Research Article

From Sustainable Tourism to Smart Sustainable Cities: Perceptual Mapping of Gen Y and Gen Z Residents

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Abstract
This paper examines the intricate dynamics that shape the relationship between sustainable tourism and the development of smart sustainable cities, while also analysing generational disparities. The study employs a multidimensional perspective, where sustainable tourism is defined by five dimensions - economic, social, cultural, environmental, and technological - and smart sustainable cities are characterized across four dimensions - planning, environmental, social, and smart. To comprehensively assess the impact of sustainable tourism on smart sustainable cities, as perceived by residents, a combination of primary and secondary data is utilized. The primary data was collected through self-administered questionnaires which were distributed among 394 residents in Kashmir, capturing the perspectives of residents from Generations Y and Z. To test the hypotheses, Structural Equation Modelling (SEM) is employed utilizing the SPSS AMOS software. The results indicate a significant relationship between the implementation of sustainable tourism practices and the development of sustainable smart cities.

Keywords:
Smart city, Sustainable tourism, Perception, Residents, Gen Y, Gen Z

1 Introduction

In the last two decades, proficient management of cities has emerged as a major hurdle in the integration of sustainability initiatives (Alberti et al., 2007; Beatley & Kristy, 1997; Bibri & Krogstie, 2017b; Jabareen, 2006; Sev, 2009). Global cities encounter a diverse set of circumstances and challenges in their pursuit of sustainable development including environmental concerns (e.g., local traffic congestion, air pollution, increasing solid waste production, inefficient energy consumption, and the use of materials that contribute to climate change) and social concerns (e.g., segregation, growing tensions, inadequate urban design, and community disruptions (Bibri & Krogstie, 2017b; Oksman et al., 2014), urban conflict, polarization, and rising poverty rates (Jabareen, 2015)). The resolution of these obstacles requires the implementation of socially inclusive, environmentally aware urban planning solutions, supported by innovative approaches, sophisticated methodologies, and advanced technology, which have the potential to create sustainable cities.

Currently, more than half of the population resides in urban areas which serve as significant centers for energy management and affect the social and economic dynamics of the country (Ahvenniemi et al., 2017; Azevedo Guedes et al., 2018). The ongoing trend of urbanization has led to transformations, such as the expansion of suburban zones, which can impede energy efficiency, waste management, and sustainability efforts (Żywiołek & Schiavone, 2021). Improved societal well-being is expected to result in enhanced living standards for urban residents, as well as advancements in energy management within cities and individual households (Allam & Newman, 2018). In response to the demands of their inhabitants, cities are increasingly adopting modern technologies and intelligent solutions across economic and social domains, leading to the gradual implementation of the smart city concept (Debnath et al., 2014; Komninos, 2008). Currently, smart cities and their communities are characterized as interconnected systems that utilize energy, resources, services, and funding flows to drive sustainable economic growth, development, resilience, and overall quality of life (Azkuna, 2012). Effective energy management and ensuring residents' data security require collaboration not only from city authorities but also from local residents, business owners, and non-profit organizations within the city, all contributing to the evolution of a smart city (Żywiołek & Schiavone, 2021). Residents play a crucial role in enhancing both urban quality of life and the city's sustainability (Lalicic & Önder, 2018).

Although, a lot of studies have been conducted to highlight the importance of perception in sustainable tourism development (Latjuba & Sari, 2022; Yanong-Tupas & Schneider, 2022; González-García et al., 2022; Venugopalan, 2021) and the residents' acceptance of smart cities for an improved quality of life (Hartley, 2023; Szczepańska et al., 2023; Macke et al., 2018; Persaud et al., 2020; Rodríguez Bolívar, 2021); a limited number of studies explore the relationship between resident's sustainable perception towards smart cities, keeping in mind the technology dimension of sustainability. Further, the perceptions between specific generations and how they differ and influence perceptions towards smart cities have not been investigated. The research findings emphasize the noteworthy consequences of incorporating sustainable tourism practices into the development of smart sustainable cities, with regards to both managerial and theoretical considerations. Nevertheless, the recognition of theoretical shortcomings, particularly in comprehending fundamental mechanisms and potential obstacles, suggests the necessity for caution when implementing policies. Although the positive correlation between sustainable tourism and smart cities is acknowledged, the study proposes potential difficulties that could hinder the achievement of synergies. Despite highlighting the potential to enhance resilience, quality of life, and ecological sustainability, the results call for ongoing research to address these theoretical gaps, ensuring a more nuanced understanding and optimal strategies for sustainable urban development. With these gaps in mind, the following objectives are set:

1. To examine the relationship between sustainable tourism and residents' perception of smart sustainable cities.

2. To assess the differences in the mean scores of smart sustainable cities between Generation Z (Gen Z) and Generation Y (Gen Y).

2 Literature Review

Due to their requirements in the urbanized world, the concept of smart cities has been gaining importance in research as well as industrial fields over the past few decades (Cui et al., 2018). Smart cities are being implemented in various urban centres as a means to improve the quality of life for residents, contributing to the advancements in technology and the growing population (Habib & Weli, 2020). In response to challenges the concentration of population caused by rapid urbanization process and unfavourable living conditions, cities are embracing advanced smart systems (Lee et al., 2020).

