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Smart positioning: how smart technologies can increase the attractiveness of heritage tourism destinations? The case of a small-scale Hungarian heritage city

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ABSTRACT

Small-scale heritage towns usually face fierce competition from surrounding destinations, particularly in peripheral rural areas where tourism holds important possibilities for regional development. This study examines on-site smart tourism technology as a tool to increase attractiveness and differentiation of heritage destinations using examples of Hungarian destinations. The research seeks to answer the question whether a small-scale heritage destination can become a more attractive destination due to technology from the perspective of potential tourists. The paper analyzes quantitative data collected from 537 potential tourists. Principal component analysis was used to identify the factors considering attractive and differential on-site technologies. A regression model was created to examine how these factors affect the potential tourist's decision-making: whether heritage towns with smart on-site tools are too similar to towns that do not use such technologies. Three factors of on-site technologies have been identified: digital sightseeing, smart attractions, and smart infrastructure. According to the regression model, digital sightseeing is the key pull factor, but smart attractions and smart infrastructure also have a positive effect in small towns. The study presents the first empirical research on the effect of smart technology on positioning small-size heritage towns based on demand-side research.

Introduction

The development of cultural heritage is at the center of European cohesion policies, with a focus on a 'place-based approach' and smart specialization. 'The smart specialisations approach is getting to be a key instrument for identifying regions' opportunities for growth, development and circular economy. It is a place-based approach and plays a critical function in benchmarking regional competitiveness and attractiveness' (Stanojev & Gustafsson, 2021, p. 3). There is a gap in the academic literature concerning smart specialization in regional, peripheral small towns, as usually urban cities are the focus, however improving the attractiveness of cultural heritage is an important way of creating regional development (Harfst et al., 2021). These small towns face fierce competition regarding attracting tourists. They usually offer only a few (sometimes very similar) attractions connected to a specific heritage (e.g. history or buildings) and can be monocentric with one historical

city center (Bucurescu, 2015). One of the main challenges of these destinations is to differentiate themselves to become unique, so that they could be recognized by potential visitors.

Differentiation is becoming even more important due to the increasingly blurred differences between destinations (Evren & Kozak, 2018). When it comes to differentiation, an adequate positioning strategy is the key, which can be a source of competitive advantage for destinations (Hooley et al., 2004).

While there are many destinations available, travelers typically consider only two to six options when making their decisions. One of the biggest challenges that destination marketers face is competing with locations with similar characteristics (Pike, 2012) which makes the former substitutable (Pike, 2005). This can be partly attributed to the impact of modernization and technological development in tourism, which has resulted in an unintended standardizing and 'dedifferentiating' of products and services (Pike, 2008). Tourists with specific motivations for traveling tend to be more satisfied with memorable and unique experiences in destinations (Sangpikul, 2018).

Technological advances and solutions such as the Internet of Things (IoT), Radio Frequency Identification (RFID), mobile devices, and gamification have revolutionized the tourism sector in recent decades (Buhalis, 2020). Digitalization has grown significantly over the years (Ritter & Pedersen, 2020) and is increasingly being used by touristic organizations to create value (Amit & Han, 2017). It involves the use of digital technologies to run more efficient and profitable processes (Hadjieliasa et al., 2022), even in heritage towns.

In recent years, historic town tourism has been growing intensively (Teng, 2017) with places of historical significance contributing in a unique way to tourist satisfaction and motivating them to visit (Rejikumar et al., 2021). Studies pertaining to heritage towns concentrate mainly on cultural heritage management (Bucurescu, 2015; Paul & Roy, 2017), on planning and management (Tian et al., 2013; Yang & Wall, 2022) and competitiveness (Bucurescu, 2015; Teng, 2017).

Implementing smart tourism technology can improve innovation through digital tools and differentiation in a heritage destination (Bohlin & Brandt, 2014) although there is a gap regarding the analysis of the perceptions of visitors and the question arises whether this innovation can affect the choice of the destination among competitors. The research in this article addresses this research gap, particularly in the field of applied technologies.

Due to the fierce competition between destinations, particularly heritage destinations, it is urgent to identify the factors that contribute to competitive advantage in terms of tourism (Pike & Page, 2014). The aim of this study is to analyze the use of digital technology as a positioning strategy for heritage towns. Through a case study, we seek to answer the question whether a small heritage destination can use technology to differentiate itself from the perspective of potential tourists. To address this question, we conducted quantitative research with 537 valid answers. A factor analysis was carried out to identify factors relating to on-site technologies and a regression model was set up to examine how far these factors affect the potential tourist's decision-making. Despite ongoing debates on the topic, to the authors' knowledge, this study is the first empirical survey using demand-side research about the impact of digitalization on the positioning of small-scale heritage towns.

The paper is structured as follows. First, we introduce the notions: positioning, destinations and on-site technologies, and discuss their function and role in differentiating from other destinations. Afterwards, we present the empirical research: the employed methodology and the results. Finally, we discuss the results and draw conclusions from the research.

Positioning in destinations

Destinations are under enormous pressure to develop offers that meet the needs of tourists for physical, emotional and internal self-enrichment (Wolf et al., 2017). It is important to become part of the mind map of the travelers (Ries & Trout, 2006) by knowing how a destination differentiates itself from competitors and how it can satisfy travelers (Botha et al., 1999). Positioning can enable a brand

to compete effectively within a particular group of competitors in a given market (Keller, 2003). Effective positioning gives decision makers the tools to solve a problem in a different way from rivals (Chacko, 1996).

