

Smart Cities and Tourist Destinations Indicators applied in Foz do Iguaçu, Brazil

Alessandra Bussador¹, Bárbara Françoise Cardoso Bauermann², Miguel Diogenes Matrakas³, Janine Carvalho Padilha⁴, Kátya Regina de Freitas Zara⁵

^{1,4,5}Federal University of Latin American Integration, UNILA, Brazil

²Institute of Applied Technology and Innovation, ITAI, Brazil

³Itaipu Technological Park, PTI, Brazil

Received: 26 Oct 2022,

Received in revised form: 11 Nov 2022,

Accepted: 17 Nov 2022,

Available online: 27 Nov 2022

©2022 The Author(s). Published by AI

Publication. This is an open access article under the CC BY license

(<https://creativecommons.org/licenses/by/4.0/>).

Keywords— Smart City, Smart Tourist Destination, Sustainable Development, SEGITTUR, ISO Standards.

Abstract — In response to the need for efficiency and sustainability, new trends in urban development and management have emerged to assist in decision-making regarding the management of public services. This paper presents the evaluation of the indicators of Smart Tourist Destinations, with the Norms for Sustainable and Smart Cities applied in the city of Foz do Iguaçu. The models applied in this study were the indicators used by SEGITTUR and the Brazilian Technical Standards for Smart Cities. The most appropriate indicators for the Brazilian reality were selected. As a result, it was observed the importance of using indicators to analyze and standardize how the population evaluates the importance of these indicators for the best use of tourist resources in the city of Foz do Iguaçu, Brazil. Thus, it is noteworthy that the identification of these indicators in these destinations can help in the planning and management of tourist activity, improving the city's position as a Smart Tourist Destination.

I. INTRODUCTION

Cities can be seen as extremely complex systems, involving politics, economics, environment, culture, and many other connections. When considering the greater concentration of people and services in urban centers, there is an intensification of problems related to mobility, accessibility, housing, access to urban infrastructure, security, leisure, tourism, basic sanitation, and sustainability. Mostly, these themes have not been adequately addressed in cities in general because they are not thought of as variables of the same system, but in a disconnected way, impacting the future of the city [1].

Grimaldi and Fernandez claim that Smart Cities (SC) have provided different experiences for their residents. The available technological infrastructures contribute to improving the quality of life and sustainable economic growth. Therefore, a participatory government management model can boost local economic growth. [3, 4].

In this context, it is up to the public administration to develop a management environment capable of integrating

these themes. One of the ways is to use Information and Communications Technologies (ICT) tools, which collaborate for efficient management in relation to the use of resources, including greater citizen participation with the help of indicators to guide public policies and their investments. These are practices considered important in smart and sustainable cities [1, 2].

In addition to contributing to comparisons among cities, the indicators can support integrated policies. These indicators assist in decision-making by monitoring their performance. Tourist cities create sustainable development based on local limitations and capabilities. These cities include SC indicators and integrate sustainability and technology into the stages of the tourism value chain as a strategy. In addition, the indicators enhance the insertion of technology in the entire value relationship of the tourist destination, defining a Smart Tourist Destination (STD) [4, 5].

The use of indicators helps public management to improve the efficiency of public services provided to the

population. On the other hand, they allow the evaluation of SC, through the presence of intelligent technologies, their integration with the existing infrastructure, and the cost/benefit ratio. In this sense, indicators can contribute to the comparison between cities, support integrated policies and decision-making, and monitor their performance. To occur standardization, norms were established for the adequacy of cities. The reference in Brazil for SC are the ABNT ISO 37120:2021 and ABNT ISO 37122:2020 standards [6, 7]. In this context, tourist cities that include SC indicators and integrate sustainability and technology in the stages of the tourism value chain, as a strategy, create sustainable development based on local limitations and capabilities. Therefore, they enhance the insertion of technology in the entire tourist destination value chain [4, 5].

The Brazilian Ministry of Tourism considers a Smart Tourist Destination as an innovative and accessible tourist space, consolidated on a state-of-the-art technological infrastructure that guarantees sustainable development. Therefore, STD facilitates the interaction and integration of visitors with the surroundings, increasing the quality of their tourist experience in the destination. Its definition was developed from the Sociedad Mercantil Estatal para la Gestión de la Innovación y las Tecnologías Turísticas (SEGITTUR), from Spain, in 2013, and adapted by the Argentine Institute Argentino called Ciudades Del Futuro [8].

Given the transversality of tourism activity, STD is characterized by the axes that exercise the management of tourism, like as: governance, innovation, sustainability, technology, and accessibility. The smart city and destination present synergies because they share the same objective: to improve the quality of life of citizens [9].