2.1 Smart City

Townsend (2013) defines smart cities as “the place which integrates information technology with infrastructure, architecture, everyday objects and our own bodies so as to address the social, economic and environmental problems”. Smart cities can also be defined as “the increased flexibility, efficiency and sustainability in the traditional networks and services with the help of information, digital and telecommunication technologies in order to improve quality of operations in a city to reap more benefits” (Mohanty et al., 2016). Information and communication technology is harnessed by smart cities to promote innovation and knowledge, cut down on expenses, optimize resource use, enhance quality of life and work, and facilitate smooth communication between the government and the populace living and working within the city (Šurdonja et al., 2020; Caragliu & Del Bo, 2019; Saba et al., 2020). 55% of the world population i.e., 4.2 billion people lived in cities in 2018 and about 66 % of the world population, which contributes to the two-third of all humanity, is estimated to live in cities by 2050 (United Nations, 2015), as a result of which the burden on climate, energy, environment and living conditions will increases significantly (Cui et al., 2018). Due to consumption of 70% of world's resources, cities are known to be the major contributors and consumers of greenhouse gases and energy resources respectively (Bibri & Krogstie, 2017b). Cities operate through the intake of goods and the generation of waste, resulting in detrimental impacts on both society and the economy; evidently, cities rely heavily on external resources and will likely continue to do so (Albino et al., 2015). The promotion of sustainability has been approached by placing emphasis on the significance of natural resources. In order to keep up with the changing conditions, long term approaches focusing on sustainability should be adopted by cities in the future (Bulkeley & Betsil, 2005). Earlier perspectives on urban sustainability prioritize the well-being of individuals by advocating for sustainable resolutions in social and economic domains. (Turcu, 2013; Berardi, 2013a; 2013b). Four fundamental dimensions drive the advantages of building smart cities: environmental sustainability, economic sustainability, social sustainability, and governance (Ratten, 2020; Visvizi & Lytras, 2019a; 2019b).

In the field of Information and Communication Technology (ICT), the concept of 'smart' is frequently linked with intelligent and advanced technologies. The notion of a digital city has surfaced as a critical element of the smart city concept (Ishida, 2002; Komnios, 2008). At the infrastructure level, smart cities utilize sensors and integrated circuitry to enhance buildings and urban amenities, while at the governance level, ICT is used to encourage closer engagement between citizens and institutions (Antholopolous & Reddick, 2016; Clohessy et al., 2014). In the context of urban planning, the notion of a 'smart city' is frequently considered an ideological perspective that underscores the importance of strategic orientations. At all tiers of governance and public administration, this concept is being embraced to distinguish their policies and endeavours, with the ultimate aim of achieving sustainable progress, economic advancement, enhanced standard of living, and overall satisfaction of the populace (Ballas, 2013). In addition, another significant aspect of the intelligent city is its focus on sustainability. A smart city is characterized by urban policies aimed at reducing the environmental impact of cities while promoting economic and social development (Albino et al., 2015; Yigitcanlar & Kamruzzaman, 2018). Accomplishing these targets can be fulfilled by utilizing various technological tools such as the Internet of Things (IoT) can be effectively utilized to reduce waste (Anagnostopoulos et al., 2015), utilizing renewable sources of energy to lower carbon dioxide emissions (Calvillo et al., 2016), and implement smart mobility solutions to decrease pollution and offer high-quality transportation services to citizens (Benevolo et al., 2016).The relationship between smart cities and tourism is based on their joint effort to protect the environment and establish resilient and eco-friendly cities; the efforts of both smart cities and tourism play a crucial role in achieving the goal of creating a green and sustainable future(Dameri et al., 2020).Various researchers have focused on the concept of sustainability while defining smart cities (Bakıcı et al., 2012; Barrionuevo et al., 2012; Caragliu et al., 2011; Gartner, 2011; Kourtit et al., 2012, IDA, 2012; Lazaroiu and Roscia, 2012; Thuzar, 2011).

Based on above literature the following hypothesis was formulated:

H1: Sustainable tourism has a significant impact on the perception of residents towards smart sustainable cities.

2.1.1 Environment and Sustainable Smart cities

The environmental facet of sustainability encompasses the efforts to create a favourable impact on the environment with a view to safeguarding the interests of future generations. This entails taking measures such as reducing the carbon footprint, enhancing the quality of the environment, proactively seeking ways to enhance the air and water quality (Rezaee et al., 2019), conservation of nature, protection of environment created by humankind, and spatial planning (Pawlowski, 2009). According to Bibri (2015), the key to achieving smart sustainable cities is to prioritize environmental values in science-based technology. Smart city initiatives intend to plan for the future, protect the natural environment, utilize existing infrastructure, and improve the quality of life for residents, therefore, positively impacting the development of an environmentally friendly city and ensure long-term sustainability (Hall et al., 2000). Policymakers aim to enhance the environmental conditions and welfare of residents by providing secure and environment friendly options through smart cities (Østergaard & Maestosi, 2019). Smart cities play a significant role in effectively addressing and overcoming the considerable challenges posed by climate change concerns (Lytras et al., 2021) and environmental issues (Razmjoo et al., 2022) faced by authorities in urban development. Drawing from the aforementioned literature, the following hypothesis was formed:

H1a: The environmental dimension is significantly related to smart sustainable cities.

2.1.2 Social Dimension and Sustainable Smart cities

Sustainability encompasses not only environmental considerations but also social and economic dimensions. Nonetheless, the social dimension is frequently disregarded or accorded less emphasis in contrast to the others (Marsal-Llacuna,2016). The social dimension of sustainability comprises of poverty reduction, social investment and safe and caring communities (Torjman, 2000).In the context of smart sustainable cities, the residents are essential and are recognized as their most valuable asset, thus, designing a smart city necessitates the improvement of the resident's digital and cognitive abilities through the enhancement of their technical skills and mental aptitudes while promoting social bonds and collaboration within the community, which is commonly referred to as social capital (Radziejowska & Sobotka, 2021).Angelidou (2014) emphasizes the social aspect of smart cities, with four essential goals: the empowerment of residents through education and engagement, the cultivation of social capital and digital inclusion, the promotion of behavioural change towards ownership and responsibility, and the harmonization of technology with diverse individual needs and interests. It is essential to comprehend the concept of sustainable social advancement in a city, which involves an understanding of social sustainability and the recognition of how smart technologies can improve people's quality of life and assist in achieving sustainability targets (Monfaredzadeh & Krueger, 2015). Efficient communication and collaboration among community members are facilitated by smart cities, which play a crucial role in the development and strengthening of social connections and networks within the city.

