ARTIGO

DOI: https://doi.org/10.21728/p2p.2024v11n1e-7043

Data de submissão: 11/05/2024 Data de aprovação: 26/08/2024 Data de publicação: 02/09/2024

PROPOSAL FOR AN EMBRYONIC MODEL TO PROMOTE SMART CITIES, IMPLEMENTED IN A BOTTOM-UP FORMAT, APPLIED TO THE AMAZON REGION

the case of the UsiPaz in Belém-Pará-Brazil

José Ricardo Valente [1]
Universidade da Amazônia
cardovalente@gmail.com

Mauro Margalho Coutinho [2]
Universidade da Amazônia
mauro.margalho@unama.br

Abstract

Environmental changes, many of which result from human negligence, have driven managers to adopt sustainable practices aligned with the concept of Smart Cities, a concept that is gaining popularity among administrators of Brazilian metropolises as a public policy. This movement has been corroborated by ABNT standards and the federal government. However, in less developed regions, such as Northern Brazil, where challenges are greater and resources more limited, traditional top-down urban development strategies, such as Bus Rapid Transit systems (BRTs), prove to be inefficient as initial solutions. This article aims to provide contributions related to a feasible alternative for the development of Smart Cities in the Amazon, proposing an empowering model, in a bottom-up format, titled Smart Launch, stemming from a conceptual redefinition of Smart Places. The model recommends initially adopting smaller, more manageable projects that can be easily implemented without extensive bureaucracy or substantial investments. The Peace Plants (UsiPaz) in Pará exemplify the success of this approach and were taken as a case study. Methodologically, a qualitative research was conducted through semi-structured interviews with managers of three Usipaz in different neighborhoods of the Belém metropolitan area. As a result, a strong majority of this group (88.8%) would recommend replicating the project model in other regions of the Amazon. It is concluded, therefore, that this is a proposal truly appropriate and viable for improving the quality of life of citizens, creating opportunities in accordance with the premises of Smart Cities.

Keywords: smart cities; smart places; smart launches; Amazon; UsiPaz.

PROPOSIÇÃO DE UM MODELO EMBRIONÁRIO DE FOMENTO ÀS CIDADES INTELIGENTES, IMPLEMENTADO EM FORMATO BOTTOM-UP, APLICADO À REGIÃO AMAZÔNICA

o caso das UsiPaz em Belém-Pará-Brasil

Resumo

As mudanças ambientais, muitas delas decorrentes da negligência humana, têm impulsionado gestores a adotarem práticas sustentáveis aderentes ao conceito de Cidades Inteligentes, conceito que está se popularizando entre administradores de metrópoles brasileiras enquanto uma política pública. Esse movimento vem sendo corroborado por normas da ABNT e pelo governo federal. Contudo, em regiões menos desenvolvidas, como o Norte do Brasil, onde os desafios são maiores e os recursos limitados, estratégias tradicionais de desenvolvimento urbano top-down, como os BRTs, provam-se pouco eficientes como soluções iniciais. Este artigo tem por objetivo fornecer contribuições relacionadas a uma alternativa factível para o desenvolvimento de Cidades Inteligentes na Amazônia, propondo de um modelo empoderador, em formato botton-up, intitulado Smart Launch (Lançamento

[1] Master in Business Administration from the Graduate Program in Business Administration (PPAD) at UNAMA.

[2] Ph.D. in Electrical Engineering from UFPA and full professor in the Graduate Program in Business Administration (PPAD) at UNAMA.

Inteligente) advindo de uma redefinição conceitual de Smart Places. O modelo recomenda adotar inicialmente projetos menores e de mais fácil gerenciamento, que possam ser facilmente implementados sem extensa burocracia ou vultuosos investimentos. As Usinas da Paz (Usipaz), no Pará, exemplificam o sucesso dessa abordagem e foram tomadas como estudo de caso para este estudo. Metodologicamente, realizou-se uma pesquisa qualitativa através de entrevistas semiestruturadas com gestores de três Usipaz em diferentes bairros da região metropolitana de Belém. Como resultados tem-se uma enorme maioria desse grupo (88,8%) que recomendaria replicar esse modelo de projeto em outras regiões da Amazônia. Concluí-se, portanto, que se trata de uma proposta realmente apropriada e viável à melhoria da qualidade de vida dos cidadãos, criando oportunidades em consonância às premissas das Cidades Inteligentes.

Palavras-chave: cidades inteligentes; smart places; smart launches; Amazônia; UsiPaz.