In the context of tourism, the concept of destination positioning was first introduced by Botha et al. (1999) claiming that instead of focusing on marketing plans from the aspects of marketers, the starting point is to identify what visitors think about the destination and use these key attributes. Developing a strategy to position tourism products effectively plays a major role in destination marketing efforts (Saqib, 2019).

> One of the greatest challenges facing DMOs [Destination Management Organizations] is navigating the often fiercely parochial local tourism industry politics in the design and implementation of a narrow brand positioning proposition, from a diverse and often eclectic range of attractions, cultures, amenities and geography, which will be meaningful in heterogeneous markets. (Pike, 2009, p. 860)

Destination positioning refers to the process by which a destination's distinctive place is established in the minds of potential visitors (Gartner, 1989) and how current and potential visitors perceive the destination in comparison to its competitors. This perception can be the result of either the visitor's previous experience or the destination's efforts on managing its own image (Ritchie & Crouch, 2003; Sulyok & Lőrincz, 2017). The destination is compared regionally, nationally and internationally as a location for a particular type of activity or as an alternative to other destinations that may be stronger or more established (Kotler et al., 1993).

The destination positioning process starts by defining the target market and examining the overall travel conditions, followed by identifying competitors, defining current/potential visitors and their perceptions of the competitors' strengths/weaknesses, and identifying differentiated positioning opportunities. The final stage involves defining and implementing the competitive positioning and evaluating the success of the positioning strategy over time (Pike, 2008). The results of the positioning study can also be used for comparative promotion of the destination. Positioning studies are more complex than image studies and target more effective ways of proposing image management policies for a destination (Gallarza et al., 2002).

While the effective positioning of a destination in the consumer decision sets is a potential source of benefit for destinations (Pike & Ryan, 2004), the process also benefits travelers, as understanding consumer needs is essential. A meaningful offer helps to simplify consumer decision-making (Ries & Trout, 1986), while defining the characteristics of a destination is needed to achieve a given positioning (Laing & Lewis, 2017).

One important issue when positioning in competitive markets is differentiation: in marketing, the metaphor 'battle' may be used, and the minds of customers are the battlefield of brands (Evren & Kozak, 2018). Research on destination positioning has mainly been carried out in the context of destination image (Gallarza et al., 2002). Coastal destinations (Pike & Mason, 2011), conference destinations (Kim et al., 2011), golf destinations (Kim et al., 2005), honeymoon destinations (Kim & Agrusa, 2005), culinary heritage (Alonso, 2013) and urban destinations (Miskolczi et al., 2020; Prayag, 2007) were examined for positioning, particularly in relation to other competing destinations. This allows the destination to develop its own specific positioning based on the preferences of visitors and weaknesses or strengths of other destinations.

Recent research on positioning has focused on smart destinations (da Costa Liberato et al., 2018), on destinations with cultural attractions (Khodadadi et al., 2022; Sorokina et al., 2022), and on clustering of tourist destinations (Claveria & Poluzzi, 2017; Jardim & Mora, 2022). However, none of the previous studies deals with small-sized heritage towns.

Smart on-site tourism technologies in heritage destinations

Technology has changed the tourism industry fundamentally over the last decades, particularly in the area of marketing and sales (Buhalis, 2020; Law et al., 2015), but it has also enhanced the

efficiency of the back-office activities of service providers (Law et al., 2014). Online peer-to-peer sites empower travelers to share reviews and search for personalized services (Buhalis & Foerste, 2015; Hays et al., 2013), while the appearance of smart phones has started a new dimension of connectedness, real-time communication and co-creation (Buhalis, 2020; Jang et al., 2021; Wang et al., 2016). The phases of development can be described as follows:

> Organizations developed their Web 1.0 presence as a window to the world and their websites as e-commerce shops. The Web 2.0 and the social media revolutionized interactivity between users and also between users and organizations. Smart tourism, Web 3.0, or the semantic web bring a range of opportunities that optimize the entire network and support the tourism ecosystem. The development of smart mobile devices rapidly emerged as a new agile flexible network and challenged desktop computing. (Buhalis, 2021, p. 1)

Smart tourism is a prevalent trend, which has a significant effect on all the participants concerned (Buhalis & Amaranggana, 2013; Jovicic, 2019; Koo et al., 2016). The term smart tourism is often used in an inconsistent and generic way (Shafiee et al., 2021). In our study, we use the term as interpreted by Zhang (2012): a system of tourism, which utilizes the advantages of digital technology to create and manage smart tourism services/experiences, as well as characterized by an intensive sharing of information and value adding.

The public and private sector, particularly Destination Management Organizations (DMOs) can play a catalyst role in managing the change toward smartness and create the rules and the policies concerning the development (Gretzel, 2022; Sorokina et al., 2022). Sorokina et al. (2022, p. 3) underline the fact that increasing visitors' experiences is among the most important elements with regard to smart tourism and therefore the perceptions of tourists should be analyzed. Technology readiness can vary a lot over different tourist groups, for instance, younger generations feel more ready to use smart tools than older ones (Blut & Wang, 2020). Regarding the demand for smart tools, differences between age groups should be identified. Levy (2020) analyzed the differences between age groups focusing on Boomers (above 55 years), Generation X (39–54) and Millennials (22–38) among American adults. The research found that

> interestingly, improvisation might be more for older age groups. Younger adults book many of their activities ahead of time, while Boomers tend to wait until they arrive at their destination to lock down plans. (…) Sharing what's happening on vacation digitally is common among all age groups; younger travelers are more likely to post on Instagram and older generations prefer Facebook. Still, not everyone shares on social media or preserves their activities digitally while traveling. More Boomers (20%) refrain than Gen Xers (13%) or Millennials (7%). And older travelers are more inclined to unplug from work when they are away. (Levy, 2020, p. 5)

It must be highlighted that younger tourists are more open to co-create their experiences through technologies by sharing information about their personal preferences (Buhalis & Foerste, 2015). Safety and cyber security policies should be given more attention, particularly in the case of sharing personal preferences or content (Femenia-Serra et al., 2019).