Considering that Brazil is investing in the construction of smart cities, and many of them have tourist characteristics, the importance of verifying the relationship between the STD indicators and the national norms related to SC was noticed. In this context, the proposal of this paper is to answer this question: What are the indicators of Smart Tourist Destinations that can be applied together with the indicators of Brazilian standards for Smart Cities and their importance in the city of Foz do Iguaçu?

II. SMART CITIES AND SMART TOURIST DESTINATIONS APPROACH

The definition of smart cities has gone through a historical evolutionary process, starting in 1994, with the use of technology and innovation in urban areas, in the digital city of Amsterdam. In 1997, virtual urban areas have emerged, which were defined as electronic and web-based representations of real urban areas and were housed with the

help of the world wide web. Virtual cities were known as the first effort to make use of the Internet to support democracy and allowed urban promotion and social development in cities. The definition of a virtual community came into being in 1998, allowing communication between individuals through shared norms. This virtual community network had a narrow scope of digitizing services because it was associated with a community. People outside the community did not have direct access to the community network [10].

In 1999, the first definition of a smart city was considered in Dubai, where residents and local governments created communities using ICT and sensors to share information. At the beginning of the 2000s, the types of smart cities evolved towards more “sophisticated” ecosystems, whose level of integration expanded from the simple delivery of information embedded in social systems to the delivery of smart services (EcoCity) [11].

The characterization of the digital city has become synonymous with the information city. Later, the digital city became the ubiquitous city, where human-computer integration became invisible, integrating information technology with people's natural actions and behaviors (2006) through pervasive computing. As of 2007, groups were created in several countries to study and collaborate on the topic of Smart Cities [10].

In 2012, the definition of Strategic Digital Cities (SDC) was made by Rezende [12], which can be understood as the application of information technology resources in the management of the municipality and in the provision of information and public services to citizens. SDC is not the same conventional definition of a digital city or a smart city. It is a project that goes far beyond just offering internet to citizens through telecommunications resources. The definition of Smart Tourist Destinations was made in 2012, supplying specific demands of government and tourism for cities [13]. To create a reference for Sustainable Cities in Brazil, the first technical standard aimed at cities was published in 2014 – NBR ISO 37120:2021 [6]. This standard considers sustainability as its general principle and the smart city as a guiding concept in the development of cities. In 2015, the Smart City IEEE group was created with the mission of being the main source of technical information on Smart Cities and developing the best technical practices applied to urban infrastructure [14].

In 2019, a financial group formed by the 19 largest economies in the world, called G20, elected the Secretariat of the Global Alliance of Smart Cities during the World Economic Forum to assist in the digital transformation of cities and fight social inequalities [15]. The evolution of definitions and events, previously described, helped in the

formalization of smart cities and are summarized in Figure 1.

Cities that have a base project for analyzing indicators can be considered precursors of intelligence, regarding the use of technologies to generate efficiency in their services. Even those cities which seek to innovate and propose improvements in the lives of citizens. Rampazzo et al. [16] state that smart cities are those that develop policies, strategies and approaches for planning, finance, construction, governance and operation of urban infrastructure and services that use ICT as a central element. However, there are several definitions of what a smart city is.

The definition of SC has evolved over the last two decades. However, this definition lacks a set of guidelines for evaluating its effectiveness and efficiency as an urban management system. Buhalis et al. [17] presented aspects for each of the intelligence indicators of a city:

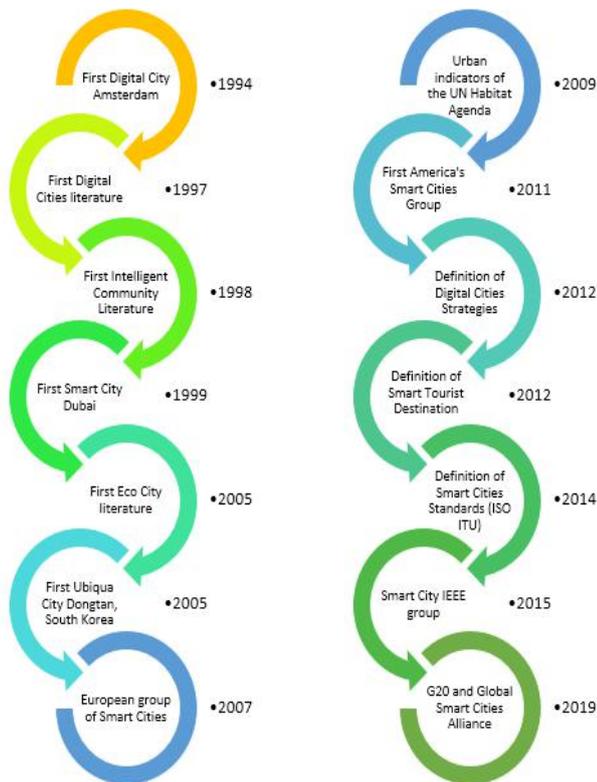


Fig. 1: Smart Cities timeline

- Smart Governance: related to the aspect of transparency within governance systems through the modernization of city administration, supporting open data and public engagement.
- Smart Environment: related to energy optimization that leads to sustainable management of available resources.
- Smart Mobility: refers to accessibility in and out of the city and the availability of modern transport systems.