PROPUESTA DE UN MODELO EMBRIONARIO DE FOMENTO A LAS CIUDADES INTELIGENTES, IMPLEMENTADO EN FORMATO BOTTOM-UP, APLICADO A LA REGIÓN AMAZÓNICA

el caso de UsiPaz en Belém-Pará-Brasil

Resumen

Los cambios ambientales, muchos de ellos resultantes de la negligencia humana, han impulsado a los gestores a adoptar prácticas sostenibles que se adhieren al concepto de Ciudades Inteligentes, un concepto que está popularizándose entre los administradores de metrópolis brasileñas como una política pública. Este movimiento ha sido corroborado por normas de la ABNT y por el gobierno federal. Sin embargo, en regiones menos desarrolladas, como el Norte de Brasil, donde los desafíos son mayores y los recursos limitados, estrategias tradicionales de desarrollo urbano de arriba hacia abajo, como los BRTs, se han demostrado poco eficientes como soluciones iniciales. Este artículo tiene como objetivo proporcionar contribuciones relacionadas con una alternativa factible para el desarrollo de Ciudades Inteligentes en la Amazonía, proponiendo un modelo empoderador, en formato bottom-up, titulado Smart Launch (Lanzamiento Inteligente) que surge de una redefinición conceptual de Smart Places. El modelo recomienda adoptar inicialmente proyectos más pequeños y de más fácil gestión, que puedan implementarse fácilmente sin extensa burocracia ni grandes inversiones. Las Usinas da Paz (Usipaz), en Pará, ejemplifican el éxito de este enfoque y se han tomado como estudio de caso para este estudio. Metodológicamente, se realizó una investigación cualitativa mediante entrevistas semiestructuradas con gestores de tres Usipaz en diferentes barrios de la región metropolitana de Belém. Como resultado, una gran mayoría de este grupo (88,8%) recomendaría replicar este modelo de proyecto en otras regiones de la Amazonía. Se concluye, por lo tanto, que se trata de una propuesta realmente apropiada y viable para mejorar la calidad de vida de los ciudadanos, creando oportunidades en consonancia con las premisas de las Ciudades Inteligentes..

Palabras clave: ciudades inteligentes; smart places; smart launch; Amazonía; Usipaz.

1 INTRODUCTION

Brazil is a predominantly urban country, with 85% of its population living in large metropolises (Alves, 2022). According to the UN-Habitat World Cities Report (2022), the urban population is expected to increase worldwide by 2.2 billion people per year until 2050, UN-Habitat (2022). In this context, the major challenge will be to provide resources associated with improving the quality of life of this urban population, while ensuring better outcomes in the economy as well as environmental sustainability (Lai *et al.,* 2020).

In the face of a scenario of increasing urban density, the concept of Smart Cities has emerged. Numerous cities aspire to transform into a Smart City, but there are many challenges to be overcome that will require support from public organizations, citizens, state and municipal governments, and private companies (Lai *et al.,* 2020). Attention to Smart Cities is evidenced in the international organization that brings together the largest and most important economies in the world, the G20 group. Among other suggestions, this group proposes types of smart city projects, some of which are already being implemented (Toh, 2022). As examples of initiatives and practices from these countries, there is the Tokyo traffic system, where sensors monitor vehicle flow and provide less congested traffic (Blanchet, 2024). Another example is the city of London that uses a smart public lighting system that adjusts the light intensity according to the environment in order to provide energy savings.

The notion of a smart city has been present in political and academic discourse since the late first decade of the 21st century. However, it is difficult to provide a clear definition of "smart city" due to the large number of elements and dimensions that are involved in characterizing such a metropolitan area (Glavan, 2022). Regardless of the concept used, the goal is to provide an environment with minimal infrastructure, in addition to a decent quality of life for its citizens, through the application of smart solutions, coupled with a clean and sustainable environment (Sarrakh *et al.,* 2019).

In terms of the Brazilian context, there are three national legal standards that underpin the concept and were designed to assist cities in directing and evaluating the management of urban services and the overall provision of services, as well as quality of life. They are referred to as ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS (ABNT) NBR ISO 37120:2021 (ABNT, 2121a), ABNT NBR ISO 37122:2020 (ABNT, 2020), and ABNT NBR ISO 37123:2021 (ABNT, 2021b). In this context, sustainability is considered as the guiding principle, with intelligence and resilience being the foundational concepts for developing cities. They establish, at their core various indicators for urban services and quality of life.

However, such standards have indicators that are not applicable and observable in various regions of the Brazilian territory, notably including the Amazon region. This is due to a significant lack of financial investments as well as areas with a significant infrastructure deficit and the continental dimensions of the Amazon, among other cultural and political aspects.

Given this context, this article aims to provide contributions and provoke discussions on viable alternatives to Smart Cities in the Amazon, considering the peculiarities, diversity, and difficulties characteristic of the region. It is noteworthy that in many countries the traditional model of implementing Smart Cities, which we will address here as top-down, often comes in the form of a large package disassociated from several local specificities, which can lead to an increase in social disparities among its population (Sontiwanich; Boonchai; Beeton, 2022). Thus, the question arises: is the implementation of Smart Cities projects in the Amazon region viable given its lack of resources?

Based on this issue, this article primarily aims to propose an empowering model for Smart Cities in the Amazon arising from a conceptual redefinition of Smart Places by presenting an embryonic model entitled Smart Launch to promote Smart Cities. The study is justified by the need to explore new alternatives that could introduce the Amazon region into the scenario of Smart Cities, distancing from concepts largely tied only to Information and Communication Technologies (ICTs), with the conceptualization of a bottom-up model for classifying Smart Cities.

