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Empirical Research Article

Evaluating the Smartness of Tourism Destinations? Evidence from Iran's Urban Tourism Destinations

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Abstract

This study aims to present a framework involving smartness components and indicators of tourism destinations. This work had three phases. The first phase extracted the components and indicators of smartness evaluation in tourism destinations and validated them by experts' opinions. The second phase determined the effectiveness of each element of smartness using an online questionnaire tool, a survey of 320 tourism experts at the level of 12 selected urban tourism destinations, and a factor analysis method, in addition to measuring the level of their smartness. The third phase of the research analyzed the difference between the smartness of the selected urban tourism destinations using a One-Way Analysis of Variance and the Tukey Test. The results indicated six components and fifty-seven indicators. Also, a substantial difference between the smartness of urban tourism destinations was proved. This study substantially contributes to the existing body of knowledge by offering the smartness indicators within a detailed package of six components with a systemic, holistic, and integrated perspective. The results help policymakers and decision-makers evaluate and improve the smartness of tourism destinations. As a result, it is possible to achieve the goals of smartness of urban tourism destinations, including equality, livability, sustainability, and effectiveness of resource management by using different technologies, especially with the emphasis on two aspects: (1) increasing the quality of the tourism experience, and (2) improving the residents' quality of life.

Keywords

Smart Tourism Destinations (STD); urban tourism destinations; smartness components; smartness indicators

1. Introduction

New technologies, rapid changes in business environments, industry structure, and tourists' needs and requirements have encountered tourist destinations with essential challenges (Almobaideen et al., 2017; Li et al., 2017; Sung, 2023). Information & Communication Technologies (ICTs) have improved access to the quantity and quality of information on the facilities and services of tourism destinations and helped tourists minimize their search expenditures. Tourism destinations may also apply database marketing techniques to identify and target profitable niche markets (Angeloni, 2016; Li et al., 2017; Pesonen & Horster, 2012; Raun et al., 2016). Technology is the foundation of forming or changing the shape of tourism destinations (Buonincontri & Micera, 2016; Islam, 2023). Thus, Smart Tourism Destination (STD) has emerged as a new typology of destinations (Buonincontri & Micera, 2016; Sustacha et al., 2023). STD represents a tourist destination that has applied new technologies to influence the tourist experience, improve the destination's competitiveness, and support tourism development plans (Buonincontri & Micera, 2016; Supak et al., 2015; Vinodan et al., 2023).

Generally, smart metering to a tourist destination has shown effective management of several sectors within a destination using ICTs (Marchiori & Cantoni, 2015). Smart Tourism Destinations (STDs) are at the forefront of tourism studies (Gelter et al., 2022; Gretzel, 2018). It is in a hopeful range in providing models, tools, and strategies for sustaining the smart configurations of tourism destinations. Descriptive characteristics of STD are advanced services, a high degree of innovation, and the presence of open, integrated, and shared processes to improve the residents' and tourists' quality of life. STDs include technology, people, and institutions. A successful STD creation requires the integration of technologies, systems, services, and capabilities within an organic network, which should be flexible and multi-sectoral for future developments (Del Vecchio et al., 2018; Sustacha et al., 2023).

Although there is a specific model, such as Cohen's model of explaining the dimensions of smart cities (Cohen, 2012), there is no detailed and specific model to determine factors, components, and indicators in a whole package. The previous studies mainly focus on ICTs and applying these technologies in the management and development of tourism destinations. A few studies have presented models considering some dimensions of destinations' smartness. Germann Molz (2012) offered the conceptual model of the main components of smart tourism in the destination. Murgante and Borruso (2013) determined the framework for measuring the smartness of cities. Wang et al. (2013) outlined China's STDs initiative. Buhalis and Amaranggana (2015) only characterized STDs. Del Chiappa and Baggio (2015) analyzed the effects of the network structure of STDs. Buonincontri and Micera (2016) stepped beyond defining STDs definitions and notions and offered a model that can facilitate the co-creation of experience in STDs. Díaz-Díaz et al. (2017) analyzed the public service business model in the smart city ecosystem. Gretzel (2018) explained the main pillars of smart tourism and smart destinations. Shafiee et al.

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(2019) suggested the conceptual model of sustainable smart destinations. As a result, there is a lack of theoretical and practical clarity in the notion and application of STD and its' elements and indicators to measure the smartness of tourism destinations in the previous studies (Bastidas-Manzano et al., 2021; Gelter et al., 2020). They could not propose a detailed and holistic model to measure the smartness of tourism destinations.