- Smart Economy: related to the implementation of economic strategies based on digital technology.
- Smart People: refers to the qualification level of the city's human capital; and
- Smart Life: involves the quality of life measured in terms of a healthy environment, social cohesion, tourist attraction, and availability of cultural and educational services.

These indicators can contribute to the transformation of a city into a smart city. It is necessary to include the human factor, in addition to offering a technological structure for the city. Norms are created based on these indicators to help in the management and good practices of SC.

Indeed, Smart Cities have overlapping and interactive concerns, including tourism. The aspects shown in Figure 2 are just an example of the various aspects that can be influenced by SC measurements. For example, big data, Artificial Intelligence (AI), or the Internet of Things (IoT) can be used to improve transportation efficiency, healthcare, sustainability, and the tourist experience [18].

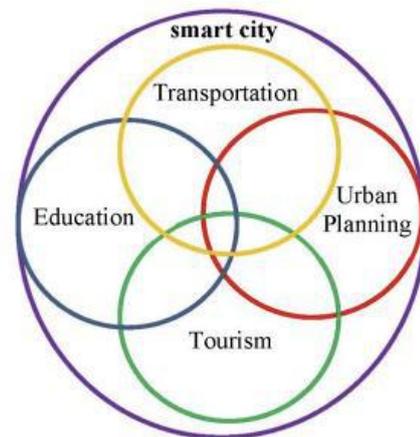


Fig. 2: Aspects of the smart city that are relevant to tourism [18].

Smart tourist destinations make intensive use of ICT to improve the tourist experience. Therefore, STD are smart cities that allow the sustainable development of tourism, maintaining the quality of life of residents. These cities serve visitors in a similar way that they serve the needs of their residents, in the way they support mobility, allocate resources, and increase sustainability and quality of life [18].

The STD definition created by Sociedad Mercantil Estatal para la Gestión de la Innovación y las Tecnologías Turísticas (SEGITTUR) was adopted as a conceptual basis and strategic tool that seeks to create tourist experiences and improve destination management through knowledge. Its main goal is to provide services to tourists in real-time, creating an environment of cooperation and sharing of data, information, and knowledge. The Spanish model uses a systemic vision for the conversion of destinations into smart

destinations, through five fundamental axes: innovation, sustainability, competitiveness, accessibility, and governance [19].

Understanding the descriptive differences between a smart city and a smart destination allows us to have a greater mastery of the needs of the city. In addition, there are contributions that a smart tourism model can generate in aspects not included in smart city models [9].

Based on SC research and methodologies, an STD successfully implements intelligence that is fueled by open innovation, supported by investments in human and social capital, and underpinned by participatory governance. These features develop the collective competitiveness of tourist destinations to improve social, economic, and environmental prosperity for all stakeholders creating an ideal habitat for the smart tourist destination.

Ribeiro dos Santos and Gândara [4] based their study on this model proposing a pilot project with the application of eleven indicators for tourist destinations (Table 1).

These indicators contribute quantitatively and qualitatively to the conceptualization and reference of a Smart Tourist Destination. Aspects such as tourist typology, tourist segmentation, infrastructure, and geographic distribution, among others are considered [4].

Ivars-Baidal et al. developed a system of indicators adapting existing indicators in the tourist destination management literature and smart cities for destinations in the region of Valencia, Spain, based on the definition of STD (Invat.Tur). The patterns were analyzed to identify those that fit the Smart Destinations model, derived from smart city indices, and adjusted to the tourism context. It was identified nine categories (governance, sustainability, innovation, accessibility, connectivity, intelligent information, online marketing, and performance indicators), obtaining a set of 72 indicators [5].

For Herscovici et al. [18], the STD is a general part of an SC. They suggest a model that allows analyzing the gaps between the Degree of Importance that tourists attribute to certain tourism factors, and the Degree of Satisfaction of tourists to assess the tourist experience and extend their stay. In their study, they use the relevant indicators from ISO 37122:2020 to establish a benchmark to relate the parameters of degrees of importance and satisfaction.

Many of the parameters of ISO 37122:2020 are also relevant to tourists, especially the ability to provide real-time information about transport, events, facilities, etc. The use of ICT brings local information closer to tourists [18].