The structure of the article, in addition to this introduction, includes the theoretical foundation and presents the base theory of the proposal, the methodological procedures that were used in data collection and analysis, a presentation and discussion of results, and final considerations, all demonstrating the viability of the Smart Launch concept as an embryonic model for promoting Smart Cities in the Amazon Region.

2 THEORETICAL FRAMEWORK

This research is anchored in the Theory of Complex Adaptive Systems (CAS). According to Huang *et al.* (2021) CAS is a network system comprising nonlinear interactive elements, which can be composed of several subsystems that depend on and cooperate with each other. One of the properties addressed by the Theory of Complex Adaptive Systems is that they are capable of adapting their structures and behaviors according to the place and the environment in which they are embedded. Compared to other theories used for the study of an

urban system, the Theory of Complex Adaptive Systems seems to provide a definition of an urban system that is closest to reality.

Using this perspective, Holland (1992) listed seven basic principles of a CAS: aggregation, tagging, non-linearity, flow, diversity, internal models, and building blocks. Although there are heated discussions around the Theory of Complex Adaptive Systems, as noted by Nan (2011), three components have been consistently recognized as the core of this theory: the agents, the environment, and the interaction between them. Nan (2011) explains that these agents can be represented by a diversity of entities, such as human beings, organizations, objects, or concepts. In this paper, each of these agents is described by attributes and behavioral rules. The agents are the processors of the interactions that are more commonly observed in a CAS, as highlighted by Drazin and Sandelands (1992). Finally, the environment is the medium through which the agents operate and interact with each other, as defined by Epstein and Axtell (1996).

When applied to the context of Smart Cities, the agents can be represented, for example, by smart citizens, ICTs, smart communities, and Smart Places. It is worth mentioning that these agents interact with each other and with the environment in which they are embedded, causing, as mentioned by Huang *et al.* (2021), a transformation, evolution, and development that are characteristic of Smart Cities.

Currently, there are various concepts for the term Smart Cities; however, they are not in conflict with each other and all aim to contribute towards an improvement in the quality of life for citizens.

Lopes and Leite (2021) posit that the purpose of a smart city is to address critical social needs by effective use of technological infrastructure, while also enhancing efficient communication between public authorities and citizens. However, the concept is not limited to the use of ICT - Information and Communication Technology, and can accommodate different definitions and approaches. The authors add that Smart Cities are related to solutions that deliver efficiency in public transport, effective urban zoning, high quality of public services, among others.

In line with the coexistence of these concepts, this the guiding concept considered in this article considered is the one used by the Brazilian Charter for Smart Cities, which has a direct relationship with sustainability. The Brazilian Charter for Smart Cities was an initiative developed by various sectors of society led by the Ministry of Regional Development and launched in August 2020, with the aim of supporting the Brazilian State in developing better

cities for its citizens by integrating the agenda of sustainable urban development with the digital transformation process. The Brazilian Charter for Smart Cities presents the following concept:

> Cities committed to sustainable urban development and digital transformation, in their economic, environmental, and sociocultural aspects, that act in a planned, innovative, inclusive, and networked manner, promote digital literacy, collaborative governance and management, and use technologies to solve concrete problems, create opportunities, offer services efficiently, reduce inequalities, increase resilience, and improve the quality of life for all people, ensuring the safe and responsible use of data and information and communication technologies (Brazilian Charter for Smart Cities).

Complementing the concepts mentioned earlier, Rizzon *et al.* (2017) argue that people represent an important part of the development and success of a Smart City. It is not enough to have an entire technological apparatus; there must also be citizen engagement in a participatory and integrated manner in this process.

Therefore, as stated by Avelar *et al.* (2012), there is no single way to transform a locality into a Smart City; however, depending on the context there are countless ways to promote the smart cities model, always guided by the observation and respect for the economic, cultural, and political specificities of each city.