On-site technology empowers service providers to reach a deeper understanding of the actual values of the destinations and attractions (Gretzel, 2018; Gretzel et al., 2015; Hausmann & Weuster, 2018). Considering the role of technology and the intensity of co-creation, Neuhofer et al. (2014, p. 13) proposed the technology-assisted experience hierarchy model, which consists of the following phases: 1. Conventional Experience: experiences without any support of technology; 2. Technology-Assisted Experience: Basic phase of involving technology particularly Web.1.0 and online communication; 3. Technology-Enhanced Experience: Main focus is on the interaction generated by the Web.2.0 technologies, and co-creation of this with the participation of peers, service providers and locals; 4. Technology-Empowered Experience: Phase 4 'provides personalised, individualised and contextualised products and services, based on real-time dynamic engagement with customers and co-creation of experiences, to optimise value for all stakeholders involved' (Buhalis & Sinarta, 2019, p. 565).

The type of smart technologies can vary a lot and include social media, mobile technologies, smart devices, sensors, cloud computing, Internet of Things (IoT), Augmented Reality (AR) or

solutions connected to Artificial Intelligence (AI) (Shafiee et al., 2021), big data and end-user internet service system (applications; Virtual Reality and Augmented Reality) (da Costa Liberato et al., 2018), specifically Google maps, ride-sharing systems and smart street lighting (Jeong & Shin, 2020). Gretzel et al. (2018) identified the following categories of smart technologies in the example of Seoul: 1. Smart infrastructure (e.g. Wi-Fi and DMB (digital multimedia broadcasting)); 2. Smart Technology-Related Initiatives (e.g. smart transportation, public bike); 3. Smart Tourism Programs (e.g. city pass, mobile applications selling local experiences); 4. IoT (e.g. sensors for tour routes planning and waste management).

Considering heritage destinations, technology can play a major role in the wide variety of tools to enhance experiences, and make attractions more accessible and understandable (Rueda-Esteban, 2019). Bohlin and Brandt (2014) highlighted the fact that technology has made the interpretation of attractions more flexible and personalized and has enhanced the experiences through storytelling with the help of augmented or virtual reality (AR/VR), particularly in the case of digital guides. Gatelier et al. (2022) emphasized the role of flexible value proposition, for example, in advanced technology like VR, each segment can be targeted with different values, based on the knowledge and the need of the targeted circle of visitor. There has been considerable research interest in AR application (Graziano & Privitera, 2020; Nevola et al., 2022), particularly regarding design and implementation of these apps, as well as the analysis of experiences and satisfaction. However, although these tools provide a popular means of interpretation, it should be highlighted that

> it is also unrealistic to suppose that apps of this nature or scope will, of themselves and in isolation, result in wholesale and/or radical behaviour changes or visitor redistributions, especially in the short term. Alone, such apps will not provide the solutions to the grand challenges of mass and overtourism. (Nevola et al., 2022, p. 385)

Among the high-tech tools of interpretation, light art design projects and attractions are spectacular (e.g. light art painting on buildings, Kinect games, light art festivals). The technology can be easily customized to special and newer characters, but can also be expensive, particularly in the case of light festivals (Giordano & Ong, 2017). QR codes are widely used in many sectors, including tourism, primarily in hotels, restaurants, transport companies, and cultural institutions (Solima & Izzo, 2018; Vuksanović et al., 2021). According to Mandić and Praničević (2019) mobile applications and Geographic Information Systems can also have an impact on the overall experience of the destination. Furthermore, memorable experiences co-created by digital devices can improve the attractiveness of a place brand and the awareness toward the destination (Trinchini et al., 2019). Information and communications technology overall has an impact on the appeal of the destination, particularly through social media and digital devices supporting the sharing of experiences with peers. According to Rueda-Esteban (2019) using technology during interpretation can enhance the sense of place and the image of the heritage destination. The result of the research of Lin et al. (2020) considering the effect of VR technology on destination choice and participating in slow tourism supports this finding: 'the key to influencing tourists' behavioral decisions regarding destination choice is triggering their emotional reactions and feelings. As a tool for branding a destination through emotional triggers, VR has the ability to effectively stimulate some human senses, particularly hearing' (Lin et al., 2020, p. 7). During the application of various technologies, it is important to take several different aspects into account and plan the process itself properly, in which the measurement of maturity can provide adequate feedback (Bakon et al., 2022).