These studies also did not analyze the difference between the smartness of urban tourism destinations in a specific and operational manner. Thus, the research gap of this study is the deficiency of a detailed model based on the survey of components and indicators of evaluating the smartness of tourism destinations in previous studies. The fundamental question of this research is to identify the components and indicators to assess and measure the smartness of tourism destinations. This study has been structured in three research phases to answer this question. The first phase extracted the components and indicators of smartness evaluation in tourism destinations and validated them by experts' opinions. The second phase of the research determined the effectiveness of each component of smartness using an online questionnaire tool, a survey of 320 tourism experts at the level of 12 selected urban tourism destinations, and a factor analysis method, in addition to measuring the level of their smartness. The third Phase of the research analyzed the difference between the smartness of the selected urban tourism destinations using a One-Way Analysis of Variance and the Tukey Test. The results indicated six components and fifty-seven indicators.

2. Literature Review

2.1. Smart Tourism Destinations (STDs)

The notion of a smartness concept to tourism destinations has shown the effective management of several sectors using ICTs (Gelter et al., 2020, 2022; Ghorbani et al., 2019; Marchiori & Cantoni, 2015). STD integrates ICTs and physical entities or infrastructures so that tourists can meet their needs in the proper form by connecting via network devices, technologies, and applications (Han et al., 2016; Tribe & Mkono, 2017; Almobaideen et al., 2017; Vinodan et al., 2023). STD designs the identity of the tourism industry to consolidate tourism experiences with the destination. It can be a piece of prepared goods and services based on the tourists' needs and expectations (Chung & Han, 2017; Bian & Zhou, 2022; Park & Kim, 2017). STD is an integrated system with adaptable critical factors to appropriately manage the tourists' time and budget (Del Vecchio & Passiante, 2017; Liu et al., 2018). STDs are destinations where the use of new technologies in the elements of a thriving tourism destination has positive effects on the smartness of these destinations in the dimensions of governance, environment, transportation, economy, people, and life (Bosch & Gharaveis, 2017; Buonincontri & Micera, 2016; Islam, 2023; Supak et al., 2015; Yuan et al., 2016). The new image of a modern STD needs new insights, policies, solutions, and smart actions to create a sustainable future for everyone, including residents and visitors (Boes et al., 2016). STD policy includes robust development strategies on multiple characteristics, which have adequate support via robust information systems (Romãoa et al., 2018; Sustacha et al., 2023; Wang et al., 2016).

The concept of an STD is related to smart cities (SCs) (Ivars-Baidal & Vera-Rebollo, 2019). STDs concentrate on improving tourist experiences through ICTs, while SCs focus on their citizens and improving their living conditions (Boes et al., 2015; Kim et al., 2017). Considering a framework for the dimensions of an STD requires fundamental structures, including leadership, human capital, entrepreneurs, innovation, and social capital. Technological applications and robust infrastructures of ICTs support these structures that, in turn, provide the foundation for supporting the elements of tourism, including tourism experience and tourism competitiveness, six primary components of a thriving tourism destination and SCs (Ayscue et al., 2016; Boes et al., 2015; Marine-Roig & Anton Clavé, 2015).

STD is a destination in which information technology provides services for economic activities and leads to the development of tourism and social happiness. STD's development aims to support transferring, creativity, availability and allocation of resources, sustainability, quality of life, implementing large-scale visits, coordinated efforts, and strategic investment in technology infrastructure. STDs construct an information structure in which customers can share data actively and creatively to achieve these goals (Bogicevic et al., 2017; Chung et al., 2015; Dinhopl & Gretzel, 2016; Gelter et al., 2020; Xiang & Fesenmaier, 2017; Yoo et al., 2017). STD is not only digitalizing in the tourism industry; it creates a more effective interaction between supply and demand in the framework of co-creation (Boes et al., 2015; Hao et al., 2015; Marine-Roig & Anton Clavé, 2015; Sustacha et al., 2023; Zhang et al., 2018). It also improves the tourism experience through three main components: cloud processing services, the Internet of Things, and end-user devices. This initiative implementation requires the transformation of the tourism experience by cocreating between supply and demand elements, changes in the destination marketing strategy (relationship management), and a different view of destination competitiveness (Buhalis & Foerste, 2015; Buonincontri et al., 2017; Chung et al., 2015; Wang et al., 2012). Smartness's goal in developing tourism destinations is to enhance the destination's competitiveness through infrastructure development and the potential of information technology, in addition to accelerating innovation in providing services and improving the tourism experience (Boes et al., 2015; Borsekova et al., 2017; Kim et al., 2017; Sustacha et al., 2023; Shafiee et al., 2019).

In conclusion, investigating the previous studies on smartness in tourism destinations indicates that these studies mainly focus on ICTs and their application in the management and development of tourism destinations in supply and demand aspects (Almobaideen et al., 2017; Angeloni, 2016; Marchiori & Cantoni, 2015; Neuhofer et al., 2012; Tussyadiah & Fesenmaier, 2009; Wang et al., 2012). Deficient studies have discussed the concept of STD. These studies only discussed some dimensions, characteristics, and functions of STDs. Thus, the lack of a detailed model based on the survey of components and evaluation indicators of smartness with emphasis on urban tourism destinations in previous studies is an identified research gap. This study's theoretical and managerial innovation and implication to the body of knowledge in STD's realm is identifying and explaining components and indicators of tourism destinations' smartness comprehensively and systematically. This innovation will help to offer a specific framework for evaluating the smart status of tourism destinations, focusing on their performance. This is an imperative research topic that was not addressed in previous studies.

