

Beyond Technology: Local Authorities' Perspectives on Smart Sustainable Cities in Porto Alegre

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Abstract. Smart Sustainable Cities (SSCs) integrate technology, governance, and sustainability to address urban challenges and improve citizens' quality of life. However, the understanding of SSCs varies depending on local contexts and stakeholders' perspectives and is often technocentric. This study presents preliminary findings on how local authorities in Porto Alegre (POA), Brazil, understand smart sustainable cities, analysing their perceptions and interpretations of this evolving urban model. This study addresses the following research question: What does "smart sustainable city" mean to local authorities in Porto Alegre? Using a qualitative approach, fifteen interviews with key officials from different city departments provide preliminary insights into how SSCs are framed beyond technological advancements illustrating examples of initiatives that contribute to Porto Alegre's transition towards an SSC. While technology plays a role, local authorities emphasise inclusive governance, innovation, data-driven decision-making, education, collaboration, citizen-centricity, and integration as central to their vision of a smart sustainable city.

Keywords. Smart city, smart sustainable city, urban innovation.

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1. Introduction

Smart Sustainable Cities (SSCs) is a prominent concept in urban development, aiming to leverage technology and data to improve residents' quality of life, promote economic growth, and ensure social development and environmental sustainability (Bibri & Krogstie, 2017; Höjer & Wangel, 2015; Pereira & de Azambuja, 2021). Even though many authors have sought to conceptualize the smart (sustainable) city concept, it remains it still lack a single definition (Albino et al., 2015; Dameri, 2013; Kummitha & Crutzen, 2017; Yeh, 2017).

This paper presents the preliminary findings of a case study from Latin America—Porto Alegre—using primary data collected through fifteen in-depth interviews. The aim of this study is to understand the perception of local authorities in Porto Alegre on smart sustainable cities and to identify key initiatives and projects. This study addresses the following research question: **What does "smart sustainable city" mean to local authorities in Porto Alegre?**

Local authorities are at the forefront of urban governance, responsible for planning, resource allocation, and service delivery, directly impacting the lives of citizens. Therefore, understanding their perceptions regarding SSCs is important for the successful implementation and adaptation of smart and sustainable cities. Their insights can help identify key initiatives, challenges, opportunities, and best practices, ensuring that technological advancements align with community needs and policy objectives.

2. Research Methods

This study adopts a qualitative approach, utilizing the case study method. This approach was chosen because it is particularly effective for exploring contemporary phenomena and aims to offer a comprehensive and detailed description of a case (Yin, 2018).

2.1 Case Selection: Porto Alegre

Porto Alegre, the capital of Rio Grande do Sul, Brazil's southernmost state, boasts a rich history and a vibrant contemporary profile. While its founding dates to 1769, the official establishment is celebrated on March 26, 1772. Home to approximately 1.5 million people, it ranks as the twelfth most populous city in Brazil, with its metropolitan area encompassing a substantial 4.5 million residents. The selection of Porto Alegre as a case study is justified by the need to explore smart sustainable cities in developing countries and by the city's distinctive socio-economic and cultural characteristics. Moreover, Porto Alegre nurtures a thriving innovation ecosystem counting with renowned universities that contribute to a dynamic pool of young talent. Two major technology parks, Zenit and TECNOPUC, exemplify the commitment to innovation with TECNOPUC recognized as one of the nation's leading incubators for technological advancement. A recent report announced the city as the second most competitive capital in Brazil (Pacto Alegre, 2025). These attributes position Porto Alegre as a compelling example for studying the challenges and opportunities associated with implementing smart city frameworks in comparable contexts.

2.2 Data Collection and Analysis

The data collection of this study happened from 2022 to 2024. The first round of interviews was conducted in 2022 and additional ones in 2023 and 2024. In total, 15 interviews have been conducted in Porto Alegre, eleven in person and four online via video call. The interviews were guided following a semi-structured interview protocol. The topics included in the protocol have been selected based on the SSC drivers and barriers identified through a previous study (Azambuja, 2021). Each interview lasted between 60 and 90 minutes. All interviews were transcribed for analysis, and interviewees were assigned unique codes (INT#1–INT#15) to maintain confidentiality.

3. Preliminary Findings

3.1 Smart Sustainable Cities: Perspectives of Local Authorities

The following table presents the perspectives of local authorities in Porto Alegre on what constitutes a 'smart sustainable city' and key characteristics.