Table.1: STD Indicators [4]

Categories	Definitions
Governance	Reinvention of municipal tourism management with the objective of evolution of the smart tourist destination, through an action plan adapted to the needs of each municipality.
Territorial and urban sustainability	It is related to the qualification of the urban category of destinations that require an adaptation to the urban tourist model of each destination, which may result in reference values for general application.
Tourism sustainability	Sustainability reinforces the STD model, because actions in this area are limited and sometimes associated with poor sustainability and the lack of holistic management. This is necessary for sustainable development, which is not sufficiently designed for the market, with the aim of becoming a differentiation to the destination.
Connectivity and sensing	Connectivity and sensing are one of the most important aspects of a STD, as they are related to easy access, free destination, quality of the Internet available, quality tourist service, promotion and sale of the tourist destination and tourist behavior. Connectivity is a priority from the point of view of tourism management to compete in a digital economy environment, both in terms of demand and connection of companies in major destinations.
Accessibility	Accessibility is a requirement for STD, as it is a requirement for everyone, with the development of an accessible tourism, both physical and digital.
Information systems and tourist intelligence	The information systems and tourist intelligence open numerous possibilities for improvements in tourism development, in which the rate of adoption of these technologies on demand of companies is high. The use of these possibilities requires changing processes and adopting a more ambitious approach to the collection and use of information of interest for tourism management.
Tourist information	STD should focus on a system of renewed tourist information, adapted to the new conditions of demand and, in general, the current tourism scenario. Information systems must adapt to a renewed motivational demand, seeking unique and personalized experiences to better satisfy a more demanding tourist.

Online Marketing	The online marketing of a STD should offer tourists technological tourist services, adapted to their needs. It is because in a first stage of the trip, the tourist sends information through alternative channels that include social networks, experiential sites, mobile applications, and inspiring videos. Therefore, the STD should develop lines of action aimed at the full satisfaction of tourists. The web of a STD should include a section dedicated to co-creating experiences: a virtual space where visitors interact with the destination and other users.
Commercialization	The purchase of online services is a sequence of processes, which has grown uncontrollably using the internet at all stages of the travel cycle. Therefore, connecting the platforms of the official tourism sites enable the provision of data and information that contribute to marketing and creating possibilities for the company to focus on marketing.
Innovation	STD faces major challenges, which is consolidating innovation as a core of competitiveness to evolve truly innovative environments. The STD model serves as an impetus for destinations to promote open innovation environments that help territorial clusters in municipalities with more experiences that have similar products.
Tourist experience improvement	Authentic experiences in areas such as differentiation, innovation and quality, i.e. customization of tourism.

III. BRAZILIAN STANDARDS FOR SUSTAINABLE CITIES AND COMMUNITIES

The Brazilian Association of Technical Standards (ABNT) is the official body responsible for technical standardization in Brazil, which provides inputs for Brazilian technological development. It is a private, non-profit, and public utility entity, founded in 1940, and founding member of the International Organization for Standardization (ISO), Comisión Panamericana de Normas Técnicas (Copant) and Asociación Mercosur de Normalización (AMN) [20].

NBR ISO 37120:2021 is about Sustainable Development in Communities: Indicators for Urban Services and Quality of Life. It was published in 2017 and revised in 2021. It has sustainability as its primary objective, in which it defines and establishes methodologies for a set of indicators, in order to guide and measure the performance of urban services and quality of life. This standard can be used in conjunction with the international standard ISO 37101:2016, Sustainable Development in Communities – Management System for Sustainable Development – Requirements with Guidance for use [6].

According to ABNT [6], being in compliance with the standards does not guarantee the city the purpose of being smart. It is necessary the city is in compliance with the indicators for defined urban services and quality of life. These indicators can be used to monitor and keep the progress up of the city's performance so that it can achieve sustainable development.

NBR ISO 37122:2020 is about Sustainable Cities and Communities: Indicators for Smart Cities. It specifies definitions and methodologies for a set of indicators in order to measure and consider aspects and practices that allow an increase in the pace at which cities improve their results of social, economic and environmental sustainability [7]. This

standard considers sustainability, as its general principle, and the smart city as a guiding concept in the development of cities. It is suggested to implement NBR ISO 37122:2020 together with NBR ISO 37120:2021, to measure progress towards smart and sustainable cities.

NBR ISO 37122:2020 defines a smart city as one that:

[...] increases the pace at which it delivers social, economic and environmental sustainability results and responds to challenges such as climate change, rapid population growth and political and economic instabilities, fundamentally improving the way it engages society, applies collaborative leadership methods, works through municipal disciplines and systems, using data information and modern technologies to provide better services and quality of life for those who inhabit it (residents, businesses and visitors), without unfair disadvantages or degradation of the natural environment [7].

This standard implements smart city policies, programs and projects to [7]:

- a) respond to challenges such as climate change, rapid population growth and political and economic instability, fundamentally improving the way they involve society.
- b) apply collaborative leadership methods and work between disciplines and urban systems.
- c) use data information and modern technologies to provide better services and quality of life for those in the city (residents, businesses, visitors).
- d) provide a better living environment where smart policies, practices and technologies are at the service of citizens.