H1b: The Social dimension is significantly related to smart sustainable cities.

2.1.3 Culture and Sustainable Smart cities

Sustainability in terms of culture encompasses a wide range of constituents that are focused on integrating cultural values, practices, and traditions into sustainable development initiatives. The achievement of sustainability in a city setting can be realized through the comprehensive consideration of economic, social, environmental, and cultural sustainability in both planning processes and the daily conduct of citizens (Khansari et al., 2014; Munda, 2006). The importance of culture in regenerating cities is acknowledged by UNESCO (Gaetan & Zaheer, 2017), however, it is significant to note that only the research conducted by Neirotti et al. (2014), integrates the notion of culture into the Smart City framework to a great extent.

H1c: The cultural dimension is significantly related to smart sustainable cities.

2.1.4 Economic Dimension and Sustainable Smart cities

According to Gascó-Hernandez's (2018), the concept of a 'smart city' involves utilizing information and communication technology to maximize the functional capacity of a city, improve the quality of life of its residents, and stimulate the local economy. Smart cities are viewed as a potential means of attaining economic development for countries (Jain et al., 2017). The emergence of smart cities has been identified as a significant factor in enhancing both the economic status of the country and the living standards of its citizens amidst various other contributing factors (Sta, 2017).

H1d: The economic dimension is significantly related to smart sustainable cities.

2.1.5 Technology and Sustainable Smart cities

Townsend (2013) highlights the interdependence between the development of Information and Communication Technology (ICT) and urban growth, which forms a mutually beneficial relationship. Consequently, sustainable urban planning necessitates the utilization of innovative ideas and sophisticated techniques that draw from complexity sciences (For example, Colldahl et al., 2013; Kramers et al., 2013, 2014; Rotmans et al., 2000; Shahrokni et al., 2015), upon which ICT is founded (Bibri & Krogstie, 2017a). The technological or technical dimension consists of new technologies, within this context, ICT plays a pivotal role in smart sustainable city planning (Bifulco et al., 2016), allowing for the re-evaluation of conventional city planning approaches (Höjer & Wangel, 2015) and offering new insights into addressing urban challenges (Batty et al., 2012).

H1e: The technological dimension is significantly related to smart sustainable cities.

2.2 Millennials and Gen Z

The term 'generation' is used to describe a group of individuals who are born during the same time frame and share similar cultural, historical and social backgrounds, leading to the development of distinct attributes (Hess & Jespen, 2009; Chhetri et al., 2014; Barhate & Dirani, 2022; Srisathan et al., 2022). The impact of generational changes on various domains such as politics, culture, economy, and the environment are widely recognized (Saijo; 2020; Brownstein & Taylor, 2014; Nazareth, 2010). There is no consistent demarcation of generational groups based on birth years across different studies. Earlier research adopts disparate viewpoints on the classification of Gen Y (millennials) and Gen Z. For instance, Chhetri et al. (2014) denote Gen Y as individuals born between 1977 and 1994, while Martin (2005) considers the range from 1978 to 1998. Srisathan et al. (2022) typically employs the age range of 27-41 years for Gen Y, with some studies encompassing those born up to 2000 (Barhate & Dirani, 2022). Similarly, Chhetri et al. (2014) delineate Gen Z as individuals born in 1995 and after, whereas Srisathan et al. (2022) recognizes the age range of 18-26 years (1996-2004). Barhate and Dirani (2022) and Simangunsong (2018) encompass individuals born between 1994 and 2012 within Gen Z. Tapscott (2009), defines Gen Z as people born between the mid-1990s to the early 2010s, with the age ranging from 13 to 28 years old in present year of 2023. The variations in determining the birth years that characterize the Gen Z generation can be attributed to the lack of discussion regarding the generation that follows it (Sherlywati et al., 2023). Generation Y or Millennials have been defined as people born between 1980 and 1990, representing the first generation of' digital natives' (Cord et al., 2015). Other definitions include those born between 1977 and 1996 (Valentine & Powers, 2013); between 1981 and 1995 (Solka et al., 2011) or between 1977 and 1994 (Neuborne, 1999; Williams & Page, 2011). In general, Millennials are considered to be individuals aged between 27 and 46 years in the present year of 2023. In this regard, Generation Z, who are currently undergoing the transition to adulthood and constitute a substantial proportion of the consumer market in some countries, plays a crucial role (Priporas et al., 2020). This generation exhibits a highly receptive attitude towards information and communication technologies (ICT) due to their lifelong exposure to these technologies and have continuous access to information, which enriches their awareness of global developments (Turner, 2015; Ozkan & Solmaz, 2015; Seemilller & Grace, 2018; Witt & Baird, 2018; Pichler et al., 2021).Therefore, environmental concerns hold significant importance for this generation (Hess, 2021; Kymäläinen et al., 2021; Ivanova et al., 2019) and hence demonstrate greater willingness to spend extra on goods and services offered by socially responsible enterprises (Nielsen, 2015). According to Noble et al. (2009), consumers' inclination to invest more money in socially responsible enterprises is based on their desire to discover genuine value. Similarly, Hume (2010) characterizes millennials as a cohort marked by an increased awareness of social and environmental issues, placing a growing emphasis on environmental consciousness (Bina, 2017). Furthermore, empirical investigations demonstrate that millennials exhibit a willingness to allocate additional resources towards goods and services that foster their physical and mental well-being, incorporate organic materials, or contribute to ecological sustainability (Green generation: Millennials think sustainability is a shopping priority, 2015). By considering the above literature, the following hypothesis was derived:

H2: There is a significant difference in the mean scores of smart sustainable cities between Gen Y and Gen Z.