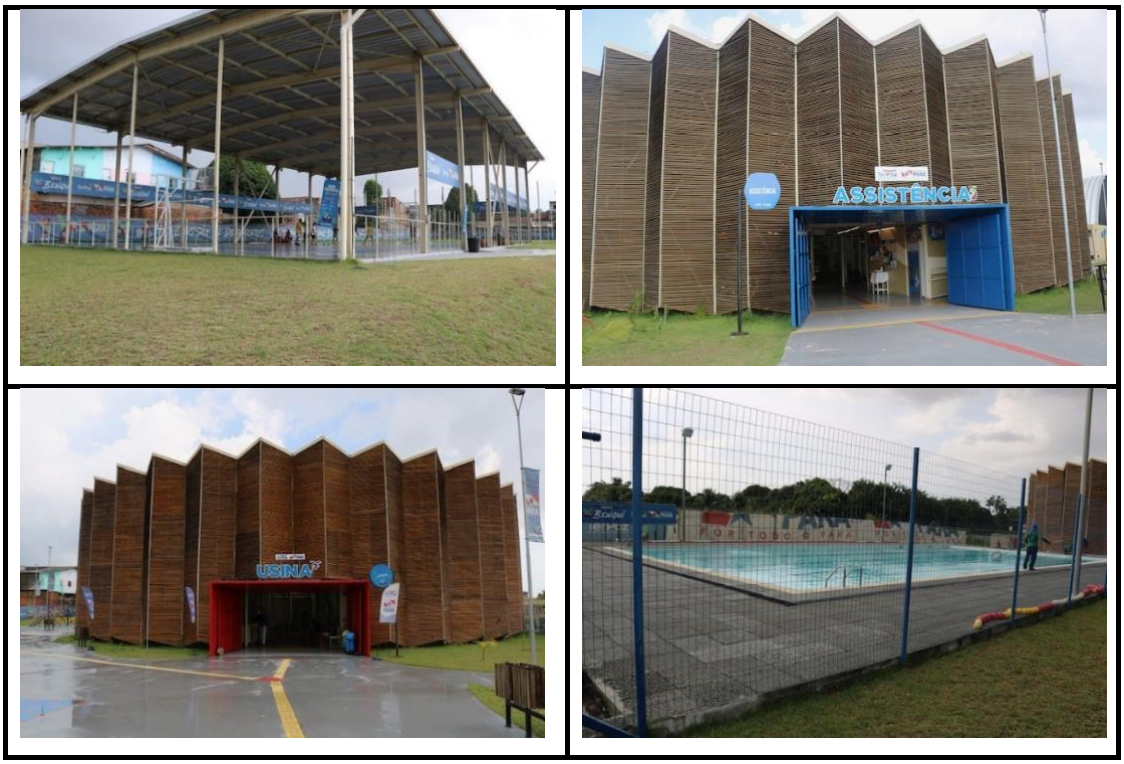
3 THE "USIPAZ" (PEACE PLANTS)

To substantiate the model proposed here, the Peace Plants - “Usinas da Paz” (UsiPaz) were taken as a case study. This innovative project aims to foster citizenship and is carried out by the government of Pará. The UsiPaz (example shown in Figure 1) are a project integrated into the state program Territories for Peace - "Territórios Pela Paz" (TerPaz), developed by the Government of Pará and coordinated by the Strategic Secretariat for Articulation of Citizenship (SEAC), in partnership with the private sector.

The TerPaz program (SEAC, 2022) is characterized as a major state public policy, directly subordinate to the head of the State Executive Power, with the systematic implementation of social inclusion policies and public security policies. It has a multifaceted organization, with principles of intersectorality, transversality, and territoriality.

There are more than 80 free services provided by state partner agencies and entities, such as: spaces for sports activities; audiovisual and digital inclusion rooms; free Wi-Fi signal for users of the space; medical and dental care; legal consultancy; document issuance; security actions; technical and vocational training; spaces designated for community events and meetings (SEAC, 2022).

Figure 1 – UsiPaz Complex



Source: Photos taken on site by the author (2023).

The complexes are aimed at preventing violence, fostering social inclusion, and strengthening community ties and have seven fundamental lines of action: technical and professional training, basic education, art and culture; employment and income, microcredit and entrepreneurship, solidarity economy; housing, land regularization and urbanization; health, sports/recreation, social assistance; technology and digital inclusion; environment and sustainability; conflict mediation and violence prevention.

4 SMART LAUNCHES

The Smart Launch concept proposed in this article consists of a territorially defined space by the full capacity of a governmental management unit (state government, municipal government, for example) to make interventions and investments that use innovative ideas to improve the quality of life of the surrounding area and allow replication and connectivity with and to other similar spaces. It is important to note that this model does not take the use of technology as a restrictive prerequisite but prioritizes good practices, implemented with creativity and transparency, recapturing the true essence of the word "smart" which, in its literal translation to Portuguese as "intelligent," stripped much of the term's intrinsic meaning.

In this case, resources such as sustainable development, effective service provision, and improvements in quality of life need not necessarily be associated with technological investment at the outset, but rather through creative practices that benefit the local society. Considering the peculiarities of our Amazon region where the scarcity of financial resources, difficult geographical location, distinctive climatic conditions, and high turnover of public managers are notorious, the concept of Smart Place, which always refers to emerging technologies, does not seem to be the most viable choice for this reality.