2.2. Components for Measuring the Smartness of Tourism Destinations

Scholars and researchers have presented various components for tourism destinations' smartness that can be modeled based on Cohen's model (Cohen, 2012) in the dimensions of smart cities and the components of a tourist destination (Buonincontri & Micera, 2016). Smartness components are categorized into six categories, including tourism business atmosphere, environment, residents/tourists, residents' lives/tourists' experiences, governance/management, and access/transportation, which are explained below. Tourism business atmosphere (Michael et al., 2019) refers to destinations with a socio-economic environment based on innovation, competition, cooperation, collaboration, new technologies, smart industries, sectors, services, and businesses. They use technologies, especially ICTs, to produce and provide services and products (Buonincontri & Micera, 2016; Cohen, 2012; Germann Molz, 2012; Murgante & Borruso, 2013). The

environment refers to the development of technologies, especially ICTs, and their use in maintaining and improving the environmental quality of tourism destinations, managing infrastructure and resources and tourism attractions, and increasing the effectiveness and efficiency of exploiting environment, resources, and infrastructures. The environment emphasizes the excellent livability of the tourism destination and the long-term sustainable development (Buhalis & Amaranggana, 2012; Díaz-Díaz et al., 2017; Germann Molz, 2012; Murgante & Borruso, 2013).

The component of Residents/Tourists is the primary and differentiating element of STD. An STD is a place for the lives of both residents and tourists and their practical, positive, and value-creating interaction and communication with each other (Buonincontri & Micera, 2016; Del Chiappa & Baggio, 2015; Germann Molz, 2012; Murgante & Borruso, 2013; Romãoa et al., 2018). The residents' lives/tourists' experiences component refers to various aspects of residents' lives and tourists' visits and stays (tourism experience) in tourism destinations. This component emphasizes the use of various technologies that improve the quality of life, tourism experience, and socio-cultural atmosphere effectively (Buhalis & Amaranggana, 2015; Germann Molz, 2012; Murgante et al., 2013; Romãoa et al., 2018; Shafiee et al., 2019).

The governance/management component primarily refers to the destination's macro-political situation, including political stability, overall security and safety, decentralization of policy-making and management, cleanliness and minimum level of corruption, and the rule of law. Fitting citizenship services and improving access to them and smart use of e-government by residents are related to the operation and management of the tourism destination (Díaz-Díaz et al., 2017; Murgante & Borruso, 2013; Shafiee et al., 2019; Wang et al., 2016). The access/transportation component emphasizes using ICTs to improve intra-city traffic and access to tourism destinations. Access quality and variety to the destination, parking spaces, and pedestrians and riders, and emphasis on improving the access of residents and tourists to different urban areas are also considered in this component (Buonincontri & Micera, 2016; Del Chiappa & Baggio, 2015; Díaz-Díaz et al., 2017; Murgante & Borruso, 2013). Also, to operationalize the smartness measurement of tourism destinations, the primary indicators are derived from the literature review and validated by tourism experts' opinions, shown in **Table 1**.

3. Methodology

This study identifies components and indicators of smartness in tourism destinations using archival data collection and analysis in the first phase. Studying the research background carefully and designing the primary questionnaire using acceptable and appropriate components and indicators are methods to obtain initial content validity. This study also uses 15 tourism experts' opinions to confirm the final content validity of the questionnaire (judgmental or purposeful sampling). In the second phase, after validating the components and indicators for measuring smartness, an online questionnaire was designed and sent to tourism experts (including knowledgeable researchers, authorities, and managers of selected destinations) to declare the smartness performance of their destination in all indicators by comparing urban tourism destinations' status to a reference group of competing destinations. To implement this study phase, a questionnaire link was prepared using the Google Forms system and sent to several members of the statistical population. They were the deputies and tourism experts of the General offices of Cultural Heritage, Tourism, and Handicrafts, professors of universities and educational and research institutions, and officials of unions and trade associations of tourist guides, hoteliers, and travel agency offices in the twelve selected destinations. They were asked to fill in the questionnaire and send it to others with the defined characteristics of the statistical population (snowball sampling). In conclusion, 320 questionnaires were completed and registered in the Google Forms system, and the results were made available to the researcher. The confirmatory factor analysis method was used in LISREL software to confirm the construct validity of the measurement tool (online questionnaire for measuring the smartness of urban tourism destinations), analyze the internal structure of the questionnaire, and discover the constituent factors of each construct or latent variable. The reliability of the measurement tool (Questionnaire) was calculated using Cronbach's Alpha method using SPSS software. The results (**Table 2**) show that Cronbach's Alpha was more than 0.8. Thus, the reliability of the measurement tool has been confirmed.

