

Exploring Qanat as a Virtual Tourism Attraction in Iran: Cultural, Natural, and Environmental Significance

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Abstract

Qanat has many valued tourist attractions and adventure, cultural, natural, and environmental attractions can be considered one of the world's main tourist destinations. Qanat as a new tourism attraction can help develop the tourism sector in Iran. Also, the determination to recognize and introduce the tourism potentials of the qanat is more than beneficial it is an essential task of science and culture and is mainly related to Iranian culture. In other words, tourism and its revenues can give rise to more motivation for sustaining qanats. Iran, in terms of historical, cultural, and natural diversity, has many valuable potential, and regional planning, and comprehensive principles can be considered one of the main destinations of tourism heritage. The study indicates that Qanat is one of the most relevant man-made attractions in Iran which is contributing to the development of Persian heritage. It gives interesting routes for tourists who are interested in cultural tourism experiences. This study aims to identify Bayazeh Qanat online visitors who are attracted by website design. For this purpose, we designed the site www.marefatnia.zgig.ir which is used by Google Map API.

Keywords: Bayazeh Qanat, Virtual Tourism, Online Experience, Google Map

1. Introduction

Iran is a country rich in cultural, historical, and natural resources, offering a wide array of tourism attractions that have the potential to draw international visitors. Among these, the qanat system stands out as a unique and vital part of Iran's heritage. Qanats, ancient underground irrigation systems, not only played a crucial role in the sustainable management of water resources in arid regions but also embody the ingenuity and resilience of Iranian civilization. Today, these qanats offer a unique tourism experience that blends cultural, natural, and environmental elements, making them valuable for both educational and recreational purposes. Despite the historical and functional significance, the potential of qanats as tourism attractions remains largely underdeveloped for further academic and practical exploration.

Qanat tourism spans multiple categories, most notably cultural heritage tourism, due to the qanats' integral role in Iran's historical, architectural, and cultural narrative (Marefatnia, 2013). Additionally, the sustainable water management techniques associated with qanats align with eco-tourism, attracting environmentally conscious travelers interested in traditional methods of resource conservation.

2. Research Methodology

This study uses a systematic literature review (SLR) approach to discover, analyze, and synthesize existing research on the elements that influence website design in the context of Qanat tourism (Table 1). The SLR technique is ideal for this research because it allows for a thorough and transparent process of obtaining and assessing scholarly literature in a systematic and reproducible manner. It ensures a critical evaluation of relevant publications, identifies knowledge gaps, and identifies essential topics and trends that might guide future research and practical website development initiatives in historic tourism.

The Web of Science database was selected as the primary source for literature collection due to its wide coverage of high-quality, peer-reviewed journals across multiple disciplines, including tourism, information systems, heritage studies, and digital marketing. A set of relevant keywords was defined to guide the search process. These included combinations such as *"tourism website design," "heritage tourism digital platforms," "user experience in tourism websites," "Qanat tourism,"* and *"online destination marketing."* Boolean operators (AND, OR) were used to refine and expand the search to ensure inclusivity and relevance. Articles were screened in multiple stages. Initially, search results were filtered by title, abstract, and keywords to assess their relevance to the research objective. In the second phase, full-text reviews were conducted to evaluate methodological rigor, relevance to the tourism sector, and contributions to the understanding of website design features. Only empirical studies, conceptual frameworks,

and review articles published in English and indexed in the Web of Science between 2000 and 2024 were considered. The review process was documented and categorized based on key variables such as: website design elements (e.g., usability, interactivity, aesthetics), user engagement, cultural heritage integration, and sustainable digital practices. Insights from selected studies were then synthesized to construct a theoretical foundation for evaluating and developing effective digital platforms tailored to the promotion of Qanat-based tourism in Iran.

Table1. Key Themes and Design Elements Identified in Tourism Website Literature from 2000 to 2024

Theme	Key	Relevant
Usability	Navigation, responsiveness, accessibility	Chan et al. (2021), Huang (2020)
Visual/Mixed Media	Virtual tours, videos, photos	Türker (2020), Kuhn et al. (2024)
Cultural Content	Educational material, history, preservation	Rashidi (2020), Nekouie Sadry et al. (2022)
Interactivity & Trust	Reviews, AI chatbots, social integration	Lim & Kim (2021), Kim et al. (2007)