Technology as a driver of differentiation

Technology can enhance the experience of both tourists and residents in many ways, but it can also damage it, especially if the technology is overwhelming, of poor quality or constantly breaks down. In this process, the first stage is the technology-mediated experience, where social media interactions are the first driver to find inspiration for the destination, followed by mobile technology

assuring on-site information gathering and memory sharing (Buhalis, 2020; Shen et al., 2020). Later, the co-creation of the experience through technology is the next stage according to Femenia-Serra et al. (2019). In this regard, technology plays an important role in creating personalized experiences, which can assure a deeper understanding of the destination and a better attitude toward the values and residents of the place (Gretzel et al., 2015, 2018; Hausmann & Weuster, 2018; Kökény & Kiss, 2021). However, there is a gap in research on the impact of technology on destinations' positioning and branding from the demand-side (Huertas et al., 2021).

Creating a 'good place' (Kavaratzis & Hatch, 2021) and offering memorable experiences are the key factors for positioning a destination (Pino et al., 2018). Co-created memorable experiences enhanced by technology can be the main driving factors for effective differentiation and branding (Deserti, 2016). Smart technologies may play an important role in destination branding according to Trinchini et al. (2019), however, the communication of the smart context is rather rare (Huertas et al., 2021).

> Consequently, tourists have a better image of SCs (smart cities) and STDs (smart destinations) because they generate expectations of more personalized services (…) and more satisfying tourist experiences (…). Thus, the image of cities and destinations will depend on their ability to provide technology and connectivity to residents and tourists through their smartphones. (Huertas et al., 2021, p. 2)

According to earlier findings, using mobile phones during travel is widespread among different age groups (Floros et al., 2021). A study carried out by Jeong and Shin (2020) about smart tourism technologies in smart cities revealed that Google maps were the most popular among tourists, followed by ride-sharing programs, city guide apps, mobile payment, and parking apps. Surprisingly, advanced technologies (i.e. AR/VR, IoT, RFID boarding or mobile concierge) were rarely used by the respondents. Considering heritage destinations, Bohlin and Brandt (2014) emphasize that in the competitive environment for such destinations, product development and new experiences are crucial for differentiation and branding, and smart technologies like digital guides can serve these goals. Based on previous research, the following research question was formulated:

> RQ: How do on-site technologies influence the choice of heritage destinations by potential tourists in a Hungarian historical town?

The following sub-questions are proposed:

> SQ1: How can on-site technologies be categorized based on the attitudes toward them?

> SQ2: What impact do attitudes towards different types of on-site technology have on the attractivity of certain heritage destination compared to its competitors?

> SQ3: What are the differences between younger and older generations' attitudes towards on-site technologies and their impacts on destination attractiveness?

Case study: the Hungarian town Székesfehérvár

Székesfehérvár is a small-scale Hungarian heritage town (according to the definition of OECD (2022) classifying small urban areas as those with a population of 50,000–200,000) close to the capital of Hungary (60 km away) with around 100,000 residents (KSH, 2021). The reason for choosing the destination as a case study was that the town implements smart technology in tourism. The town is well-known for its history and is often referred to as 'City of Kings' since it was the place where the Hungarian kings were crowned. Some former Hungarian kings are also buried in the town. This means the uniqueness of the destination and the interpretation of the attractions are based on this.

The destination faces fierce competition against other Hungarian heritage destinations, like Visegrád and Gödöllő. Veszprém, the 'City of Queens' and European Capital of Culture for 2023 is located 50 km from Székesfehérvár, the 'City of Kings'.

In Székesfehérvár, the DMO was established in 2009 by both the local government and stakeholders to increase the number and the length of stay of the visitors. The DMO was successful: in 2018 more than 160,000 guest nights were registered (45% by foreigners), which showed a 132% increase from 2009. In the 2020s, the town attracts young students on school excursions and seniors, but business tourists are also important, particularly in regard of their spending. The local DMO would like to make the city more popular among families and couples in the future.

Due to the pandemic, tourist arrivals declined in the town: the number of guests declined by more than 50% from 2020 to 2021 (Farkasné Szegő, 2019, 2020, 2021). There was a shift in the target segments and strategic objectives: during the pandemic the focus was on domestic tourists and the most important question was how to attract new tourists and how to regenerate the heritage attractions in the town.

The improvement of smart technologies in relation to infrastructure, education and tourism have been among the strategic objectives of the town in recent years. In 2018, smart parking was adopted with a mobile application showing empty parking places. Smart benches with USB charging points and free Wi-Fi are available in two public parks of the town, while at some of the busiest road junctions, smart pedestrian crossings were implemented to signal to car drivers the walkers' intention of crossing the roads. Digital tools have also been developed to renew the attractiveness of the town and/or to create new attractions in the following areas (Table 1).

Methodology

According to the DMO of Székesfehérvár, the smart tourism developments play a strategic role in meeting the new trends and serving, at the same time, the repositioning of the town to become a unique heritage destination in Hungary with modern interpretation of cultural attractions and experiences. Analyzing the demand-side perspectives, the research question is the following: how

Table 1. Digital tools to revitalize tourism in Székesfehérvár.