3 Methodology

In an attempt to address the purpose of this study, a quantitative research approach was adopted. For the present study both the primary and secondary data have been used to assess the impact of sustainable tourism smart sustainable cities as perceived by the residents. The secondary data collected from various international as well as national journals. The primary data was collected through self – administered questionnaires and were disseminated among the residents.

3.1 Research Framework

The present research intends to assess the perceived impact of sustainable tourism on smart sustainable cities. Besides, the investigation aims to check the significant differences in mean scores of Gen Z and Gen Y towards smart sustainable cities. In line with the study's aim, an exhaustive review of the existing literature related to sustainable tourism and smart sustainable cities was carried out, and after that, the conceptual framework was developed (Figure 1).

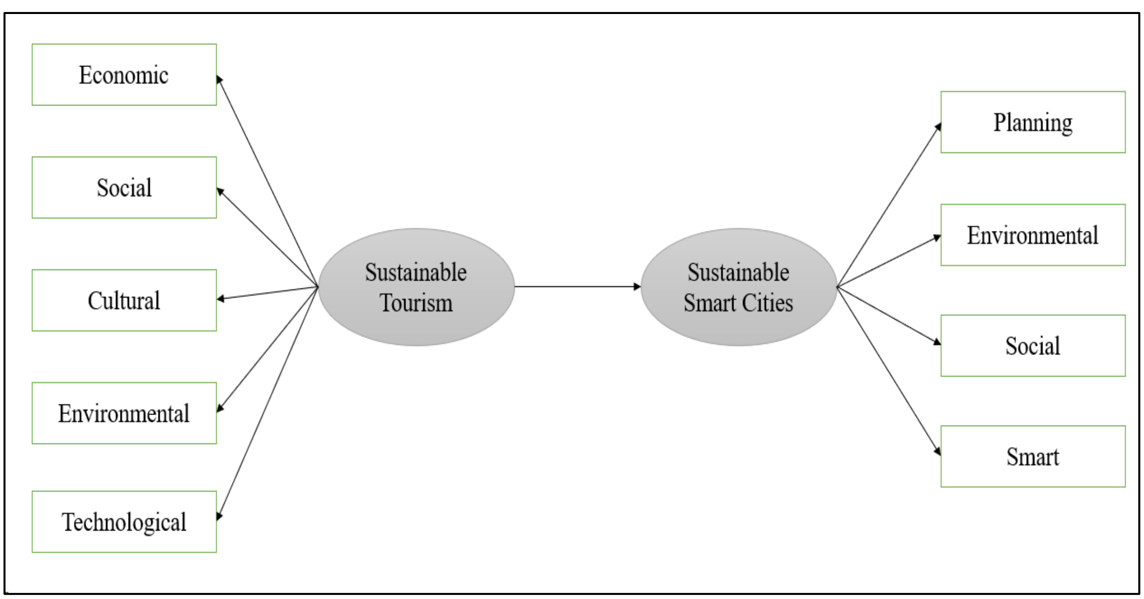

Figure 1: Research framework

3.2 Research Instrument and Pilot Study

The questionnaire had two sections. The first section referred to the socio demographic characteristics of the respondents, namely Gender, Family Income level per month, Size of city of residence, PPAF classification, Time spent browsing sites and Time spent using social media. The second part of the questionnaire evaluated the perception of residents regarding of impact of sustainable tourism on smart sustainable cities. Respondents were asked to rate 42 statements on a 5- point Likert scale from 1 to 5 where "1" meant "strongly disagree" and "5" meant "strongly agree".

The scale consists of two main variables viz. sustainable tourism and smart sustainable cities. The exogenous variable sustainable tourism had 05 first order reflective constructs (Economic, Social, Cultural, Environmental and Technology Dimension). The scale was adopted from Sfodera et al., 2022 and was modified accordingly for the present study. The endogenous variable smart sustainable cities had 04 first order reflective constructs (Planning, Environment, Social and Smart). This variable was adopted from the scale of Homer, 2022 and was modified accordingly for the current investigation.

To capture the essence of the study, the instrument was initially pre-tested by 03 industry specialists, 04 faculty members and 02 research scholars. Following pre-testing, the questionnaire was delivered to 40 participants in the pilot study to assess the instrument's reliability. Each construct's reliability was sufficiently above the suggested threshold of .70 (Nunnally, 1978).

3.3 Study Settings and Sampling Design

The study was conducted in Kashmir valley that is surrounded by the mighty Himalayan ranges with lofty snow-covered peaks at an altitude of 5200 feet above sea level. Data were collected from destination communities of Kashmir Valley. 1365 questionnaires were distributed among the respondents using the convenience sampling method. Among the returned questionnaires, only 394 were found to be valid for further analysis.

4 Data Analysis and Results

Data screening is an essential step before proceeding to further multivariate analysis. The proper screening of data is done to find out whether there is any missing value, unengaged response, or an outlier (Gaskin, 2017). Therefore, using the Statistical Package SPSS 20.00, the whole data was screened using a frequency test, with results demonstrating no occurrence of outliers.