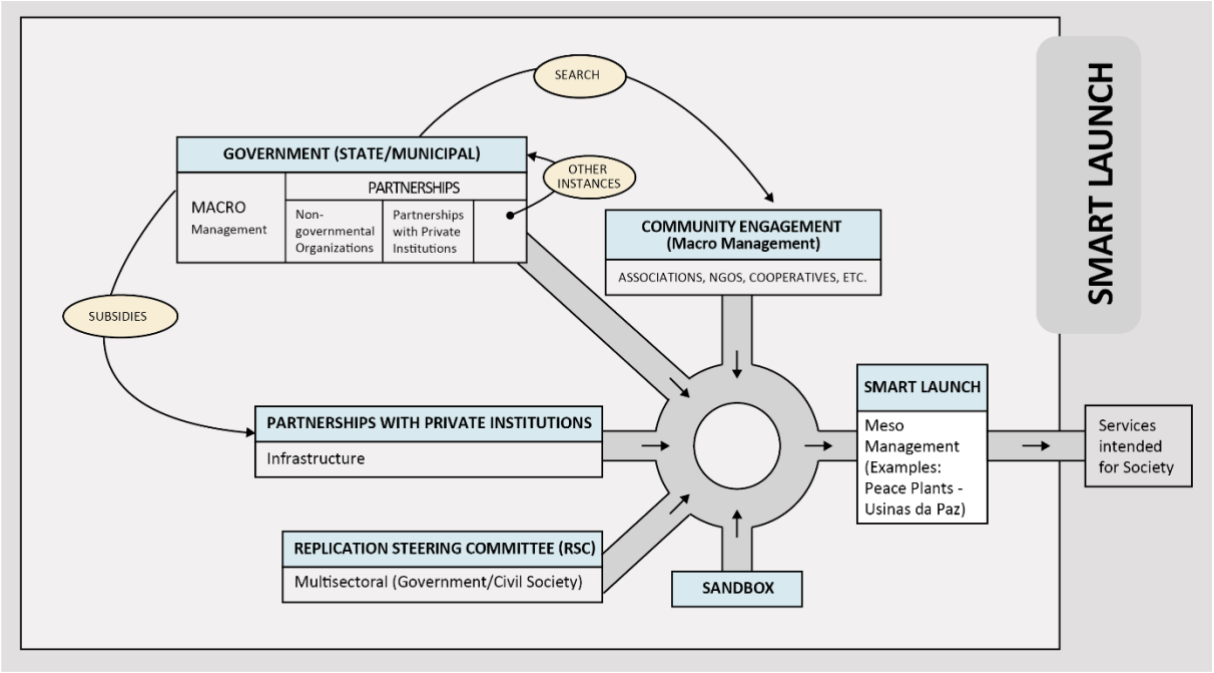
Smart Launch is related to the idea of an initial project; a starting point for fostering initiatives aimed at developing Smart Cities. A Smart Launch project can be born and executed under the management of a single local public authority, such as a municipal government. Small initiatives are prioritized, with financial investment compatible with local capacity, projects strategically focused on smaller areas that facilitate their management and evaluation, where once their efficiency and effectiveness are proven, they can be reproduced, replicated, and interconnected throughout the region. Certainly, these projects will become more financially viable and more easily executable by local public administrations, fostering the development of Smart Cities in the Amazon region.

Smart Launch is thus is a concept derived from Smart Place. It is a redefinition because, like Smart Place it can be handled locally. The choice of this term over the other is due to the fact that the concept of Smart Place is tied to the application of technology. While technological tools are encouraged in Smart Launch initiatives, they are not an sine qua non prerequisite and are not the primary focus. Another characteristic with Smart Launch is that it is a bottom-up initiative. It is a reevaluation of the replication of large smart city projects that worked in other instances but in this case, considering the peculiarities of the Amazon region, did not function adequately, whether for financial, territorial, cultural or other reasons. Thus, the idea of a bottom-up model to foster projects arising from local initiatives emerged with small financial investments and in line with the region's reality.

The Sandbox, an initiative, led by the Brazilian Agency for Industrial Development – ABDI was incorporated into the conceptual model of Smart Launches with the aim of unlocking certain common constraints in the process of consolidating economic, social, and technological development for cities. Sandbox (GSCI, 2021) provides a step-by-step guide for public managers to safely test and validate technologies while also enabling resource savings. Given that certain innovative actions of Smart Cities clash with old federal, municipal or state norms, when structuring and executing projects by Municipalities, the Sandbox environments for

Smart Cities have emerged based on the premise of knowing before legislating, knowing before taxing, and especially, knowing before prohibiting.

Figure 2 – Conceptual Diagram of a Smart Launch



Source: Prepared by the author (2024).

The diagram presented in figure 2 represents the conceptual structure for a Smart Launch. It highlights the pathways that lead to the conception of the resulting artifact which, in this case study are the UsiPaz units. Initially, there should be an articulation between the government, which will provide management on a macro level, and the private sector, which will be responsible for the infrastructure. This partnership can occur through tax incentives, subsidies, or any other available means. One example cited would be the partnership between the Government of the State of Pará and companies like Vale and Hydro, which culminated in the construction of several plants. The project must be designed with the perspective of replication planned by the Replication Management Committee (RMC)as a premise. Moreover, it must adhere to local needs. For example, because the state of Pará suffers from high temperatures, tiles from Israel designed to provide a cooler temperature even during extremely hot periods were used in the UsiPaz project. The government has the responsibility to enter the spaces where the UsiPaz will be installed and establish partnerships with active community groups such as associations, NGOs, cooperatives and others. This provides credibility and allows the community to feel confident, given that established organizations are participating

in the process. In the UsiPaz case, it is common for the plant manager to be someone from the community. The Sandbox serves as support for resolving legal and legislative issues involving the project. It acts as a remover of bureaucratic barriers and thus enables the execution and provision of the Smart Launch.

5 METHODOLOGICAL APPROACH

In terms of its objective and following the classification by Gil (1991) this research can be categorized as exploratory. Its approach is predominantly qualitative. Interviews were the main tool for data collection, although questionnaires with open-ended questions were also used.