- e) achieving its environmental and sustainability objectives in a more innovative way.
- f) identify the need and benefits of smart infrastructure.
- g) facilitate innovation and growth.
- h) build a dynamic and innovative economy, ready for the challenges of the future.

IV. METHODOLOGY

A descriptive study was carried out through the bibliographic and documentary research. In addition, a survey was carried out with Foz do Iguaçu residents, considering the Spanish Model of indicators proposed by Ivars-Baidal et al. [5] and the Brazilian Standards of Smart Cities, specifically NBR ISO 37120:2021 and NBR ISO 37122:2020 [6, 7].

A questionnaire was applied for the population of Foz do Iguaçu, over 18 years old through the Google Forms tool. It had 16 questions about the intelligence indicators. The questionnaire evaluated the degree of importance perceived by the population regarding the characteristics of the intelligence indicators compared to each other. The participants were asked to compare the degree of importance, along with the intelligent indicators:

- SMART ECONOMY: related to the implementation of economic strategies, entrepreneurship and innovation based on digital technology.
- SMART PEOPLE: related to the level of qualification of human capital and citizen participation in public life.
- SMART GOVERNANCE: related to the aspect of transparency within governance systems, supporting the use of open data and public involvement.
- SMART MOBILITY: refers to accessibility inside and outside the city, innovative transport initiatives, transport safety and use of clean vehicles.
- SMART SUSTAINABLE ENVIRONMENT: related to the rational optimization of the use of energy, water and natural resources that leads to the sustainable management of available resources.
- SMART QUALITY OF LIFE: involves the quality of life measured in terms of healthy environment, health management, public safety, housing conditions, social cohesion, tourist attraction and availability of cultural and educational services.

The question used to interview the respondents was: "How important is one indicator in relation to the other?". The Fundamental Saaty Scale [21] was applied to assess the degree of importance:

- 1 - No importance;
- 2 - Equal importance;
- 3 - Small importance;
- 4 - Medium importance;

5 - Great importance.

The survey resulted in a total of 129 answers. Of the total, 18 (13.9%) respondents always attributed the greatest degree of importance to the first option in all questions. It was judged as a case of atypical and, therefore, an invalid answer condition. Thus, these answers were not considered in this research. As a result, only 111 (86%) responses were considered as valid.

Given the fact that it was not possible to geographically limit the application of the questionnaire, participants were asked to identify their respective cities. Of the total valid answers, 63 (56.7%) identified themselves as residents of Foz do Iguaçu, whose answers were analyzed in the next section.

Then, the relevance among the categories of each intelligence indicator was evaluated, analyzing the degree of importance and population's perception on STD and SC indicators in the city of Foz do Iguaçu. This method considers all the individual opinions of each respondent to perform the calculations and obtain the final ranking of the categories.

It is noteworthy that this methodology is specific for the Brazilian case, because it considers the Brazilian standards for the analysis of indicators and categories SC and STD. However, it can be replicated in any country, since local legislation on smart cities can be adopted.

V. RESULTS

The relationship data between intelligence indicators and the categories of Brazilian norms showed the presence of groups that indicate greater complexity of analysis. It consists of a greater amount of data and the relevance for the determination of service of urban services, in addition to the quality of life desired for the city.

The results of this paper were obtained from the list of SC indicators, Brazilian Standards of Smart Cities, and the Categories of STD.

This situation was more evident in the categories related to the indicators of Smart Sustainable Environment (6 categories) and Smart Quality of Life (5 categories) (Table 2).

It is perceived that intelligence indicators and the categories of Smart Tourist Destinations are directly related. Because, in addition to having natural or built attractions, they require good dissemination, search for local improvements and use of existing technologies.

The analyzed patterns identified the categories that fit the STD model, derived from SC categories, and adjusted to the context of tourism. From this relationship, a correspondence of categories of smart tourist destinations was performed, using the Spanish model, with the themes existing in the Brazilian SC standards.

Table.2: Relation between intelligence indicators and SC and STD categories

Intelligence Indicators [14]	STD Categories [5]	SC categories [6, 7]
Smart Sustainable Environment	Sustainability	Solid Waste, Environment, Agriculture, Water, Sewage and Energy
Smart Economy	Performance Indicators, Online Marketing and Smart Tourism	Economy and Finance
Smart Governance	Information Systems and Governance	Governance and Urban Planning
Smart Mobility	Accessibility	Telecommunications, Transportation
Smart People	Innovation	Education and Population
Smart Quality of Life	Connectivity and Sensing	Public and Social Services

It was analyzed the answers from the 63 valid forms of the city of Foz do Iguacu. The Smart Economy indicator (Figure 3), which focuses on productivity, entrepreneurship, innovation and the labor market presented a great importance degree in relation to People (52.38%), Governance (57.14%), Sustainable Environment (49.21%) and Quality of Life (49.21%). Only in relation to Mobility, the medium importance prevails (42.86%).