Name	Short description
Digital city game (application)	Mobile application for an adventure game about the history of the city (e.g. Park of Secrets, which can be played with touch-screen mobile devices, the use of the park and the game is free) (Figure 1)
Application for events	Mobile application for Royal Days of Székesfehérvár with information and navigation
Interactive light art painting of buildings	Different heritage themes and artistic performances are projected on buildings in the inner town (e.g. History of the Coronation Basilica was projected onto the facade of the Mausoleum: the promise of an experiential past) (Figure 2)
Light art design game	Interactive street game with Kinect sensor in different topics
Puzzle with 3D light cubes	Kinect game for playing puzzle with painted cubes projected on buildings
Smart sightseeing with QR codes	Information about tourist attractions by scanning QR codes
Digital tourist discount card system	Digital pass containing offers and discounts for attractions and services
Digital themed sightseeing trails	Offering themed routes in different topics with navigation
Urban mobile application	Application with information about the town, attractions, and events
Smart pedestrian crossing	The system obtaining the energy required from solar cells detects when pedestrians cross the road, which is indicated by a flashing yellow light to motorists, and it also illuminates the person's footwear with a laser in the darkness of the evening
Smart parking	Motorists and car drivers can monitor the occupancy status of a parking space using a mobile application
Smart benches, charging points	Functioning as a wired and wireless charging point. There are solar collectors under the seating surface, so the structure is constantly charging itself. The seating area also provides free Wi-Fi, and its built-in sensors also monitor the weather, so you can sit on the benches even if it's snowing, as it has a heating element and is comfortable even in the winter months

Source: Own construct based on the interviews of the DMO.

Figure 1. Digital city game in Székesfehérvár. Source: Székesfehérvár (2014).

do on-site technologies influence the attractiveness of small-scale heritage destinations in the face of fierce competition?

Sample

The two main objectives of the sampling were (1) to reach potential domestic tourists outside of the destination, and (2) to collect responses from different age groups. Due to COVID-19, the survey was distributed only on an online platform. The questionnaires were filled out face-to-face through online channels (Skype and Messenger), and the answers were recorded in the online survey system Qualtrics. Between March and April 2021, trained interviewers collected 537 valid answers from potential tourists.
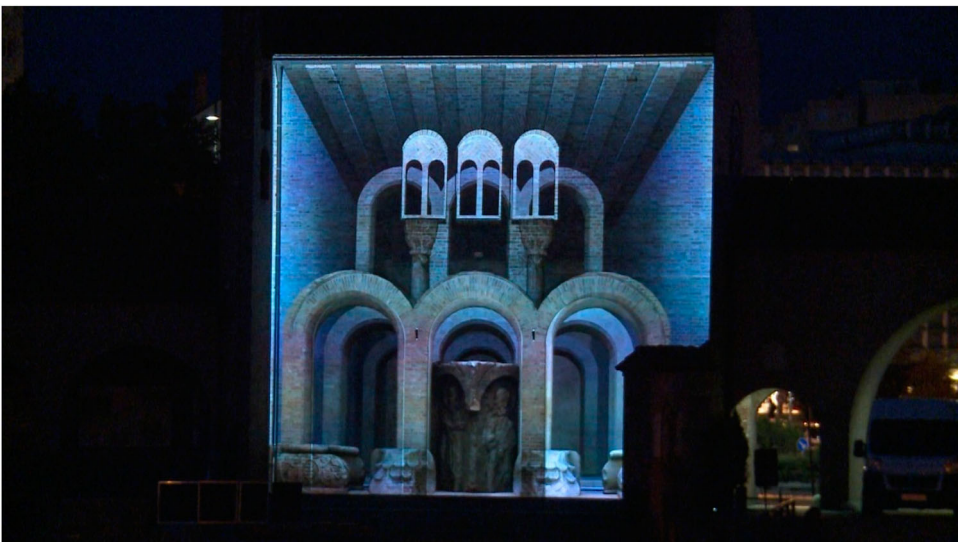
Figure 2. Interactive light art painting. Source: Székesfehérvár (2017).

Purposive sampling was used: only those domestic respondents who live outside the destination were chosen to be part of the sample, since they can be identified as potential domestic tourists. Female respondents were dominant in the sample (59.8%). Regarding the age distribution, 22.3% of the respondents were between 18 and 25-years-old; 18.9% 26–35; 7.9% 36–45; 12.8% 46–55; 18.7% 56–65, and 19.4% above 65-years-old. 62.5% of the respondents travel without kids, while 13.6% with one kid, 17.1% with two kids and a further 6.9% with three kids or more. In consideration of the technology usage, the respondents showed a positive attitude toward technology usage during their trip (with an average of 5.29). The results vary in different age groups: younger segments below the age of 55 years had a very positive attitude toward using mobile phones during travel (in age-group 18–25 with an average of 6.5; 26–35 years 6.5; 36–45 years 6.02; 46–55 years 5.65) rather positive in the case of 56–65 years old respondents (av.: 4.59), while 65+ respondents had weak interest (av.: 2.87).

Measurement

The questionnaire was designed in cooperation with the local DMO. The type of on-site technologies statements were created based on the on-site technologies of the destination and previous research in the area. They were measured on a 1–7 Likert scale (1 = strongly disagree; 7 = strongly agree). A further item (Variable: Differentiative impact) contained a general statement regarding how far digital technology is able to differentiate destinations (Table 2).

A pilot questionnaire was created and pre-tested with 30 potential domestic tourists in February 2021 to assess familiarity of respondents with the meaning of the different on-site tools. It could be seen that the younger people were familiar with the different technologies, while the definition of some tools needed to be explained to older people. This was the reason to implement a face-to-face survey instead of online questionnaires and train the interviewers with the definition of the digital tools. The data were analyzed with Principal Component Analysis (PCA) and linear regression using SPSS software. PCA was chosen as it is among the most widely used methods to reduce the variables but to keep as much information as possible, while linear regression is an effective tool to analyze the linear relationship between dependent and independent variables.