Tab. 1 Perspectives of local authorities on SSC

Perspectives on Smart Sustainable Cities	Key Characteristics	Interviewee
"... is one that can use data to identify and address issues, with agencies working together rather than in silos."	Integrated, Collaborative, Data-driven	INT#1
"... bring citizens into a place of collaboration, not just reacting to individual problems, but contributing to the city as a whole."	Citizen-centric, Collaborative	INT#2
"Coordinates public policies to manage the collective intelligence of the city, enabling people to enter a virtuous cycle of production, sharing, and well-being."	Collective intelligence, Collaborative, Citizen-centric	INT#3
"Needs to be coordinated and connected, with a clear understanding of its resources and capabilities before implementing new technologies."	Strategic planning, Connectivity	INT#4
"It's more of a journey than a destination. Smarter cities are those that are constantly improving and becoming more sustainable."	Sustainable, Continuous improvement	INT#5
"A city that uses data, technology, and relationships to truly solve people's problems when they occur."	Citizen-centric, Data-driven, Collaborative	INT#7
"A smart city has integrated databases accessible to citizens, with easy connections, and is extremely simple for everyone to use, regardless of their level of knowledge."	Accessibility, Integrated, Inclusive	INT#8
"It starts with education and connectivity. We need to connect with citizens and understand their needs and expectations."	Education, Connectivity, Citizen-centric	INT#9
"... it should use all the tools and technology to analyse, formulate, quantify, control, and monitor the impacts of its actions."	Citizen-centric, Data-driven, technologically advanced	INT#10

"A smart city is a city where freedoms are respected, and the main element is the citizen, not the public authority."	Citizen-centric, Individual freedom	INT#11
"A smart city is a planned city... with continuity of planning. It uses technology to provide digital services and is less bureaucratic."	Continuous Improvement, Less bureaucracy	INT#12
"A smart city is a collaborative city... where we can exchange resources and knowledge with other cities."	Collaborative, Knowledge sharing	INT#13
"A smart city is a city that has the citizen at the centre of everything... with initiatives in health, safety, and education."	Citizen-centric	INT#14
"The first thing that comes to my mind is digital inclusion... A smart and sustainable city is one that thinks about digital inclusion."	Inclusion, Citizen-centric	INT#15

As seen, most of the interviewees mentioned the importance of a citizen-centric approach for the success of smart sustainable cities. According to the results, citizen needs are crucial for the planning of actions. Another important finding is the strong link of SSC development the of education. As mentioned by one interviewee "cities cannot be smart without smart people, because ultimately, it needs people". Furthermore, smart people are the ones able to create a "virtuous cycle of production", which is crucial for a sustainable development.

3.2 Key Initiatives contributing to Porto Alegre's transition

Porto Alegre have been developing several initiatives ranging from technology-driven solutions to community-centred projects. Table 2 outlines a summary of initiatives mentioned by the interviewees.

Tab. 2 Key Projects and Initiatives in Porto Alegre

Initiative/Project	Category	Short Description	Evidence
100% Digital Licensing	Urban Planning	Online platform for urban licensing, streamlining processes and reducing bureaucracy.	INT#7
156 and Central do Cidadão	Citizen Services, EGOV	Integrated platform for citizen service requests and information.	INT#1, INT#2, INT#3, INT#9, INT#10
Carta de Serviços (Service catalog)	Citizen Services, EGOV	Online list of all services provided by the city, with details and instructions.	INT#1
Cidades Educadoras (Educating Cities)	Education, Inclusion	International network of cities promoting education and citizen engagement.	INT#2, INT#3, INT#5
CEIC	Public Safety, Mobility	Using smart cameras for public safety and traffic control.	INT#7, INT#8
Concession of Parks and Green Spaces	Living	Ensuring maintenance and investment in parks and green spaces.	INT#8
Luz do Saber	Environment	Project using solar energy in schools.	INT#4
Open Data Portal, ObservaPOA	EGOV	Platform that makes public data available for consultation and download.	INT#2, INT#5, INT#8, INT#10
AI Optimization of Public Services	AI and Efficiency	Using AI to optimize resource allocation and improve service efficiency.	INT#8
Pacto Alegre	Economy, Education, Living	Platform for collaboration between government, universities, and businesses to promote innovation.	INT#3, INT#4, INT#5, INT#6, INT#8
Sala do Empreendedor (Entrepreneur's Room)	Economy	One-stop shop for entrepreneurs to access information and services.	INT#11, INT#15
Smart Cities Hub	AI, Urban Services, EGOV	Collaborative hub for developing and implementing AI solutions for smart cities.	INT#13, INT#14
Smart Urban Services	Urban Services	Using technology to optimize garbage collection, public lighting, and road maintenance.	INT#8