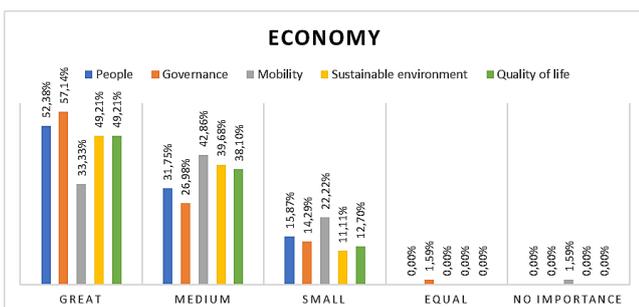


Fig. 3: Percentage of responses from the Smart Economy indicator.

For the Indicator Smart People, the point of interest is the level of qualification and its quality offered to the citizen, as well as the participation of the citizen in the public life of the municipality. As for this indicator, it was observed that it predominates for People a great importance degree in relation to Governance (50.79%), Sustainable Environment (46.03%) and Quality of Life (49.21%). Regarding mobility, the great and medium degree of importance appear tied with 33.33% each (Figure 4).

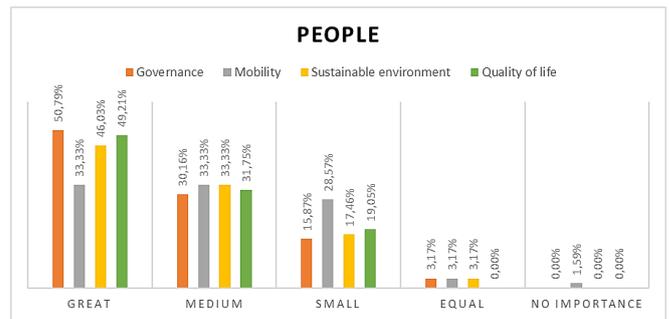


Fig. 4: Percentage of responses from the Smart People indicator.

As for the Smart Governance indicator, it is linked to the efficiency of public services provided and the existence of channels of transparency of the city's actions. It was noticed that the great degree of importance of Governance in relation to Mobility (58.73%), Sustainable Environment (61.90%) and Quality of Life (63.49%) predominates. The individual analysis of the indicators is shown in Figure 5.

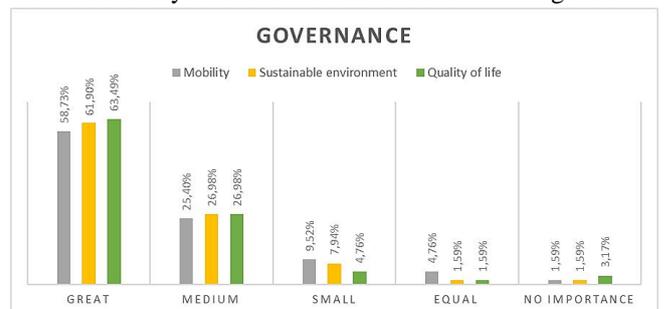


Fig. 5: Percentage of responses from the Smart Governance indicator.

Figure 6 shows the Smart Mobility indicator, which is related to the initiatives of transportation, transport safety, use of clean vehicles and the access of the population to the Internet.

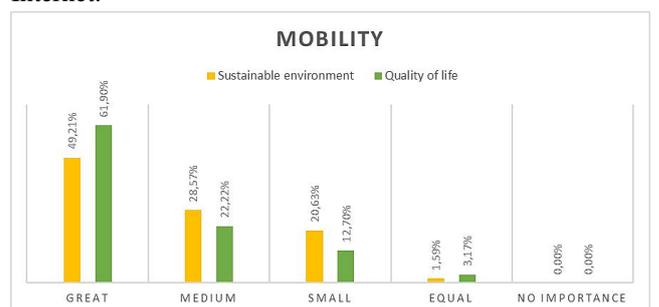


Fig. 6: Percentage of responses from the Smart Mobility indicator.

The individual analysis of the indicators shows a diversity among their degree of importance. Mobility has a great degree of importance in relation to the Sustainable Environment (49.21%) and Quality of Life (61.90%). It is worth mentioning the medium degree of importance of Mobility in relation to these two indicators (28.57% and

22.22%, respectively). In addition, the degree of equal importance that 1.59% of the respondents attributed to the Environment and 3.17% to quality of life is emphasized.