4.1 Demographic Characteristics

This descriptive analysis provides an overview of the respondent's demographic profile, shedding light on important characteristics such as Gender, Family Income level per month, Size of city of residence, PPAF classification, Time spent browsing sites and Time spent using social media. The results of demographic characteristics are summarized in table 1.

Table 1: Demographic Profile Results

		Frequency	Percent
Gender	Male	212	53.8
	Female	182	46.2
Monthly Income	Less than Rs 20,000	85	21.6
	Rs 20,001–40,000	107	27.2
	Rs 40,001–60,000	81	20.6
	Rs 60,001–80,000	84	21.3
	Above Rs 80,000	37	9.4
	Large cities (between 1 and 2 m inhabitants)	192	48.7
	Large metropolitan area (more than 10 m inhabitants)	28	7.1
	Medium-sized cities (between 500,000 and 1 m inhabitants)	84	21.3
	Medium-sized metropolitan area (between 2 to 10 m inhabitants)	84	21.3
	Small cities (municipalities with less than 500,000 inhabitants)	6	1.5

Table 1 provides significant insights into the characteristics of the respondents surveyed. Among the 394 participants, the distribution of gender was nearly equal, with males comprising 53.8% and females comprising 46.2% of the sample. The majority of respondents, comprising 27.2%, reported a monthly income falling between the range of "Rs 20,001–40,000". This finding suggests that a considerable proportion of the participants possessed a modest level of income. It is noteworthy that the income category categorised as "Above Rs 80,000" exhibited the lowest number of respondents, accounting for merely 9.4% of the overall sample. The analysis also provides insights into the geographical distribution of the participants, indicating that a significant proportion, specifically 48.7%, were residents of large cities with populations ranging between 1 and 2 million inhabitants. The survey participants said that medium-sized cities and metropolitan areas were equally represented, with each category accounting for 21.3% of the respondents. Remarkably, a scant 1.5% of the participants originated from "Small cities" characterised by populations below 500,000 residents. The results of this study have the potential to be valuable for researchers, marketers, and policymakers in gaining a deeper comprehension of the demographic makeup of the study participants. This understanding can aid in the development of targeted interventions and customised strategies that take into account income and geographical attributes.

4.2 Reliability Results

Zigmund (1995) defines the reliability in terms of internal consistency "which is the instrument's ability to correlate with other items on the sample scale that measure the same construct". To determine the reliability of the instrument Cronbach's alpha coefficient was used. Cronbach's alpha of 0.70 or more (Nunnally, 1978) indicates that the measuring scale employed to quantify a construct is moderately dependable. The reliability test results are summarized in Table 2 below.

Table 2: Results of Reliability Test

Dimension	No. of items	Cronbach Alpha (α) Value
Economic Dimension	06	.925
Social Dimension	03	.856
Cultural Dimension	03	.889
Environmental Dimension	04	.891
Technology Dimension	05	.912
Sustainable Tourism	**21**	**.872**
Planning	05	.932
Environmental	04	.862
Social	03	.794
Smart	04	.877
Smart Sustainable Cities	**16**	**.877**

"Note: Cronbach Alpha (α) for all the constructs is above the threshold level **0.70**"

4.3 Measurement Model

A measurement model with two 2nd Order Constructs viz. sustainable tourism having five first order reflective constructs (Economic, Social, Cultural, Environmental and Technology Dimension) and Smart Sustainable Cities having 04 first order reflective constructs (Planning, Environment, Social and Smart) were tested for confirmatory factor analysis.

The first phase in a reflection model evaluation entails assessing the loading of the indicator. Loads above 0.708 are suggested, indicating that the design explains over 50 percent of the variance of the indicator and provides therefore adequate item reliability. The indicator loadings of all the statements used in the study were checked. The indicator loadings for all statements were found to be greater than the recommended threshold value of 0.70 (Hair et al., 2013). The indicator loadings of all the statements are shown in table 3 given below.

The second phase is the assessment of reliability. Jöreskog's (1971) composite reliability was used to check the reliability of the measured constructs. Composite Reliability (CR) was calculated for all the constructs used in the study. The results of CR for the constructs indicate that their reliability was above the recommended value of 0.70, thus were satisfactory. The value of composite reliability is shown the table 3 as given below

The third step of the reflection model evaluation covers the convergent validity of each construct. Convergent validity is assessed through Average Variance Extracted (AVE). A valid AVE is 0.50 or more, suggesting that the concept accounts for at least 50% of the variance in its elements. Convergent validity was calculated for the dimensions of Host-Tourist Interaction. The AVE for the variables was found to be above the recommended threshold value of 0.50 thereby holding the convergent validity. The convergent validity of all the constructs is shown in the above table 4.6 given above.

Lastly, the discriminant validity was assessed. It refers to "the extent to which the measures are not a reflection of some other variables" and is indicated by the low correlations between the measure of interest and the measures of other constructs (Ramayah et al., 2013). The square root of the AVE (diagonal values) of each construct is larger than its corresponding correlation coefficients, pointing towards adequate discriminant validity as shown in Table I (Fornell & Larcker, 1981). To conclude, the measurement model showed an adequate convergent validity and discriminant validity.

The comprehensive results of the Confirmatory Factor Analysis (CFA) can be seen in Tables 3, 4 and 5, providing an overview of the findings related to the reliability, convergent validity, and discriminant validity of the investigated constructs.