In the third phase, a one-way analysis of variance (ANOVA) test was used to examine the difference between the smartness of urban tourism destinations in Iran. This test divides the source of changes (variances) into two groups, including inter-group and intra-group. Part of the variances is due to the difference between the communities with the researcher's grouping (inter-group), and part of the differences is due to other factors (error) (intra-group). Nonetheless, this test alone does not determine which averages are different. Therefore, Post Hoc Tests such as the Tukey Test have been used to express the difference between averages or to rank the difference between them.

There is no specific study identifying the country's smart cities realm. Thus, smart urban tourism destinations in this study are urban destinations that are smarter or have paid attention to aspects of smartness. This study refers to the conferences and reports in which Iran's smart cities have been introduced. The first conference on "Smart City, Infrastructure and Investment Opportunities" in Iran considered five cities, including Urmia, Isfahan, Tabriz, Tehran, and Mashhad, as Iranian Smart Cities. Smart City and Legal Requirements report prepared by the Communication and Modern Technologies Studies Office of the Vice President of Infrastructure Research and Production Affairs of Parliament Research Center emphasized these findings (Communications and New Technologies Studies Office of the Vice-Chancellor for Infrastructure Research and Production Affairs, Parliament Research Center, 2015).

The second conference on "Smart City, Infrastructure and Investment Opportunities" (2015) introduced Iranian Smartest Cities differently. In this conference, two cities (Shahrud and Latifi) were recognized as worthy of recognition among cities with populations of less than 200,000. Yazd and Hamedan were ranked the optimal in Urban Automation. Zanjan obtained the first rank in Sustainability. Kermanshah was the first to attract capital Investment. Sari gained the first rank in Smartness Management among cities with 200,000 and one million populations. With a population of over one million, Tabriz City, in Automation, Infrastructure, and Smartness Management, and Qom City, in Citizen Services and Automation, have been selected as the finest. Isfahan City, in Infrastructure and Citizen Services and Attracting Capital Investment, and Shiraz City, in Attracting Capital Investment and Smartness Management, had been optimal.

There is no definite and approved study to identify Iranian Top Destinations. However, ranking and determining the top tourism destinations by referring to the number of incoming tourists is possible. Based on the latest statistics provided by the Planning and Budget Office of the Ministry of Cultural Heritage, Tourism and Handicrafts (2016), the cities that have the most substantial number of foreign tourists and are also among the Iranian Smart Cities have been selected as Smart Urban Tourism Destinations in this study. In conclusion, 12 cities, including Qom, Mashhad, Tehran, Urmia, Tabriz, Shiraz, Isfahan, Yazd, Sari, Kermanshah, Zanjan, and Hamedan, have been selected as the Iranian Smart Urban Tourism Destinations whose smartness is measured in this study.

4. Results and Discussion

4.1. First Phase: Smartness Components and Indicators of Tourism Destinations

This work identified 64 indicators for measuring the smartness of tourism destinations using archival studies and classified them into six components based on reviewing the literature. They include the tourism business atmosphere, environment, access/transportation, residents/tourists, residents' lives/ tourists' experience, and governance/management. In the following, there was a need to validate the results. Content validity was the method of determining the results' validity. The designed questionnaire, including components and indicators, was sent to 15 tourism experts to determine the content validity. Indicators with an average of three and higher (or average on the 5-score Likert scale) have sufficient validity. Tourism experts confirmed 57 indicators (from 64 primary indicators derived from the literature review and previous studies, and categorized in 6 components) that have sufficient validity to evaluate the smartness of tourism destinations (**Table 1**). They suggested the necessary changes to rewrite and simplify some approved indicators.

Table 1 shows the content validity results of the smartness indicators. Indicators with an average of less than three have insufficient validity. Thus, two indicators of the tourism business atmosphere component, including "the number of innovative and entrepreneurial enterprises" and "offering tourist products according to all customers' characteristics," were removed. Having accurate information from all enterprises to compare them is necessary. Thus, identifying the number of innovator and entrepreneur enterprises, especially in Iran, is impossible. The second removed indicator is a fluid concept. Measuring this indicator is problematic due to the diversity of customer groups and the fluidity of their characteristics, interests, and tastes over time.

The "Tourists' creativity and spontaneity in the tourism experience production" indicator was removed from the residents/tourists' component indicators. Measuring this indicator requires sub-indicators and technological and management requirements to provide the possibility of experience co-creation between tourists and tourism suppliers.