In complementing the analysis, a specific quantitative survey was conducted to measure the satisfaction of individuals served by UsiPaz and to gauge the awareness of this project among the inhabitants of the Belém metropolitan area.

In terms of the research procedure, a case study of the UsiPaz units in Belém do Pará was utilized. Yin (1994) briefly comments that the case study is one of the variations of qualitative research, which allows for an understanding of the holistic and meaningful characteristics of the phenomenon in its real context.

The decision to study the UsiPaz is justified by the similarity of the project developed in these complexes to the embryonic model for promoting Smart Cities applied to the Amazon region, presented in section 3. Observing and analyzing the daily operations of the UsiPaz complexes will thus contribute significantly to understanding these spaces dedicated to providing services to the community.

The primary tool used in this research for data collection was the semi-structured interview. These interviews were conducted with the UsiPaz managers who were asked to describe the actions carried out within UsiPaz, the challenges encountered, their perceptions regarding the satisfaction of the citizens covered by the project, and to comment on the project's efficiency, i.e., whether it achieved its objectives.

For this research, four managers were interviewed: one of them being the project coordinator who conducts his activities at SEAC. The others are directors of UsiPaz units in the Metropolitan Region of Belém. In this approach the thematic content analysis technique by Bardin (2016) was used, supported by Atlas.ti software version 23.

The semi-structured interviews were conducted in person. All interviewees gave prior consent s to being recorded and transcribed. A questionnaire with pre-prepared questions was

also applied, primarily to facilitate the flow of the interview. However, the interviewees were free to make any comments they deemed relevant.

The information was transcribed with the help of Microsoft Teams, using the transcription feature through the recorded audio. Subsequently, a grammatical review was carried out to identify only spelling errors, while preserving the meaning of the interviewees' speech.

Once the transcriptions were completed, the coding and analysis phase began with the help of Atlas.ti software version 23, relating the interviewee discourses with the dimensions (categories) defined from a preliminary analysis of the material.

The excerpts from interviewee responses were categorized into 91 codes, all grouped into 6 dimensions, considering the context in which they were mentioned. The six dimensions considered in this proposal were based on the concept of Smart Cities present in the Brazilian Charter for Smart Cities. The concept relates the theme of Smart Cities to the issue of sustainable development, innovative actions and inclusivity. It acts in an integrated manner with a view to improving societal engagement and employs available technological resources to achieve, above all, quality of life for the citizens.

6 RESULTS AND DISCUSSIONS

Analyzing the concept of Smart City, as outlined in the Brazilian Charter for Smart Cities, it was noticed that Smart Cities must be committed not only to digital transformation but also to urban development. Such a commitment fosters efficient services that can reduce social inequalities, while improving the quality of life for citizens and creating opportunities. All this should occur through collaborative governance and management.

It was also observed that strategies for implementing Smart Cities mostly stem from large projects with a substantial volume of resources. This traditional model is referred to in this article as top-down because it is a macro strategy of large proportions that involves resources from federal, state, and municipal spheres. In practice, it reveals numerous weaknesses in regions such as the Amazon, which has very specific characteristics.

The proposal, characterized in this article as bottom-up and referred to as Smart Launch, is compact enough to fit into a local government management framework, whether at the municipal or state level, and employs, premises of modularity, and consequently scalability in its implementation, allowing the population to enjoy its benefits within an acceptable period.

As a model of smaller proportions, albeit with scaling capacity, it allows all interventions to be made in adjustments to the pilot without excessive bureaucracy before it is propagated.

2.1 RESULTS OBTAINED IN THE SURVEY

Although this research is predominantly qualitative, some quantitative elements were incorporated to broaden the spectrum of knowledge of the UsiPaz project among the local population. Thus, a survey in a snowball format was conducted in the Metropolitan Region of Belém (RMB) from September 2023 to January 2024, through social networks in which 122 respondents participated. The Table 1, shows some information about the participant profile:

Table 1 – Participant profile

Item	Subitem	Quantitative/Percentage
Total Number of Respondents		122
Gender	Female	64,8%
	Male	35,2%
Current Employment Status	Works in the Public Sector	48,4%
	Works in the Private Sector	30,4%
	Currently Unemployed	17,2%
	Prefer Not to Answer	4,1%
Age Group	36 to 45 years	27,9%
	18 to 25 years	21,3%
	46 to 55 years	19,7%
	56 to 65 years	14,8%
	26 to 35 years	14,8%
	Over 65	0,8%
	Prefer Not to Answer	0,8%
Participant´s Neighborhood	Umarizal	18
	Marco	17
	Guamá	15
	Outros	40
	Nazaré	12
	Reduto	9
	Pedreira	7
	São Brás	7
	Coqueiro	6
	Parque Verde	6
	Cremação	4

Source: Developed by the author (2024).

This survey data provides insightful perspectives on community awareness and reception of the UsiPaz project initiated by the State Government of Pará. Below is a breakdown of the responses and findings:

I. Demographics and Awareness: Female participants constituted the majority of respondents, accounting for 64.8%; Public sector employees were prominently represented, comprising 48.4% of the participants; The age group with the highest representation (27.9%) was those aged 36 to 45 years; The survey covered a significant diversity of neighborhoods within the RMB (Belém Metropolitan Region), with a total of 26, indicating a broad reach across different socio-economic areas.