Results

The categorization of on-site technologies

To identify the attitude to different types of technologies by demand, one of the most widely used tools for data analysis, PCA, was applied to the statements described in Table 2 so as to generate uncorrelated variables. The number of the principal components were identified based on Kaiser criteria and Varimax rotation (converged in six iterations) to understand and interpret the components. The value of KMO was high, 0.903, the Bartlett's test was significant. Both results showed appropriate fit for the factor analysis. The results showed three factors explaining the 74.351% of the variance (Table 3).

Table 4 contains the weights of each factor, and the interpreted variables as follows.

The factors have been named based on the research of Gretzel et al. (2018) introduced earlier. The first factor called 'Smart Tourism Programs' contains all those elements which can help to plan programs and experiences in the destination. These tools support information gathering, planning and paying for programs as well as navigation, particularly in the form of applications, while others help visitor management in the town. These sub-types (application and visitor management tools) can be seen in this factor. The second factor named 'Smart Attractions' are those high-tech, interactive and spectacular smart tools, which can interpret the history of the city in a modern way with the involvement of visitors. The third, 'Smart Technology-Related Initiatives' are about those innovations supporting traffic management and outdoor mobile phone charging.

Table 2. Description of measurement items.

Variable	Statement	References
Differentiative impact	Digital attractions make a heritage town more attractive to me than a town without attractions.	Local DMO (Huertas et al., 2021; Trinchini et al., 2019)
Type of on-site technologies	How much would you prefer Székesfehérvár as a destination compared to similar heritage small towns due to the following technical innovations?	Local DMO (Bohlin & Brandt, 2014; Fusté-Forné, 2020; Giordano & Ong, 2017; Gretzel et al., 2018; Mandić & Praničević, 2019; Shafiee et al., 2021; Solima & Izzo, 2018; Vuksanović et al., 2021; Yew et al., 2020)
	Digital city game (application): mobile application for an adventure game in the topic of history.	
	Applications for festivals: mobile application for festivals/events of the destination, with information and navigation.	
	Interactive light art painting of buildings: different heritage themes and artistic performances are projected onto the building.	
	Projected wall painting, light art design game: interactive street game with Kinect sensor in different topics	
	Puzzle with 3D light cubes: kinect game for playing puzzles with painted cubes projected on buildings.	
	Smart sightseeing with QR codes: information about tourist attractions by scanning QR codes.	
	Digital tourist discount card system: a digital pass containing offers and discounts for attractions and services.	
	Digital themed sightseeing trails: offering themed routes in different topics with navigation.	
	Urban mobile application: an application with information about the city, attractions and events.	
Age	18–25	(Buhalis & Foerste, 2015; Floros et al., 2021; Jeong & Shin, 2020; Levy, 2020)
	26–35	
	36–45	
	46–55	
	56–65	
	Above 65	

Source: Own construct.

Relationship between on-site technology and attractiveness of the destination

Linear regression was used to identify the effects of the different on-site technology variables created in the PCA above, so as to see the impacts of them on the attractiveness of a destination presenting smart technology. According to the result of the F-test ($F = 119.86$; sig = 0.00) our model below is significant, there is a correlation between the dependent and independent variables. The adjusted coefficient of the determination is 0.4, which means that the model above explains 40% of the choice of the destination with smart technology through the variables identified above. Based on the coefficients introduced in Table 4, the following model can be described:

The attractiveness of the destination with smart technology = 3.842 + 0.478 Smart Tourism Programs + 0.294 Smart Attractions + 0.297 Smart Technology-Related Initiatives

Table 3. Eigenvalues and percentages of the rotated factors variance.

Factor	Initial Eigenvalues	% Of variance	Cumulative %
1	6.487	32.077	32.077
2	1.435	21.995	54.072
3	1.000	20.279	74.351

Source: Own construct.

Table 4. Rotated component matrix.

Manifest variables for differentiating on-site technologies	Factor 1	Factor 2	Factor 3	Latent variables
Urban mobile application	0.832			Smart tourism programs
Digital themed sightseeing trails	0.805			
Digital tourist discount card system	0.772			
Smart sightseeing with QR codes	0.750			
Digital city game (application)	0.660			
Applications for festivals	0.585			
Light art design game		0.893		Smart attractions
Interactive light art painting of buildings		0.874		
Puzzle with 3D light cubes		0.759		
Smart pedestrian crossing			0.892	Smart technology-related initiatives
Smart parking			0.810	
Smart benches, charging points			0.694	

Source: Own construct.

All the independent variables have a significant impact on the dependent variable: Smart Tourism Programs have the highest impact on the choice of the destination. This can be explained by the fact, that tourists seek programs and experiences, particularly in urban tourism, where visitors search for intensive, local, authentic, and active experiences (Bock, 2015) and these types of tools support such motivations. Smart attractions, particularly interactive light art design, seemed to have a significant but moderate effect, as well as smart technology-related initiatives, which are not so common in Hungary.

The effect of age

Earlier studies showed that there are differences between younger (below 50 years) and older generations (above 50 years) considering attitudes toward tourism-related smart technologies (Jeong & Shin, 2020; Levy, 2020). Although our research did not aim to analyze the need of the segments deeply, from a practical perspective, the identification of the impact of age differences was important. For this reason, the sample was divided into two parts.

As we could see above, younger segments (below 55 years) had a strong interest in using mobiles during travel, while the older respondents had moderate or weak interest. Due to this, the database was split at the age of 55 years (the segment 55 and below years represented 62% of the sample). A linear regression model was used for both segments, showing significant results (F below 55 = 46.879, sig = 0.000; F above 56 = 48.086, sig = 0.000) and explains 41% of the variables in the case of the above 56 segment, and 29% at 55 and below segment. The coefficients show differences between the two segments according to the results displayed in Table 5.