Three indicators of residents' lives/tourists' experiences component, including "participation in cultural events," "the low rate of crime," and "equal opportunities for all residents to use resources and facilities," have insufficient validity. Their concepts and meanings are hidden in the indicators of "the extent of social capital," "the quality of residents' life," and even "the quality of tourists' experience." The quality of life of residents and the experience of tourists in the destination will be high if the crime rate is acceptable and equal opportunities are accessible for everyone to benefit from resources and facilities. Finally, "the extent of areas with limited traffic" has insufficient validity to be placed among the indicators of the "access/transportation" component. "The quality of pedestrian and bicycle access," "sufficient parking space," "the extent of greenways and sidewalks," and "the extent and efficiency of the public transportation network" will reduce the areas with limited traffic. As a result, the removed indicator overlaps with other indicators of this component.

The first phase results determined the six components of tourism system smartness, including the tourism business atmosphere, environment, residents/tourists, residents' lives/tourists' experience, governance/management, and access/transportation based on Cohen's (2012) model in the context of the dimensions of smartness of cities as well as the components of a tourist destination (Buonincontri & Micera, 2016). To measure the smartness of urban tourism destinations, 57 indicators were determined and validated by tourism experts. Smartness indicators based on these components did not exist in any of the previous studies in a definite, specific, and categorized way, which is perhaps the most important theoretical innovation of this study that has a substantial role in filling the identified research gap.

Table 1. Content validity results of the smartness indicators.

Component	Indicator	Average	Standard Deviation
Tourist Business Atmosphere	Up-to-date banking and financial systems	4.13	0.74
	Efficiency of e-commerce	4.33	1.35
	Number of innovative and entrepreneurial enterprises	2.93	1.94
	Ability to network with other destinations	3.47	1.60
	Effectiveness of destination marketing activities	3.13	1.81
	Level of partnership between actors (public, private, and NGO)	3.67	1.72
	Partnership between domestic and foreign businesses	3.60	1.64
	Productivity of executive operations of businesses	3.13	1.73
	Diversity of tourism services	3.67	1.68
	Automation of tourism services	4.67	0.62
	The extent of online information and communication systems for service delivery	4.73	0.59
	Offer tourist products according to all customers' characteristics	2.53	2.20
Environment	Environmentally friendly tourism facilities and amenities	3.07	1.83
	The extent of livability in the destination	3.20	1.86
	Regarding ethical codes by all tourism stakeholders	3.00	1.93
	Environmental quality of natural resources and attractions	3.33	2.13
	The rate of solid waste separation and recycling	3.80	1.66
	The rate of wastewater purifying and recycling	3.80	1.70
	The quality of water supply (water leak and water purification)	3.27	2.12
	The use of water-reducing and energy-reducing systems	3.60	1.59
	Using renewable energies	4.47	1.30
	Designing infrastructures based on specific groups' needs	3.07	2.31
	The production of authentic and original content for the description and interpretation of attractions	3.27	2.12
	The use of sensors and controlling and monitoring devices	3.13	2.07
	General development of ICTs	3.53	1.96
	Equipping attractions to ICTs	4.07	1.71
	The existence of cloud computing services	3.93	1.71
	The creation of the Internet of Things	4.00	1.73
	The possibility of using end-user devices	3.93	1.71
	High-speed and mobile internet penetration	4.07	1.75

	Collecting, analysis, and synthesis of data facilities	3.73	2.02
	The extent of public access to tourism services	3.13	2.33
	The extent of public access to ICTs	4.53	0.64
	The degree of automation of public services	3.93	1.71
	The penetration coefficient of social media in everyday life and interaction with each other	4.13	1.30
Residents/Tourists	Residents' participation in destination management	3.67	1.76
	Online and quick contact with officials to submit complaints and suggestions	4.00	1.41
	Sharing tourists' travel experience	3.80	1.74
	Tourists' ability and skills to use types of technologies to do tourism-related activities	3.67	1.68
	Tourists' creativity and spontaneity in the tourism experience production	2.20	1.93
	Effective communication and interaction between residents and tourists	3.67	1.63
	The extent of social capital	3.07	2.09
	Participation in cultural events	2.67	2.06
	Quality of education and training	3.33	2.16
	The low rate of crime	2.27	2.28
Residents' lives/ Tourists' Experiences	Up-to-datedness and comprehensiveness of the website and destination information system	3.80	1.74
	The role-playing of residents in destination management	3.40	1.96
	Equal opportunities for all residents to use resources and facilities	2.33	2.06
	The quality of residents' life	3.13	2.07
	The quality of tourists' experience	3.60	1.96
	The quality of information and content produced about the destination	3.80	1.70
	Delegation of authority and collaborative management	3.07	1.71
	The degree of transparency and accountability of the destination's general management	4.13	1.36
Governance/Management	The existence of crisis management plans	3.73	1.67
	The existence of laws and regulations encouraging and facilitating the development of tourism	3.73	1.71
	The extent of e-governance services	4.20	0.86
	The extent of control and monitoring of the impacts of tourism development	3.73	1.71
	The quality of pedestrian and bicycle access	3.60	1.96
	Sufficient parking space	3.20	1.78
	The extent of greenways and sidewalks	3.20	1.78
Access/Transportation	The extent and efficiency of the public transportation network	4.20	1.37
	The extent of using transport green (clean fuel) vehicles	3.60	1.30
	The extent of areas with limited traffic	2.47	2.03
	The extent of using rental or shared cars	3.20	1.82