II. Awareness of the UsiPaz Project: Half of the respondents (50%) were aware of the project and some of its services but had never used them, likely due to many respondents being from middle and high-income neighborhoods, where UsiPaz facilities, which are aimed at aiding more impoverished populations are less prevalent; A smaller segment (8.2%) was familiar with and had used some of the project's services; 28.7% had only heard of the project, and 13.1% were completely unaware of it.

III. Perceived Importance and Satisfaction: Among those who were familiar with and had used the project's services, 100% rated the importance of the services as a 5 on a scale from 1 to 5, indicating they found them "Extremely important for the community."; Satisfaction levels were high, with 100% of these users feeling well (20%) or optimally (80%) served by the project; A strong majority (88.8%) of this group would recommend replicating the project in other regions of the Amazon.

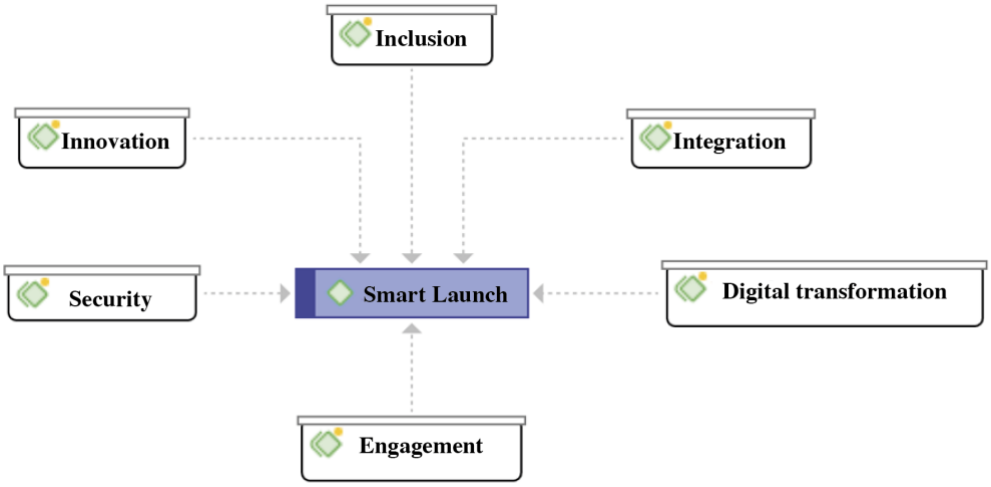
These findings suggest a positive reception and perceived value of the UsiPaz among those who have engaged with the services and highlights its potential impact on community safety and development. The high recommendation rate for replication suggests that the project is seen as a successful model that could be beneficial if implemented in other regions facing similar challenges. This response underscores the importance of scaling successful social initiatives to broader areas to enhance public welfare and community development.

2.2 INTERVIEW RESULTS

The dimensions obtained, which encompass inclusion, innovation, integration, engagement, digital transformation, and safety, align with the concepts of Smart Cities and are present in the discourses of the UsiPaz managers. This illustrates how the services provided by the UsiPaz are made available and managed. This finding thus confirms the idea that the UsiPaz

serves as a starting point for fostering Smart Cities in the Amazon, i.e., it can be considered a model for Smart Launch. The visualization network created in Atlas.ti presented in Figure 3 shows the relationship between the dimensions where the codes were grouped with the proposed concept of Smart Launch presented in this research.

Figure 3 – Relationship of Dimensions



Source: Developed by the author from Atlas.ti (2023).

The UsiPaz project was initiated as a governmental effort by the State of Pará to change the reality in specific regions (territories) plagued by violence and criminality. For that reason, the concept of Smart Launch is based on localized, specific actions with initiatives confined to that particular locality, as demonstrated in this case study where the actions are focused on promoting public safety and are later expanded to other services provided by the public sector.

Smart Launch is closely associated with seeking creative and integrated solutions that are low-cost and require minimal technological demand. In that way, it prioritizes the quality of life of citizens by placing them at the center of its actions and promoting a more profound transformation within the community. Table 2 shows the frequency of each dimension mentioned in the interviews:

Table 2 - Frequency of each dimension

Dimension	Interviewee Coordinator	Interviewee Director 1	Interviewee Director 2	Interviewee Director 3	Totals	% Relative
Engagement	10	12	14	4	40	8,95
Inclusion	72	48	23	20	163	36,47
Innovation	33	37	10	16	96	21,48
Integration	42	17	5	9	73	16,33
Security	46	5	7	2	60	13,42
Transformation	3	8	3	1	15	3,36
Totals	206	127	62	52	447	100

Source: Developed by the author from Atlas.ti (2023).

Among the six dimensions considered in this study, the three with the highest occurrences were inclusion, innovation, and integration. These dimensions underline the focal areas of the UsiPaz projects and emphasize efforts to integrate disadvantaged communities into safer and more innovative environments. This aligns with the broader goals of Smart Launch initiatives, which aim to foster Smart Cities through actions that are deeply embedded in the needs and contexts of local communities in order to enhance their social and technological infrastructures.