Regarding the Indicator Smart Sustainable Environment (Figure 7), it corresponds to the themes on environment, water and energy, and sustainable management. The study about this indicator shows that 65.08% of the respondents consider Sustainable Environment with a great importance in relation to Quality of Life; while 1.59% consider that there is no important relationship between these indicators.



Fig. 7: Percentage of responses from the Smart Sustainable Environments indicator.

These analyses showed that the Smart Quality of Life, measured in terms of healthy environment, social cohesion, tourist attraction and availability of cultural and educational services, is related to the other indicators.

Figure 8 shows the responses that consider one indicator more important than other (peer comparison) considering the sum of the answers given in the degrees of small, medium and great importance.

INDICATOR	Quality of life	Sustainable Development	Mobility	Governance	People	Economy
Sustainable Development	98.37%					
Mobility	96.82%	98.41%				
Governance	95.23%	96.82%	93.63%			
People	100.00%	96.82%	95.23%	96.82%		
Economy	100.00%	100.00%	98.41%	98.41%	100.00%	

Fig. 8: Percentage of the degrees of importance of the indicators

Analyzing the Economics indicator, it is noticed that 100% of the respondents declared that Economics is more important (sum of great, medium and small degrees) than Quality of Life, Sustainable Environment and People. In relation to the People indicator, it was 100% more important than Quality of Life.

Although Quality of Life has proved less important than other indicators, it does not mean that society does not consider it important. This fact means that quality of life comes as a result of the actions of previous indicators.

VI. FINAL CONSIDERATIONS

The purpose of this paper was to evaluate the degree of importance of indicators of Smart Tourist Destinations and the Brazilian Standards for Sustainable and Intelligent

Cities applied in the city of Foz do Iguacu. The models used were the indicators used by SEGITTUR and the Brazilian Technical Standards of Intelligent Cities, being selected the most appropriate indicators for the Brazilian reality.

Foz do Iguacu city was used as a case study because it is a city of a great tourist volume. In addition, Foz do Iguacu does not have municipal planning directed to the proposed theme, as well as public policies that have indicators in a conception of Smart Tourist Destination.

From the answers it is possible to affirm that, it is important to develop aspects of the intelligent economy for the expansion of tourist services, that is, to implement economic strategies based on digital technology. Moreover, there is a need to include the human factor not only in relation to the level of qualification of people, but also to offer a technological infrastructure for the city.

Another important factor refers to Governance, which is related to the aspects of transparency in government activities towards society in general, citizens and tourists. There is also Mobility, involving modern transport systems, and the sustainable environment, which aims to optimize available resources.

The definition of these indicators of intelligence in SC and STD for the city of Foz do Iguacu allowed measuring the degree of importance that the residents of the city attribute to the indicators. Thus, this study can contribute to improve the planning and management of tourism activity, both public and private one.

It is emphasized that with the investment in the development and application of indicators in these cities, they can improve their position as a Smart Tourist Destination.

The contribution of a STD to tourists, as well as to city residents, is holistic in the different aspects of quality of life. Thinking about the future of the city should consider the need of the importance of public policies and the transversality of processes and experiences involving participatory cooperation between residents and visitors.

With this analysis, it will be possible to perform a more in-depth study, using the indicators pointed out in this research for the elaboration of a decision tree using the Analytic Hierarchy Process (AHP) method proposed by Saaty, which is the next step to be taken to expand this research.

The main limitation of the current research is that the model was tested only in the city of Foz do Iguacu. It is believed that the use of indicators and the decision tree will improve the evaluation of the municipality providing subsidies for public management to improve the experience and length of stay of the visitor in the destination.