Source: Own elaboration

4.2. Second Phase: Analyzing the Effectiveness of Smartness to Measure the Level of Smartness of Selected Urban Tourism Destinations

In the second phase, 320 questionnaires were completed and registered in Google Forms, and the results were made available to the researcher. Respondents' distribution according to twelve urban tourism destinations is shown in **Table 2**. **Table 3** shows the Cronbach's Alpha calculation results. The results show the high degree of internal consistency of the items (indicators) related to each component. Thus, the fitness (reliability) of the model is confirmed. In the following, the confirmatory factor analysis is used to analyze the internal structure of the questionnaire and confirm the construct validity (**Table 4**). The confirmatory factor analysis test has two outputs. The first output (Standard Estimate) shows the Factor Load of each index, and the second output shows the Significance of Coefficients or T Values. The factor load shows the contribution of each index in forming the smartness variable. A value above 0.4 is acceptable, and less than is removed. The significance of coefficients or t-values shows the significance level of an index. If the t-value is less than 1.96, the index is removed at the 95% confidence level. If the index's t-value is above 1.96, the index is acceptable (Kalantari, 2013).

Table 2. Frequency distribution of urban tourism destinations.

Tourism Destination	Frequency (N)	Frequency (%)	Tourism Destination	Frequency (N)	Frequency (%)
Yazd	49	15/3	Mashhad	45	14/1
Shiraz	44	13/8	Hamedan	13	4/1
Tabriz	43	19/3	Zanjan	12	3/8
Qom	26	8/1	Kermanshah	7	2/2
Isfahan	31	9/7	Sari	7	2/2
Tehran	47	14/7	Urmia	6	1/9
Total	320	100			

Source: Own elaboration

Table 3. Statistical indicators of the reliability of the measurement tool.

Variable	Cronbach's Alpha	Component	Cronbach's Alpha
Smartness	0/974	Tourism Business Atmosphere	0/895
		Environment	0/942
		Residents/Tourists	0/870
		Residents' Lives/ Tourists' Experience	0/843
		Governance/Management	0/896
		Access/Transportation	0/853

Source: Own elaboration.

The factor analysis results (**Table 4**) show that the factor loading of all indicators or questionnaire items is higher than 0.4, and their t-value is higher than 1.96. Thus, these indicators or items of the questionnaire are fit for measuring the smartness components of urban tourism destinations, and the construct validity of the questionnaire is confirmed. According to other results in Table 4, the factor load for all smartness components is more than 0.4, and the t-values are more than 1.96; their assignment as smartness components is confirmed. Based on the results of the above table, the residents' life/tourists' experience has the highest effect on the smartness of urban tourism destinations (0.92). The environment and residents/tourists are ranked second, and the components of governance/management, access/transportation, and tourism business atmosphere are ranked next.

The results of the second phase (**Table 4**) showed that the component of residents' lives/tourists' experiences has the highest impact on smartness, with 92%. This component, which is related to life and experience in urban tourism destinations, refers to two fundamental aspects of forming smart urban tourism destinations, i.e., improving equality in access to services and facilities and the livability of urban destinations. Also, maximizing the quality of life/tourism experience is the primary aim of forming and developing an STD. The components of environment and residents/tourists, with 90%, are placed in the following ranks with the most substantial impact on smartness. The component of environment emphasizes two crucial aspects of smartness, i.e., applying technologies in different components and dimensions of the environment and the long-term sustainability of urban tourism destinations. The resident/tourist component deals with aspects or dimensions of smartness, including equality, the use of technologies, especially ICTs, and the livability of urban tourism destinations. There is no previous study or research that can determine the impacts of smartness components. This is perhaps another theoretical and practical innovation of this study that has a substantial role in filling the identified research gap.

Table 4. The results of the effectiveness of Smartness components.