Strategic Project Management System	Strategic Planning, EGOV	System for managing and monitoring the city's strategic projects.	INT#10
Telemedicine and Digital Health	Health	Using technology to improve healthcare access and efficiency.	INT#3, INT#5, INT#9, INT#10, INT#15
Territórios Inovadores (Innovative Territories)	Innovation and Entrepreneurship	Promoting innovation and entrepreneurship in different neighbourhoods.	INT#13
Urban Revitalization Projects	Environment, Economy	Revitalising the Historic Centre and Quarto Distrito to attract investment and improve quality of life.	INT#8, INT#11
WI-Fi extension	Inclusion	Providing free Wi-Fi in vulnerable areas to promote digital inclusion.	INT#13

Among the most notable initiatives mentioned by the interviewees is the Pacto Alegre, a collaborative framework that fosters innovation and entrepreneurship by promoting collaboration between universities, companies, and the government. INT#5 highlights the importance of Pacto Alegre as a "platform for coordinating various actions," driving economic development and creating a "future-oriented" perspective. This initiative was inspired by various global examples being influenced by international experiences, particularly from cities like Barcelona, Medellín, and Israel, but was uniquely shaped by Porto Alegre's local needs and experiences, explains INT#5. The Cidades Educadoras project is part of the Pacto Alegre and focuses on educating citizens about their rights and responsibilities in urban development, promoting civic engagement through various programs.

Other key initiative is the Central do Cidadão (156web and mobile app), which is an evolution of the 156 Fala Porto Alegre which enable citizens to report urban issues such as streetlights, waste collection, and road conditions. INT#1 explains that 156 "integrates different communication channels" and "forwards demands to the responsible secretariats," making public services more accessible and efficient. Moreover, Porto Alegre has been investing in smart urban services, implementing initiatives like intelligent garbage collection (not yet in all regions) and public lighting systems. INT#8 mentions these projects as examples of how technology can be used to improve efficiency and resource management in urban services.

Urban revitalization projects like the revitalization of the Historic Centre and Quarto Distrito were also mentioned as capable of promoting economic development. INT#8 emphasizes the importance of urban revitalization for attracting and retaining talent, stating that "talents are attracted by these interesting places". Moreover, the city also counts with mobility related efforts to improve public transit systems, including smart traffic management and app-based ticketing solutions and a huge Integrated Centre of Command (CEIC). CEIC is a facility that integrates various municipal departments to monitor and manage city services. In recent years, the CEIC has expanded its capabilities by installing interactive security totems to enhance public safety.

4. Preliminary Conclusions and Future Work

This research, based on interviews with 15 key representatives from various municipal departments in Porto Alegre, has provided valuable preliminary insights into the perceptions of local authorities regarding smart sustainable cities (SSCs) within the specific context of a city in the Global South. The preliminary analysis the interviews, revealed a diverse range of definitions and key characteristics associated with SSCs, laying the groundwork for a more comprehensive understanding.

For Porto Alegre's authorities, a smart sustainable city is fundamentally citizen-centric, prioritising residents' needs, well-being, and active participation. Additionally, authorities recognise education and engagement as critical components, ensuring that citizens are informed, empowered, and involved in shaping urban development. Several initiatives illustrate Porto Alegre's commitment to this vision. Platforms such as the 156 Service and Central do Cidadão improve citizen access to information and municipal services. Pacto Alegre fosters cross-sector collaboration to drive innovation, while Cidades Educadoras promotes civic engagement through education. Urban revitalisation projects enhance public spaces for community use, and digital inclusion programmes work to bridge the digital divide. However, despite these advancements, significant challenges persist, which are going to be discussed in a future work.

In terms of contributions, this paper presents examples of key initiatives currently in place in Porto Alegre that, according to local authorities, are contributing to the city's development towards becoming a smarter and more sustainable one. Future studies could explore one of the key initiatives presented in Table 2 in greater depth to

investigate implementation challenges and successful practices. Further research is also encouraged to analyse public perceptions of the city's initiatives and projects, as well as to evaluate their tangible impact on citizens' lives.

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Contributor Statement

Autor 1: conceptualization, formal analysis, investigation, methodology, writing. Author 2: supervision. [Policies \(tudelft.nl\)](https://www.tudelft.nl)

Conflict Of Interest (COI)

There is no conflict of interest

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