REFERENCES

- [1] S. Brorström, "The paradoxes of city strategy practice: Why some issues become strategically important and others do not," *Scandinavian Journal of Management*, vol. 33, no. 4, pp. 213–221, 2017, doi: 10.1016/j.scaman.2017.06.004.
- [2] J. S. da S. Cristóvam, L. B. Saikali, and T. P. de Sousa, "Governo digital na implementação de serviços públicos para a concretização de direitos sociais no Brasil," *Seqüência: Estudos Jurídicos e Políticos*, vol. 43, no. 84, pp. 209–242, Jun. 2020, doi: 10.5007/2177-7055.2020v43n84p209.
- [3] D. Grimaldi and V. Fernandez, "The alignment of University curricula with the building of a Smart City: A case study from Barcelona," *Technol Forecast Soc Change*, vol. 123, pp. 298–306, Oct. 2017, doi: 10.1016/j.techfore.2016.03.011.
- [4] S. R. dos Santos and J. Gândara, "Destino turístico inteligente: construção de um modelo de avaliação com base em indicadores para planejamento, gestão e controle de destinos histórico-culturais patrimônio da humanidade, analisando o caso de São Luís (Maranhão, Brasil)," *CULTUR - Revista de Cultura e Turismo*, vol. 10, no. 2, pp. 69–79, 2016.
- [5] J. A. Ivars-Baidal, M. A. Celdrán-Bernabeu, F. Femenia-Serra, J. F. Perles-Ribes, and D. Giner-Sánchez, "Measuring the progress of smart destinations: The use of indicators as a management tool," *Journal of Destination Marketing and Management*, vol. 19, p. 100531, Mar. 2021, doi: 10.1016/j.jdmm.2020.100531.
- [6] ABNT, "NBR ISO 37120 - Cidades e comunidades sustentáveis – Indicadores para serviços urbanos e qualidade de vida." Associação Brasileira de Normas Técnicas, Sao Paulo, SP, p. 146, 2021.
- [7] ABNT, "NBR ISO 37122 - Cidades e comunidades sustentáveis - indicadores para cidades inteligentes." Associação Brasileira de Normas Técnicas, Sao Paulo, SP, p. 112, 2020.
- [8] M. do Turismo, "Destinos Turísticos Inteligentes (DTI)," 2021. <https://www.gov.br/turismo/pt-br/acao-informacao/perguntas-frequentes/destinos-turisticos-inteligentes-dti> (accessed Aug. 02, 2021).
- [9] G. Guerrero and D. Acosta, "Destinos turísticos inteligentes en Latinoamérica: tendencias y retos para el desarrollo inteligente de destinos.," 2019. Accessed: Jul. 30, 2021. [Online]. Available: <https://www.esmartcity.es/comunicaciones/comunicacion-destinos-turisticos-inteligentes-latinoamerica-tendencias-retos-desarrollo-inteligente-destinos>
- [10] A. Das, S. C. M. Sharma, and B. K. Ratha, "The new era of smart cities, from the perspective of the internet of things," in *Smart Cities Cybersecurity and Privacy*, Danda B. Rawat and Kayhan Zrar Ghafoor, Eds. Amsterdam, Netherlands: Elsevier Inc., 2018, pp. 1–9. doi: <https://doi.org/10.1016/C2017-0-02545-4>.
- [11] L. G. Anthopoulos, "The Rise of the Smart City," in *Public Administration and Information Technology*, vol. 22, no. April 2017, Online: Springer, Cham, 2017, pp. 5–45. doi: 10.1007/978-3-319-57015-0_2.
- [12] D. A. Rezende, *Planejamento de estratégias e informações municipais para cidade digital: guia para projetos em prefeituras e organizações públicas.*, 1 Edição. Sao Paulo, SP: Atlas, 2012.
- [13] D. Z. Jovicic, "From the traditional understanding of tourism destination to the smart tourism destination," *Current Issues in Tourism*, vol. 22, no. 3, pp. 276–282, 2019, doi: 10.1080/13683500.2017.1313203.
- [14] "IEEE Smart Cities," *IEEE Power and Energy Society*, 2021. <https://www.ieee-pes.org/pes-communities/ieee-smart-cities> (accessed Aug. 11, 2021).
- [15] GlobalData Thematic Research, "History of smart cities: Timeline," *Digital Disruption Internet of Things Technology*, 2020. <https://www.verdict.co.uk/smart-cities-timeline/> (accessed Aug. 10, 2021).
- [16] R. de F. P. Rampazzo and F. N. Vasconcelos, "Cidades Inteligentes e (Quase) Humanas," *Revista Políticas Públicas & Cidades*, vol. 8, no. 4, pp. 27–39, Dec. 2019, doi: 10.23900/2359-1552v8n4-3-2019.
- [17] D. Buhalis and A. Amaranggana, "Smart Tourism Destinations," *Information and Communication Technologies in Tourism 2014*, pp. 553–564, 2013, doi: 10.1007/978-3-319-03973-2.
- [18] A. Herscovici, G. Dahan, and G. Cohen, "Smart Cities and Tourism: The Case of Tel Aviv-Yafo," *Sustainability (Switzerland)*, vol. 14, no. 17, Sep. 2022, doi: 10.3390/SU141710968.
- [19] E. C. L. Muniz, G. A. Dandolini, A. A. Biz, and A. C. Ribeiro, "Customer knowledge management and smart tourism destinations: a framework for the smart management of the tourist experience – SMARTUR," *Journal of Knowledge Management*, vol. 25, no. 5, pp. 1336–1361, 2020, doi: 10.1108/JKM-07-2020-0529.
- [20] "ABNT - Associação Brasileira de Normas Técnicas." <http://www.abnt.com.br/institucional/sobre> (accessed Oct. 17, 2022).
- [21] T. L. Saaty, "The analytic hierarchy and analytic network processes for the measurement of intangible criteria and for decision-making," *International Series in Operations Research and Management Science*, vol. 233, pp. 363–419, 2016, doi: 10.1007/978-1-4939-3094-4_10.