Variable	Component	Factor Load	T Statistics
Smartness	Tourism Business Atmosphere	0/77	16/29
	Environment	0/90	20/52
	Residents/Tourists	0/90	20/78
	Residents' Lives/ Tourists' Experience	0/92	21/37
	Governance/Management	0/83	18/0416/89
	Access/Transportation	0/79	

Source: Own elaboration

4.3. Third Phase: Analyzing and Ranking the Smartness of Urban Tourism Destinations

The One-Way Analysis of Variance (ANOVA) Test was used to analyze the difference between smartness and its components in urban tourism destinations. The source of changes (variances) in the ANOVA Test is divided into two groups (inter-group and intra-group). Part of the variances is due to the difference between the populations with the researcher's grouping (inter-group), and part of the differences is due to other factors (error) (intra-group). In this test, when the significance level is less than 0.05, a substantial difference between the average populations' average was proved. If more than 0.05, no notable difference between the populations' average was verified. However, this test alone does not determine which averages are different. Thus, it is advised to use Post Hoc Tests such as the Tukey Test to express the difference between the averages or to rank the difference between them (if the significance level is more notable than 0.05, no need for the Post Hoc Tests was verified).

Table 5 shows the result of the ANOVA Test. The significant level of smartness and its components is lower than the error level, i.e., 0.05 (0.000). Thus, the test's significance is confirmed, or a substantial difference between smartness and its components in different urban tourism destinations was verified. Thus, the Tukey Test shows the difference between the average groups. The results of the Tukey Test (**Table 6**) show that Qom, Hamadan, Tabriz, Urmia, Shiraz, Isfahan, Mashhad, Yazd, Tehran, Zanjan, Kermanshah, and Sari rank first to twelfth in terms of smartness. Also, the city of Qom, with an average of (2/9696), has the highest level of smartness, and the city of Sari, with an average of (1/9678), has the lowest level of smartness. **Table 7** shows the twelfth urban tourism destinations' rankings in smartness and its components based on the Tukey Test's results. Hamedan, Qom, Hamedan, Shiraz, Qom, and Urmia obtained the highest level of smartness in tourism business atmosphere, environment, residents/tourists, residents' lives/tourists' experience, governance/management, and transportation/access. Sari is ranked last (twelfth) in all smartness components.

The results of the third phase showed that Qom, Tabriz, and Shiraz are among the top 5 destinations in the smartness realm. These destinations were also ranked first, fifth, and sixth based on the number of foreign tourists in 2016 and among the twelve Iranian smart cities in 2015. Hamedan, Qom, Hamedan, Shiraz, Qom, and Urmia obtained the highest level of smartness in tourism business atmosphere, environment, residents/tourists, residents' lives/tourists' experience, governance/management, and transportation/access. Sari is ranked last (twelfth) in all smartness components. The results help policymakers and decision-makers improve the smartness of urban tourism destinations. Therefore, it is possible to achieve the goals of smartness of urban tourism destinations by using different technologies, especially with an emphasis on two aspects: (1) increasing the quality of the tourism experience and the level of tourist satisfaction, and (2) improving the residents' quality of life. Smartness ranking of urban tourism destinations and comparing their smartness together did not exist in any of the previous studies.

Table 5. ANOVA test results.

Variable/ Components		F	Sig	Variable/ Components		F	Sig
Smartness	**Intra-Group**	2/556	0/004	**Residents' Lives/Tourists' Experiences**	**Intra-Group**	2/160	0/016
Tourism Business Atmosphere	**Intra-Group**	2/908	0/001	**Governance/Management**	**Intra-Group**	2/737	0/002
Environment	**Intra-Group**	2/724	0/002	**Transportation/Access**	**Intra-Group**	2/111	0/019
Residents/Tourists	**Intra-Group**	1/828	0/049				

Source: Own elaboration

Table 6. Tukey Test results.

Destinations	N	Smartness	Tourism Business Atmosphere	Environment	Residents/ Tourists	Residents' Lives/ Tourists' Experiences	Governance/ Management	Transportation/ Access
Yazd	49	2/7038	2/9134	2/4685	2/9649	3/0083	2/4776	2/5068
Shiraz	44	2/8128	2/9318	2/5960	3/1465	3/1591	2/2538	2/8977
Tabriz	33	2/9064	3/0606	2/8636	3/1650	3/0779	2/3889	2/6818
Qom	26	2/9696	3/0035	2/8782	3/2308	2/9780	2/8141	2/9359
Isfahan	31	2/7929	2/9883	2/5986	2/9606	3/0783	2/4892	2/7366
Tehran	47	2/6442	3/0077	2/4555	2/8180	2/8298	2/1787	2/5319
Mashhad	45	2/7712	3/0545	2/4938	3/0123	3/0317	2/4185	2/7704
Hamedan	13	2/9247	3/0979	2/7109	3/2500	3/0238	2/5833	2/9028
Zanjan	12	2/2851	2/1742	2/1528	2/6852	2/6071	1/9444	2/2500
Kermanshah	7	2/2256	2/2727	2/1032	2/5079	2/3673	1/9762	2/1667
Sari	7	1/9678	2/0779	1/6667	2/4603	2/1633	1/5238	2/1667
Urmia	6	2/8918	2/8939	2/7037	3/0185	3/0000	2/8056	3/2222

Source: Own elaboration

Table 7. Ranking of tourist destinations based on the level of intelligence and its components.