Table 3: Results of the Overall Measurement Model

Construct	Item	Factor Loading	CR (above 0.7)	AVE (above 0.5)
	EcD2	.881		
	EcD3	.830	0.972	0.681
Economic	EcD1	.834		
	EcD4	.794		
	EcD6	.841		
	EcD5	.766		
	SD1	.875		
Social	SD2	.771	0.857	0.667
	SD3	.801		
	CD1	.920		
Cultural	CD3	.874	0.892	0.734
	CD2	.769		

Environmental	EnvD1	.911		
	EnvD4	.801	0.892	0.675
	EnvD3	.786		
	EnvD2	.782		
Technological	TD5	.971		
	TD4	.980	0.898	0.646
	TD3	.686		
	TD2	.659		
	TD1	.651		
Sustainable Tourism	Economic	.816		
	Social	.808		
	Cultural	.757	0.898	0.638
	Environmental	.739		
	Technological	.867		
Planning	P2	.866		
	P3	.888		
	P5	.844	0.932	0.734
	P1	.843		
	P4	.841		
Environmental	Env1	.843		
	Env2	.779	0.865	0.616
	Env4	.766		
	Env3	.748		
Social	Sol1	.595		
	Sol3	.785	0.797	0.572
	Sol2	.864		
Smart	Smart4	.842		
	Smart3	.814	0.878	0.644
	Smart1	.764		
	Smart2	.788		
Sustainable Smart Cities	Planning	.875		
	Environmental	.731		
	Social	.706	0.872	0.633
	Smart	.856		

Table 4: Discriminant validity Results

	CR	AVE	Cultural	Economic	Technological	Environmental	Social
Cultural	0.892	0.734	**0.857**				
Economic	0.927	0.681	0.150	**0.825**			
Technological	0.898	0.646	0.107	0.437	**0.804**		
Environmental	0.892	0.675	0.206	0.262	0.157	**0.822**	
Social	0.857	0.667	0.404	0.047	0.033	0.163	**0.817**

Table 5: Discriminant validity Results

	CR	AVE	Environmental	Planning	Smart	Social
Environmental	0.865	0.616	**0.785**			
Planning	0.932	0.734	0.563	**0.857**		
Smart	0.878	0.644	0.099	0.191	**0.803**	
Social	0.797	0.572	0.562	0.650	0.052	**0.756**

4.4 Hypotheses Testing

The next stage is to conduct hypothesis testing once confirmatory factor analysis has been completed. Using the SPSS AMOS software, researchers conducted SEM in order to test the proposed hypotheses.

The findings of the study showed that Sustainable tourism has a significant impact on the smart sustainable cities as perceived by the resident communities (β=0.703; $p < 0.05$) (Figure 2). Also, the study's findings showed that there is a significant positive relation among the dimensions of Sustainable tourism with smart sustainable cities i.e., Economic Dimension (β=0.503; $p < 0.05$), Social Dimension (β=0.335; $p < 0.05$), Cultural Dimension (β=0.456; $p < 0.05$), Environmental Dimension (β=0.486; $p < 0.05$) and Technology Dimension (β=0.378; $p < 0.05$) (Figure 3). Therefore, the study's findings supported hypotheses H1 and sub-hypotheses H1a, H1b, H1c, H1d and H1e. The results of the hypotheses are summarised in Table 6.

Table 6: Hypotheses Results

				Estimate	C.R.	P	Results
H1	Sustainable Tourism	--->	Sustainable Smart Cities	**0.703**	**8.909**	***	Supported
H1a	Economic	--->	Sustainable Smart Cities	**0.503**	**7.653**	***	Supported
H1b	Social	--->	Sustainable Smart Cities	**0.335**	**5.734**	***	Supported
H1c	Cultural	--->	Sustainable Smart Cities	**0.456**	**6.264**	***	Supported
H1d	Environmental	--->	Sustainable Smart Cities	**0.486**	**6.998**	***	Supported
H1e	Technological	--->	Sustainable Smart Cities	**0.378**	**4.343**	***	Supported