All the variables have a significant impact on the dependent variable in both cases. As shown, in the case of respondents aged 55 years and below, smart attractions and smart technology-related initiatives have a slightly stronger impact than in the overall model (Table 4), while smart tourism programs are far more important for the 55+ segment, showing a low interest in other smart technologies (Table 6).

Table 5. Coefficients of the model of the impact of on-site technologies (total sample).

Model	Unstandardized coefficients B	Std. error	Standardized coefficients Beta	t	Sig.
(Constant)	3.842	0.065		59.156	0.000
Smart tourism programs	0.928	0.065	0.478	14.272	0.000
Smart attractions	0.570	0.065	0.294	8.774	0.000
Smart technology-related initiatives	0.578	0.065	0.297	8.885	0.000

Source: Own construct.

Table 6. Coefficients of the model of the impact of on-site technologies (sub samples: below 55 and above 56).

Age	Models	Unstandardized coefficients		Standardized coefficients		
		B	Std. error	Beta	t	Sig.
55 and below	(Constant)	3.961	0.095		41.619	0
	Smart tourism programs	0.860	0.105	0.383	8.173	0
	Smart attractions	0.580	0.086	0.313	6.767	0
	Smart technology-related initiatives	0.634	0.088	0.338	7.219	0
Above 56	(Constant)	3.618	0.105		34.322	0
	Smart tourism programs	0.892	0.092	0.527	9.735	0
	Smart attractions	0.505	0.098	0.277	5.135	0
	Smart technology-related initiatives	0.413	0.097	0.231	4.268	0

Source: Own construct.

Discussion

Technology greatly influences the tourism industry (Huang et al., 2017). The analyzed small-scale heritage destination Székesfehérvár has taken the first steps toward becoming a smart town. The question arises as to how the city can enhance destination attractiveness and differentiate itself using on-site smart tourism technologies.

First, we focused on identifying the main factors of smart on-site technologies. Research reveals that the answer to our first sub-question (How can on-site technologies be categorized based on the attitudes toward them?) is that three categories can be created: Smart Tourism Programs (digital sightseeing, urban mobile and festival applications, digital themed sightseeing trails, digital tourist discount card system, smart sightseeing with QR codes, digital city games); Smart Attractions (light art design game, interactive light art painting of buildings, puzzle with 3D light cubes) and Smart Technology-Related Initiatives (smart pedestrian crossing, smart parking, smart benches, charging points).

In connection with our second sub-question, we examined with a regression model how the attitudes toward different types of on-site technology impact on the attractiveness of destinations. The findings highlight the importance of on-site technologies (40% of the variance). Tourists use smart technologies mainly for orientation and information-finding programs (Jeong & Shin, 2020). The study also underlines the importance of digital sightseeing. Smart tools mainly utilized for collecting information and planning tourism programs are the most important pull-factors. The current research demonstrates that two other factors must be considered in small-size heritage towns: smart attractions and smart infrastructure.

The results confirm the previous findings of Jeong and Shin (2020), which showed that informativeness, interactivity, and personalization are the three key attributes of smart tourism technologies affecting travel experience, satisfaction, and future revisit intention. While smart sightseeing can enforce informativeness, smart attractions and infrastructure can increase the level of satisfaction. Smart parking, for example, provides tourists with the most efficient parking strategy, causing less stress and saving time.

Studies have shown that different generations have different interests in smart on-site technologies (Buhalis & Foerste, 2015; Jeong & Shin, 2020). From this perspective, it is important to examine what are the differences between younger and older generations' attitudes toward on-site technologies and their impacts on destination attractiveness (SQ3).

In this study, we found that age has an impact for both age segments considering smart tourism technologies. In addition, we concluded that in the case of younger segments, smart attractions and smart technology-related initiatives have a slightly stronger impact than in the overall model, while smart tourism programs are more important for older generations. This result can be surprising because given the focus on technology, a greater interest among younger people would have been expected here. The overuse of technology in the case of the younger generations, especially

the digital natives (i.e. Generation Z) (McCrindle & Wolfinger, 2009), born after 1995, and who are particularly dependent on technology (Ozkan & Solmaz, 2015). Overall, it can be concluded, that when choosing smart technology, age should be kept in mind as a visitor segmentation criterion (Hausmann & Schuhbauer, 2021).

The current study seems to be one of the first attempts to understand how on-site technologies influence the attractiveness for potential tourists of small-scale heritage destinations in the face of fierce competition (RQ) emphasized by Bohlin and Brandt (2014). This study found empirical evidence that on-site technologies can be used as distinctive tools for small-scale heritage towns.

A heritage town can hardly – or only slowly – increase its attractions: the number of museums is a given, the historic part of the city is established now, and historic buildings are already limited both in number and in function. These cities have a smaller budget than large cities, therefore, they can only develop new attractions step by step. However, developing new attractions may destroy the city's reputation as a heritage city.

Smart technologies provide an optimal solution for these cities in five respects:

First, digital attractions and digital solutions can be built on the historical values of the city: existing attractions can be further developed by adding a smart solution to the attraction, for example, a QR code providing more extensive information or a virtual view of a building. The city's positioning remains the same – a historical city – but with the smart solutions, it improves in attractiveness as a modern city using the latest technologies.