Smartness	Tourism Business Atmosphere	Environment	Residents/ Tourists	Residents' Lives/ Tourists' Experiences	Governance/ Management	Transportation/ Access
Qom	Hamedan	Qom	Hamedan	Shiraz	Qom	Urmia
Hamedan	Tabriz	Tabriz	Qom	Isfahan	Urmia	Qom
Tabriz	Mashhad	Hamedan	Tabriz	Tabriz	Hamedan	Hamedan
Urmia	Tehran	Urmia	Shiraz	Mashhad	Isfahan	Shiraz
Shiraz	Qom	Isfahan	Urmia	Hamedan	Yazd	Mashhad
Isfahan	Isfahan	Shiraz	Mashhad	Yazd	Mashhad	Isfahan
Mashhad	Shiraz	Mashhad	Yazd	Urmia	Tabriz	Tabriz
Yazd	Yazd	Yazd	Isfahan	Qom	Shiraz	Tehran
Tehran	Urmia	Tehran	Tehran	Tehran	Tehran	Yazd
Zanjan	Kermanshah	Zanjan	Zanjan	Zanjan	Kermanshah	Zanjan
Kermanshah	Zanjan	Kermanshah	Kermanshah	Kermanshah	Zanjan	Kermanshah
Sari	Sari	Sari	Sari	Sari	Sari	Sari

Source: Own elaboration

5. Conclusion

According to the rapid development of technology in tourism and the growing interest in smartness, a new typology of destinations (STD) has emerged. Smart tourism destinations have attracted the attention of many researchers in the past decade. Limited studies hypothesized and argued the concept, dimensions, characteristics, functions, components, and smartness indicators of these destinations. They indicated only some dimensions, components, and indicators of STDs and did not offer a detailed and holistic model to measure the smartness of tourism destinations. They also have not analyzed the difference between the smartness of urban tourism destinations in a specific and operational manner. To measure the smartness of urban tourism destinations, 57 indicators were determined and validated by tourism experts in the first phase. Smartness indicators based on these components did not exist in any of the previous studies in a definite, specific, and categorized way, despite of Cohen's model (Cohen, 2012) in the context of the dimensions of smartness of cities and the components of a tourist destination (Buonincontri & Micera, 2016). This is perhaps the most important theoretical innovation of this study that has a substantial role in filling the identified research gap. Determining the impact of each component on the smartness of urban tourism destinations in the second phase was another innovation of this research. There is no previous study or research that can determine the impacts of smartness components. Finally, ranking urban tourism destinations based on their smartness was the other innovation of this research. Smartness ranking of urban tourism destinations and comparing their smartness together did not exist in any of the previous studies.

Therefore, this study substantially contributes to the existing body of knowledge in each phase. This study is the first to offer the smartness indicators within a detailed package of six components with a systemic, holistic, and integrated perspective. It is conceivable to evaluate the smartness of tourist destinations,

identify the advantages and challenges of tourism development, and rank tourist destinations in the field of smartness using these components and indicators. This study also notably contributes to the knowledge body by offering a method to determine the effects of each component on the smartness of urban tourism destinations. In conclusion, the results proposed a method to determine the level of smartness in general and separately by components and indicators and rank STDs. Tourism-related researchers and scholars can compare the extent of the smartness of tourism destinations by using this proposed method or develop other advanced methods based on these findings.

Also, this study's results offer three practical implications. First, tourism destination managers and policymakers can evaluate the level of smartness and determine the rank of their tourism destinations. Thus, it is possible to determine the advantages and challenges of the destinations in the smartness realm and provide solutions to improve the existing situation of smartness, which will affect competitiveness and sustainability in the long term. Second, destination policymakers and managers can decide which components or indicators should be improved to increase the smartness of tourism destinations. They can also prioritize the components and indicators and allocate limited or rare resources to improve their status effectively and efficiently. Third, the results help policymakers and decision-makers improve the smartness of urban tourism destinations. Thus, it is possible to achieve the goals of smartness of urban tourism destinations, including equality, livability, sustainability, and effectiveness of resource management by using different technologies, especially with emphasis on two aspects: (1) increasing the quality of the tourism experience and the level of tourists' satisfaction, and (2) improving the residents' quality of life.

This study has limitations, including the deficiency of access to sufficient information and data and the lack of research in the STDs realm, which may affect the results and findings. Also, tourism experts determined the score of each smartness component in urban tourism destinations, and the quantitative data to evaluate the smartness status of urban tourism destinations was not available. Therefore, future studies should focus on offering an effective pattern for collecting, analyzing, and applying big data to measure the smartness of tourism destinations and providing policies and solutions to improve their smartness, conducting similar research in other tourism destinations, and comparative analysis of STDs to present experiences and lessons learned to improve the smartness of tourist destinations.

Declaration of competing interests

The author declares that he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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