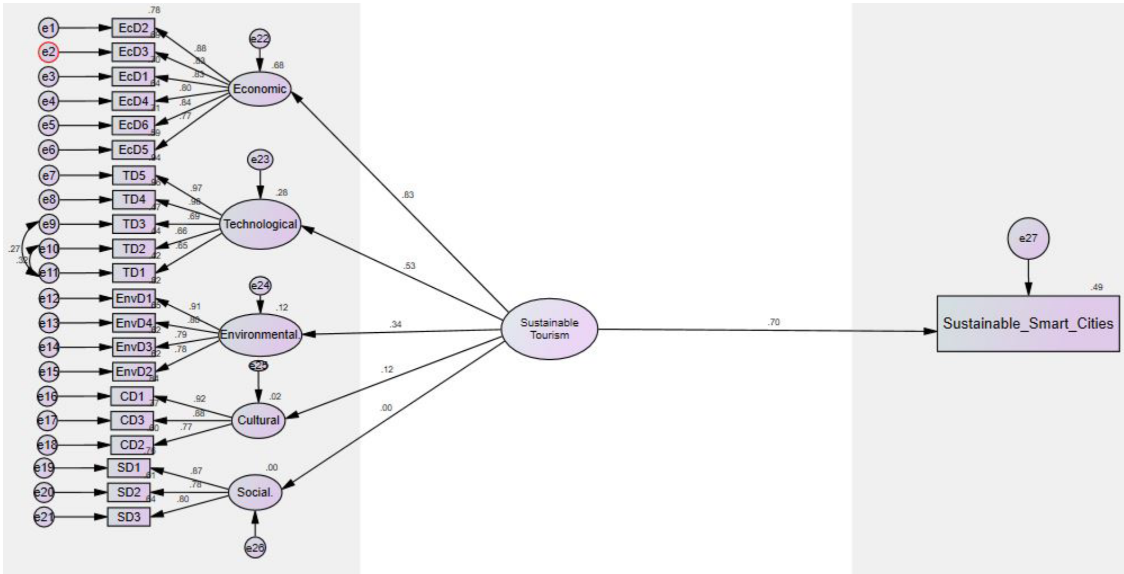

Figure 2: The estimated SEM path model. Source: Authors' elaboration

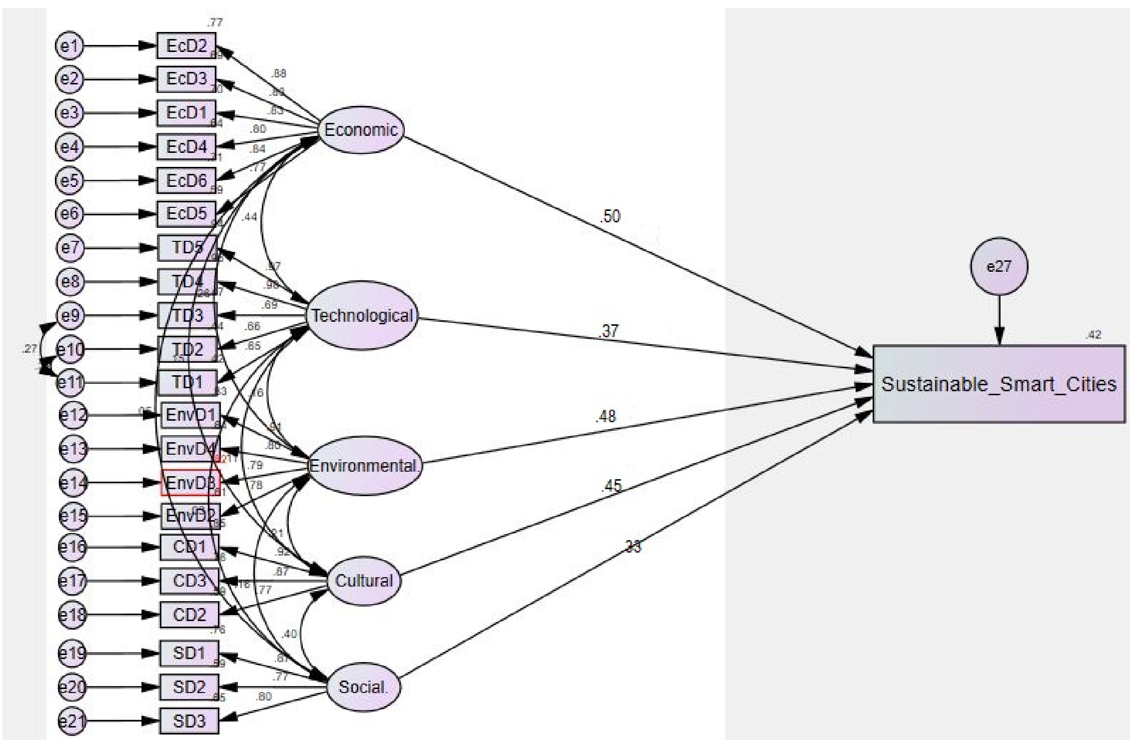

Figure 3: The estimated SEM path model. Source: Authors' elaboration

To find out significant differences in the mean scores of Generation Y and Generation Z towards Smart sustainable cities.

Table 7: Group Statistics

				Levene's Test for Equality of Variances		t-test for Equality of Means		
Variable	Gender	N	Mean	F	Sig.	t	df	Sig. (2-tailed)
Smart sustainable cities	Gen Y	193	3.192	1.189	.276	1.718	392	.087
	Gen Z	201	3.055			1.719	391.967	.086

To compare the mean scores of Generation Y and Generation Z and determine whether there are statistically significant differences between the two groups, t-tests were conducted for each category. The results of two statistical tests i.e., Levene's Test for Equality of Variances and the t-test for Equality of Means are presented. Levene's Test for Equality of Variances is used to assess whether the variances of the two groups (Gen Y and Gen Z) are significantly different. In this case, the Levene's Test results show that the F-statistic is 1.189 with a p-value of 0.276. Since the p-value (0.276) is greater than the significance level of 0.05, thereby indicating variances between the two groups are same. The results show that the t-statistic for Gen Y is 1.718 with 392 degrees of freedom, and the p-value is 0.087. For the Gen Z, the t-statistic is 1.719 with 391.967 degrees of freedom, and the p-value is 0.086. With a significance level of 0.05, both t-tests indicate that there is no statistically significant difference in the means scores of Generation Y and Generation Z towards Smart sustainable cities. Specifically, the Generation Y has a higher mean score (3.192) compared to the Generation Z (3.055).

5 Discussion

The research findings indicate that sustainable tourism has a noteworthy influence on smart sustainable cities, as evidenced by a beta coefficient (β) of 0.703 and a p-value below the threshold of 0.05. The findings of this study indicate a significant and favourable correlation between the implementation of sustainable tourist practices and the advancement of smart sustainable cities. The statistical significance of the association is supported by the p-value being less than 0.05, which provides confidence in the validity of the findings. The significance of this discovery lies in its ability to emphasize the necessity of integrating sustainable tourism strategies into the planning and administration of intelligent sustainable urban areas. Sustainable tourism is a concept that prioritizes the reduction of adverse environmental and socio-cultural consequences, while simultaneously striving to optimize economic advantages for indigenous populations. By incorporating these concepts into the design and functioning of intelligent sustainable cities, urban planners and politicians have the potential to develop urban places that are more resilient, inclusive, and ecologically conscious. The study additionally examined the individual associations among several characteristics of sustainable tourism and smart sustainable cities. The results indicated that there were statistically significant positive relationships seen for all dimensions.