3.Theoretical Framework

3.1 The Role of Qanats in Iranian Culture and Heritage

Qanats have a deep-rooted historical and cultural significance in Iran. Dating back over 2,500 years, these systems were developed to provide reliable water supplies in arid regions by tapping into underground water sources. The qanat systems consist of a series of wells and tunnels that lead water from a higher elevation to settlements, often traveling several kilometers underground (Shahri, 2023). This innovation was essential for the survival of numerous Iranian communities and remains a testament to Persian engineering and hydrology. The qanat's cultural value is immense, not only because of its technological advancement but also due to its embodiment of Iranian traditional knowledge, craftsmanship, and values. Many qanats, particularly in the central and eastern parts of Iran, have been recognized as UNESCO World Heritage Sites, underscoring their universal significance (UNESCO, 2016; Manuel et al, 2018). These sites, such as the Qanat of Gonabad, offer visitors a glimpse into a way of life that has been in existence for millennia, contributing to Iran's cultural tourism potential. Furthermore, Bayazeh, located in the heart of Qanat civilization, refers to the main Qanat of Bayazeh (Figure1) is one of the longest and deepest Qanats in the Khoro Bayabanak city. In addition, the rural communities of Khurbiabanak city, with its unique landscapes for tourism development, can significantly contribute to the development of this region (Salmani, 2013).

3.1.1 Bayazeh Qanat

The Bayazeh Qanat series is called Qanat-e-Shor and Shirin, and it joins from Bayazeh and flows towards Abadi (village of Bayazeh). These two series of the qanat have a total of 120 wells. The depth of the well head (Mother Chah) is 97 meters, the length of one series is 5 kilometers and the other is 4 kilometers, and the distance between the two wells is 50-60 meters. When the Qanats reach the beginning of the village, they are used by Payab (figure 2), and after passing through the interior of the Bayazeh village, they appear at a place called Darb-e-Kahi, from where they transfer water through branches. As explained by Dr. Mohamad Salmani in an interview on March 10, 2011, that the Payab of Bayazeh Qanat used as a school, and in the summer, people studied at the Qanat School for hundreds of years.

Then in the second decade of the 14th century, a formal government school was established in Bayazeh, and this school was closed.

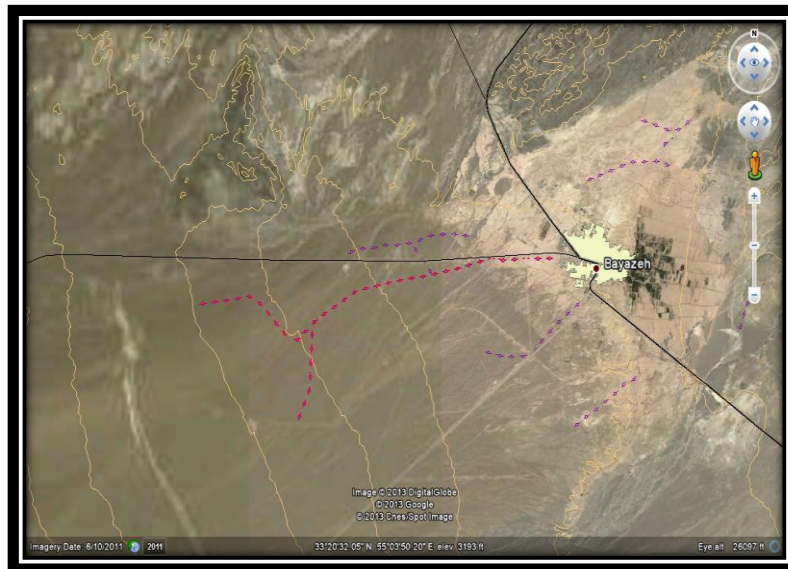


Fig. 1 Bayazeh Qanat (Google Earth -KMZ) (www.marefatnia.zgig.ir, 2013)



Fig. 2 The Payab of Bayazeh Qanat from inside a house in the village of Bayazeh

3.2 Tourism and Economic Impacts of Qanats

The tourism industry in Iran has been growing steadily over the past few years, with the government making significant efforts to promote cultural and historical heritage as key attractions (Rashidi, 2020). Qanats, with their unique blend of history, culture, and engineering, present an untapped opportunity for expanding tourism. As a form of sustainable tourism, qanat-related activities—such as visiting heritage sites, participating in guided tours, and engaging in educational experiences—offer significant economic potential. The income generated from these activities could contribute to the preservation and rehabilitation of qanats, ensuring their longevity and continued relevance (Amin, 2018).

Moreover, the development of qanat-related tourism could also serve as a means to raise awareness about environmental conservation. Qanats are not only a cultural asset but also an environmental one, providing insights into water management in arid regions. As the world faces growing challenges related to water scarcity, the qanat system can be highlighted as an important, sustainable method of managing water resources, which could attract eco-tourists and environmentally conscious travelers (Beyer, 2017).

3.3 Digital Innovation and the Promotion of Qanat Tourism

In the modern age, the internet plays a crucial role in promoting tourism attractions. As part of this effort, digital tools such as websites, social media platforms, and interactive maps have proven to be effective in engaging prospective visitors. One such example is the website developed for qanat tourism—www.marefatnia.zgig.ir—which leverages the

Google Map API to provide visitors with an interactive experience of qanat heritage sites in Iran. In qualitative studies, the researchers assessed website quality without generating indices or scores. For instance, Heldal, Sjøvold, and Heldal (2004) argued that the combination of branding, human–computer interaction, and usability could enhance website evaluation.