Second, these smart solutions are relatively cheap: in many cases it needs just an innovative idea and the use of already existing technologies. In addition, an already existing smart solution can be easily changed. For example, to a smart guide, new languages may be added, a digital trail can be extended, season-specific quests may be added to a game. This versatility may encourage tourists to visit the city more frequently.

Third, new attractions can relatively easily be created using smart, digital technologies: a light art attraction on an existing building is more easily implemented than establishing a new museum. These new attractions may partly reposition the city – e.g. as a modern, innovative city – attracting new tourist segments.

Fourth, some of these smart solutions also add to the comfort of inhabitants: e.g. inhabitants also use smart parking and new attractions spur them to go to the city center or (re)visit an attraction. This increased feeling of well-being is an additional benefit.

Fifth, the repositioning of a heritage city partly as a smart, technology-friendly city may persuade startups and new businesses to move to the city resulting in a more vibrant business life.

We can conclude the following by relating these results to the three above-identified factors: Smart Tourism Programs, Smart Attractions and Smart Technology-Related Initiatives.

Smart Tourism Programs are easily implemented and add to the city's attractiveness while preserving its main attractions and its position as a heritage city. They may attract tourists to visit the city again.

Smart Attractions can add a new perspective to the city, creating a new positioning for the city and attracting new tourist segments.

Smart Technology-Related Initiatives: they are less tourist-specific; they make the life of tourists and inhabitants easier. By themselves, they will attract no new visitors, but they can largely increase the satisfaction of tourists and add to the well-being of inhabitants. Compared to larger destinations, these new technologies may function as a breakout point for small heritage cities: with relatively little investment, more tourists can be persuaded to visit the city.

However, the limitations and dangers of using digital technologies must be mentioned. Tourists must be aware of the smart technologies a city offers for tourists: the existing tools, services, and attractions must be communicated to tourists. It can happen in advance – positioning the town as a 'smart destination' and attracting more and new visitors, but also creating expectations. When the expectations are met, visitors are satisfied; if they are not met (e.g. the town is not as smart as advertised), it can create dissatisfaction. Communication can happen also on-site in the

city. In this case, it must be done in a way in which visitors are informed extensively about smart solutions and attractions e.g. billboards on a given site or fliers. Thus, smart solutions must be advertised in an old-fashioned way. Visitors may not know that a given smart attraction or service exists if they are not advertised. Town marketing experts should therefore create not only smart solutions and attractions, but also communicate them adequately.

Conclusion

This paper provides theoretical and practical contributions. It expands our knowledge on the use of smart on-site technologies in destinations, as well as the understanding about the tourist's perception of small-size heritage towns. Repositioning of big cities (Cacho et al., 2016) and middle-sized cities (Alaily-Mattar et al., 2018; da Costa Liberato et al., 2018) have been the subject of investigation, but this is the first attempt to examine a small heritage town, which is based on traditions but started to use different on-site digital tools. Heritage preservation can be identified as a key economic driver and can be used to create social pride (Little et al., 2020).

In medium-sized cities, the aim of repositioning is the distinction within a specific field, focusing on reinvention of their internal dynamics. It is not purely an economic investment, it can be considered mainly as a socio-cultural performance (Alaily-Mattar et al., 2018). In big destinations, smart city initiatives are built on an interoperable infrastructure that is aiming for state-of-the-art in information and communication technologies for planning and managing activities (Cacho et al., 2016). Big and small smart tourism destinations alike are concentrating on tourists' experiences through innovation and interactivity, and internet availability, the associated platforms and interactive digital tools serve as an integrated system for tourists. This teaches destinations the lesson that tourists' experience can be achieved only through permanent interactive relationship among all the actors (da Costa Liberato et al., 2018).

Findings of this study have several implications for academics in the tourism field, as well as for DMOs. Since destinations seek to differentiate themselves (De Carlo et al., 2009), this study contributes to the theory of repositioning, showing that technologies can increase attractiveness (Pino et al., 2018). Moreover, findings have revealed that for the repositioning of a heritage town, digital on-site technologies can be helpful.

Results show, however, that repositioning and the attitude toward smart solutions is connected to age. Thus, the results of this research contribute to our understanding of how age differences affect attitudes toward on-site digital technologies. As we have seen, when targeting the 55+ generation, it is advisable to use the existing attractions and digitalize them. When targeting the generation below 55, all identified factors – Smart Tourism Programs, Smart Attractions, Smart Technology-Related Initiatives – have an impact.

Results suggest that it is worth while for decision makers to further invest in digital tools, since they can increase the attractiveness of towns. As a consequence, destination marketers must adapt their marketing strategy to attract the tourists by communicating the existence of digital tools. Based on the factors identified in current research, the systematic construction of additional on-site tools by DMOs can be more effective and most attention should be paid to Smart Tourism Programs.

Limitations and future research

The findings of this study are subject to several limitations:

First, as the case study is about a small-scale heritage town, cautious generalization is suggested: the results are not applicable to larger, multi-dimensional cities. Second, data collection was in Hungary, a Central European country and research participants were from Hungary. Third, the time period in which the data was collected also limits the study: data were collected in early 2021 during the pandemic. This may have influenced the attitude positively toward technologies,

which allow tourists to act 'independently', meaning using tools and attending programs where contact with other tourists can be minimized. Finally, our investigation was carried out only based on visitor perceptions, and consequently the view of touristic service providers and stakeholders should be examined as well. Future studies could also explore the cause of the differences between generations in the frame of a qualitative research study.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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