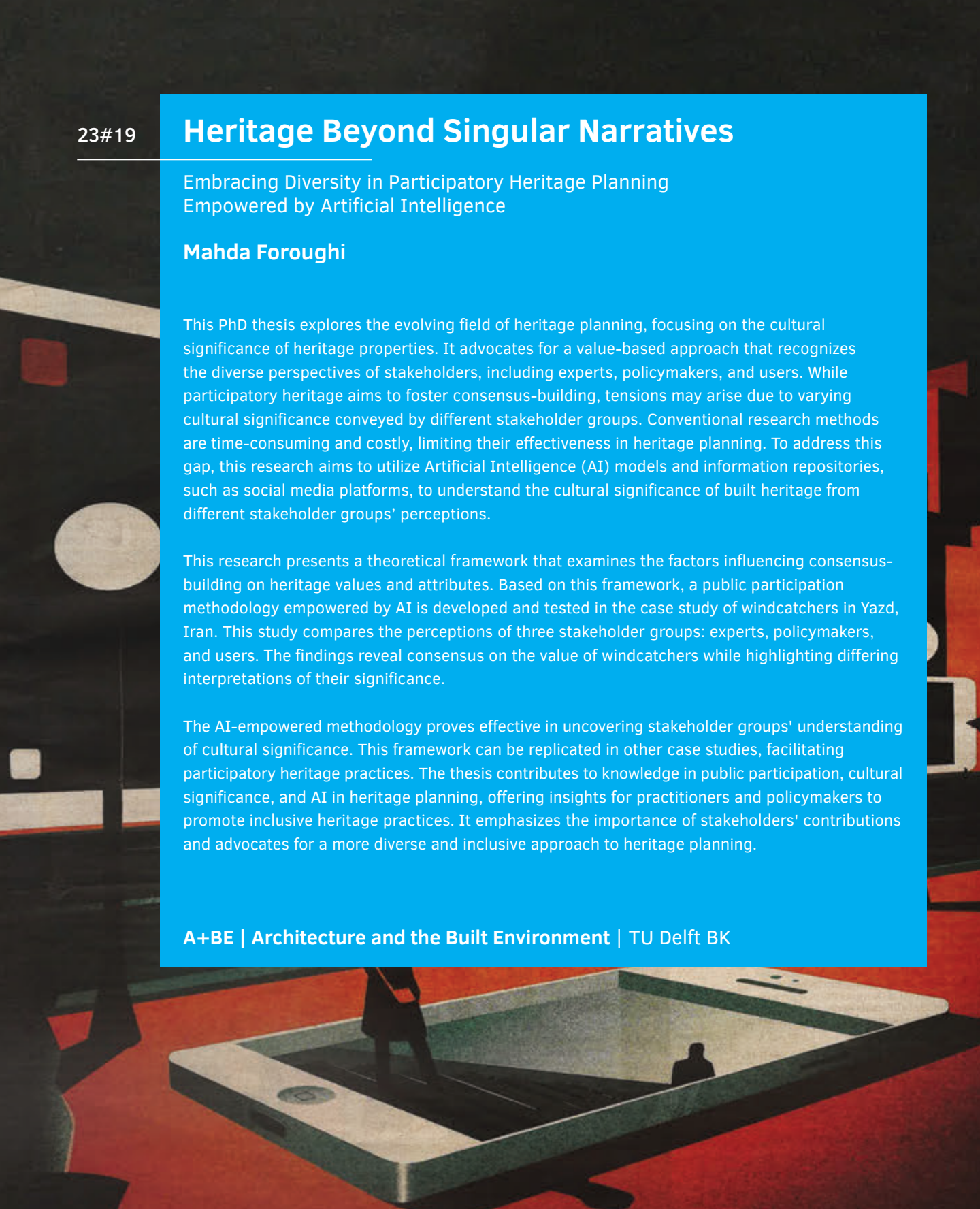

23#19

Heritage Beyond Singular Narratives

Embracing Diversity in Participatory Heritage Planning Empowered by Artificial Intelligence

Mahda Foroughi

This PhD thesis explores the evolving field of heritage planning, focusing on the cultural significance of heritage properties. It advocates for a value-based approach that recognizes the diverse perspectives of stakeholders, including experts, policymakers, and users. While participatory heritage aims to foster consensus-building, tensions may arise due to varying cultural significance conveyed by different stakeholder groups. Conventional research methods are time-consuming and costly, limiting their effectiveness in heritage planning. To address this gap, this research aims to utilize Artificial Intelligence (AI) models and information repositories, such as social media platforms, to understand the cultural significance of built heritage from different stakeholder groups' perceptions.

This research presents a theoretical framework that examines the factors influencing consensus-building on heritage values and attributes. Based on this framework, a public participation methodology empowered by AI is developed and tested in the case study of windcatchers in Yazd, Iran. This study compares the perceptions of three stakeholder groups: experts, policymakers, and users. The findings reveal consensus on the value of windcatchers while highlighting differing interpretations of their significance.

The AI-empowered methodology proves effective in uncovering stakeholder groups' understanding of cultural significance. This framework can be replicated in other case studies, facilitating participatory heritage practices. The thesis contributes to knowledge in public participation, cultural significance, and AI in heritage planning, offering insights for practitioners and policymakers to promote inclusive heritage practices. It emphasizes the importance of stakeholders' contributions and advocates for a more diverse and inclusive approach to heritage planning.

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