Economic Dimension ($\beta=0.503$, $p<0.05$): This suggests that sustainable tourism practices that promote local economic development, job creation, and support for local businesses have a positive influence on the development of smart sustainable cities. These economic benefits can contribute to the overall well-being and prosperity of the city's residents.

Social Dimension ($\beta=0.335$, $p<0.05$): The positive relationship between the social dimension of sustainable tourism and smart sustainable cities implies that community engagement, inclusivity, and social well-being fostered by sustainable tourism practices can enhance the city's overall smart sustainability.

Cultural Dimension ($\beta=0.456$, $p<0.05$): Sustainable tourism that respects and preserves the local culture and heritage can contribute significantly to the development of smart sustainable cities. Cultural richness and identity play an essential role in creating a sense of place and community, making the city more attractive to residents and visitors alike.

Environmental Dimension ($\beta=0.486$, $p<0.05$): The positive association between the environmental dimension of sustainable tourism and smart sustainable cities indicates that practices promoting environmental protection and resource efficiency can have a substantial impact on the city's overall sustainability goals.

Technology Dimension ($\beta=0.378$, $p<0.05$): Lastly, the study found that the technology dimension of sustainable tourism, which likely refers to the integration of smart technologies in the tourism sector, is positively related to the development of smart sustainable cities. This suggests that leveraging technology can enhance the efficiency and effectiveness of sustainable tourism practices, further contributing to the city's smart sustainability goals.

Overall, these findings provide valuable insights for policymakers, urban planners, and stakeholders involved in city development and tourism management. Integrating sustainable tourism practices into the planning and implementation of smart sustainable cities can lead to more resilient, livable, and environmentally friendly urban environments while positively impacting the lives of the resident communities. However, further research and exploration are necessary to fully understand the underlying mechanisms and potential challenges in achieving these synergies between sustainable tourism and smart sustainable cities.

6 Implications

The study's research findings have significant relevance for both managerial and theoretical aspects of smart sustainable city development. The study presents empirical evidence of a strong and positive association between sustainable tourist practices and the progress of smart sustainable cities, underscoring the imperative to include sustainable tourism strategies into urban planning and governance. Sustainable tourism is characterized by its emphasis on minimizing adverse environmental and socio-cultural consequences, while concurrently maximizing economic advantages for local communities. This approach has the capacity to fundamentally alter urban regions, rendering them resilient, inclusive, and environmentally aware. Additionally, this study examines distinct aspects of sustainable tourism and their respective correlations with smart sustainable cities. The economic aspect emphasizes that sustainable tourist practices, which promote local economic development, job generation, and support for local enterprises, contribute positively to the general well-being and prosperity of the city. The significance of community participation, inclusion, and social well-being in bolstering the smart sustainability of cities is shown by the positive correlation between the social dimension of sustainable tourism and smart sustainable cities.

The development of smart sustainable cities is significantly influenced by the preservation of local culture and legacy, as highlighted by the cultural dimension. The presence of cultural richness and identity is of utmost importance in fostering a sense of place and community, hence enhancing the appeal of a city to both its inhabitants and tourists. The research also highlights the significance of the environmental aspect, suggesting that strategies that promote environmental preservation and efficient resource utilization can have a significant impact on the city's objectives for sustainability. Moreover, the incorporation of technology, as exemplified by the technology aspect of sustainable tourism, has been observed to have a favorable correlation with the advancement of intelligent sustainable cities. The utilization of technology has the potential to augment the efficiency and efficacy of sustainable tourism practices, thereby making a substantial contribution towards the city's objectives of smart sustainability.

In summary, the outcomes of this research have substantial ramifications for policymakers, urban planners, and stakeholders engaged in the realms of urban development and tourism administration. The integration of sustainable tourism practices into the strategic development and execution of intelligent sustainable cities has the potential to enhance the resilience, quality of life, and ecological sustainability of urban areas, hence benefiting the local communities. Nevertheless, it is imperative to acknowledge the necessity for additional study in order to gain a complete understanding of the fundamental mechanisms and potential obstacles linked to the attainment of these synergies between sustainable tourism and smart sustainable cities.

7 Limitations and Directions for Future Study

The research findings offer significant contributions to the field, although it is imperative to recognise the inherent constraints of the study and propose potential avenues for further investigation. The research may be limited by its narrow scope, namely focusing on two generations, namely Gen Y and Gen Z. This limited focus may not offer a full understanding of sustainable perceptions throughout all age cohorts. Incorporating elder generations into the analysis may result in a more comprehensive comprehension of the various perspectives on sustainability within the framework of smart cities. Furthermore, the research is dependent on data that is self-reported, a factor that introduces the potential for respondent bias. Subsequent investigations may consider utilising a mixed-methods methodology, integrating qualitative and quantitative data in order to triangulate results and augment the level of analysis. Moreover, this study primarily focuses on the analysis of perceptions. Although this is a valuable approach, the study might be enhanced by integrating objective indicators of sustainability and evaluating the tangible effects of these perceptions on the behaviours and choices of inhabitants in smart cities. In conclusion, the examination of the ever-changing relationship between technology and sustainability might be enhanced by longitudinal studies. Such studies would provide valuable insights into the evolution of views and their ability to adjust to the shifts in smart city projects and sustainable practises. In conclusion, it is recommended that future research efforts expand the inclusivity of generational representation, utilise a combination of qualitative and quantitative methodologies, integrate objective metrics, and investigate the longitudinal dimensions of sustainable perceptions within the framework of smart cities. These initiatives will contribute to the advancement of knowledge in this intricate and dynamic domain.

8 References

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