The design of the website was based on user engagement and accessibility, aiming to attract tourists to qanat-related destinations (figure3, 4 and 5). By integrating digital mapping with detailed historical and cultural content, the website offers a unique virtual tour of qanat systems. This digital resource can help potential visitors plan their trips, learn about the significance of the qanat systems, and access practical information about the attractions. Furthermore, it provides a platform for further scholarly research and global interest in Iranian heritage, facilitating a global connection with this important cultural asset. Liu and Leung (2011) reviewed information technology publications in leading tourism journals for the 1985–2004 periods and found that networking was the most popular research area, with the highest growth rate. These studies demonstrate that travel website-related studies have become important to both industrial practitioners and academic researchers (Law, Bai, 2006).



Fig. 3 Bayazeh Qanat (www.marefatnia.zgig.ir, 2013)



Fig. 4 Bayazeh Qanat (www.marefatnia.zgig.ir, 2013)



Fig. 5 Hotel Qanat (www.marefatnia.zgig.ir, 2013)

3.4 Field Studies and the Importance of Online Engagement

Field studies have shown that effective website design, along with online engagement strategies, can significantly increase interest in tourism destinations. According to a study by Lim and Kim (2007), the usability and design of a website play a pivotal role in attracting and retaining online visitors. For the first time in Iran, in the case of qanat tourism (Marefatnia,2013), the combination of informative content and engaging digital tools has

proven to be an effective strategy in piquing interest and encouraging tourists to visit heritage sites in Iran (Marefatnia,2013).

Moreover, the rise of social media platforms and online travel forums has further amplified the role of digital tools in tourism promotion. Positive reviews, shared experiences, and virtual tours can help create a buzz around lesser-known attractions, such as qanats. As a result, tourists are more likely to be drawn to these destinations, enhancing the visibility and tourism potential of qanat-related sites.

Conclusion

Qanats are a magnificent blend of Iran's cultural, historical, and natural heritage, demonstrating the brilliance and tenacity of ancient Persian engineering. These subterranean water management systems-built thousands of years ago, not only supported agricultural life in arid regions, but also impacted settlement patterns, economic development, and cultural identity throughout huge stretches of the Iranian plateau. Their impact on the emergence and prosperity of Persian civilization is significant and long-lasting. In modern Iran, qanats provide more than basically historical significance; they also represent an incredible chance for sustainable tourism growth. As the country strives to diversify its tourism industry and emphasize its rich cultural legacy, the qanat system emerges as a symbol of environmental harmony, technological innovation, and architectural beauty. Unlike traditional tourist destinations, qanats encourage tourists to explore a unique blend of nature and human ingenuity, promoting educational and environmentally conscientious tourism.

Additionally, the application of digital platforms, such as the website www.marefatnia.zgig.ir, has created new opportunities to promote qanats to a global audience. These tools, which include virtual tours, interactive maps, and online educational content, have the potential to raise international awareness, attract cultural tourists, and stimulate future academic research. By utilizing such digital technology, Iran may improve the global awareness of its qanat legacy, transforming these historic monuments into iconic symbols of cultural diplomacy and sustainable tourism. Ultimately, the qanat system stands as a powerful reminder of Iran's contribution to world heritage. Its continued preservation, documentation, and promotion can play a pivotal role in strengthening national identity, empowering local communities, and positioning Iran as a leader in the global movement toward heritage-based and sustainable tourism.

Travel and tourism have continually been among the most popular categories of websites visited by Internet users globally. With the rapid advancement of digital technology, tourist websites have evolved as critical tools for promoting destinations and engaging a worldwide audience. These platforms work as virtual portals, offering potential for tourist, a variety of locales, attractions, and cultural experiences long before their actual voyage begins. Tourism websites often provide a wide range of multimedia content, including high-resolution photographs, destination descriptions, historical and cultural background information, interactive maps, and even immersive virtual tours. This combination gives customers a detailed and entertaining glimpse of everything a location has to offer, allowing them to make more educated selections during the pre-trip planning phase. In this sense, the Internet has transformed how people discover and engage with new places, making remote or lesser-known locations more accessible and desirable. An effective tourism website must include a variety of dynamic components, including straightforward

navigation, appealing visuals, detailed and relevant content, interactive features, and clear calls to action, all customized to the requirements and expectations of different consumers. The overall appearance and functionality of a website may have a big impact on how visitors perceive and engage with it. More than just looks, it's about providing value: visitors evaluate the usability of a tourism website by evaluating what they get—information, inspiration, reassurance—versus the effort or time they put in. Therefore, understanding the behavior and expectations of digital visitors is essential. By emphasizing usability, content quality, personalization, and emotional appeal, destination marketers and tourist planners can build engaging online experiences that not only attract but also convert interest into action, eventually boosting travel and increasing pleasure.

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