6.2.1 Category "Inclusion"

This dimension is characterized by the inclusion of citizens in various government policies. This makes individuals feel not only integrated into social life but also supported by the state. The UsiPaz project originated from the Government's TerPaz Program (Territories for Peace), which involves the coordinating public policies for social inclusion aimed at reducing social vulnerability and addressing the dynamics of violence in the territories where the UsiPaz units are installed.

The case study of UsiPaz clearly demonstrates that the project encompasses a segment of society that was previously marginalized by state actions. This is evident from the statement of interviewee D1:

> We have teenagers who go to school, rush home, and then stay here at the Usipaz. So, it feels like a safe haven within the community. For example, there's a lady who said: 'I've worked my whole life, from a young girl, from a child in the fields, and now that I'm retired, I was locked up at home, and the Usipaz gave me this opportunity'.

The UsiPaz project covers a diverse age range. From the words of interviewee D1, it is clear that teenagers—one of the target audiences of the project—were motivated to frequent the

UsiPaz after school hours. This period, which is often seen as ripe for organized crime, has been transformed into a time for providing community services. Teenagers now have opportunities to develop their potential, discover new opportunities, and engage in sports activities. In other words, idleness has been replaced by productivity. Additionally, the UsiPaz reached an unexpected demographic: the elderly segment of the community. They were often the ones who brought the youth to the activities at the UsiPaz and would wait for these activities to end without having anything to do.

Faced with this scenario the managers, who are usually selected from the community itself, felt compelled to develop activities that included this demographic that frequented the UsiPaz. The project's ability to adapt and include new scenarios in its services is also illustrated by interviewee D1, who states:

> When the UsiPaz began operating, we got a sense of the actual needs of the neighborhood. For example, the number of elderly people we have here is enormous. It surprised everyone. They were not the audience we were trying to reach, but they should have been. Typically, sports and music activities start from the age of seven. These kids don't come alone; they usually come with someone, often their grandmothers. So, we have many elderly women here, and they demand activities from us. Initially, this had not been considered.

It is noteworthy that the UsiPaz were designed to reach a specific audience: young people and women in vulnerable situations. However, after project was implemented another segment of the community, the elderly, began to demand other services, prompting the UsiPaz to adapt and meet the real needs of the territory.

Of all the dimensions, inclusion had the highest occurrence rate, with 163 mentions accounting for 36.47% of the total. There is a clear concern to encompass all those who demand services, so much so that the proposal was developed and disseminated to the entire community.

6.2.2 Category "Innovation"

As a central theme in Smart Cities, innovation is broadly conceived as being beyond merely technological advances. Weiss, Guimarães e Aguiar (2019) highlight the importance of a polysemic innovation concept in the study of Smart Cities and suggest that innovation can be associated with various methods and ways of establishing new processes and public policies. They assert that innovation should be viewed through a broader lens, and not merely a technological one.

Angelidou (2014) discusses the benefits of Smart Cities strategies applied at the local level, arguing that innovation has a geographical locus and knowledge has geographical "stickiness," making local advancement more conducive to creating smart cities. This local

focus is crucial for the kind of innovation exemplified by the UsiPaz projects, which are deeply rooted in the specific needs of the community rather than solely aimed at technological development and ICT.

This approach to innovation is evident in the narrative of interviewee D1, who reflects on the project's inception that was influenced by international models yet tailored to local needs:

> When we were generally thinking about the project, the main initiator used the model implemented in Medellín. We went to see similar initiatives here in Brazil; I think the main one was in Recife. But it was about changing the municipality, and the range of services was more limited and not as extensive.

This prioritization of developing local, targeted projects that are low cost and reasonably easy to manage aligns perfectly with the Smart Launch proposal. These are bottom-up projects that arise from the specific demands of the region rather than mimicking large investments that do not meet local specificities.

The concept for the UsiPaz project was inspired by a social project in Medellín—the Integral Urban Project (PUI)—characterized by a set of state actions aimed at tackling social problems in marginalized and vulnerable areas of Medellín. Interviewee D2 shared:

> You know, this project here was actually based on Medellín. Because if you look at ComPaz, Compaz built buildings, but it didn't work the community. Not this one. This one, yes, it built the building. But it first worked the community; it first brought the idea to the community.

However, UsiPaz was not merely a replication of the Medellín project. Before building UsiPaz, the state was concerned with the real needs of the territories, promoting the idea of constructing a complex that could effectively meet the citizens' needs. This required innovation in work processes and local public policies to ensure that the project would be implemented with the community's endorsement.

Furthermore, innovative projects are also sustainable projects. Thus, Smart Launch projects should be linked with the concept of sustainability. At UsiPaz, the focus on the community developing activities that prioritize sustainability was clear. A portfolio of vocational courses that encouraged local entrepreneurship was made available. Interviewee D2 expressed this concern:

> Actually, our goal is sustainability. I know we are far from it. We strive for this, all the courses we offer are aimed at this. Now, if you look at sustainability, in my view, as it really could be, it's a desire. One of these days, I was talking to a gentleman here, he was pointing out some ways to resolve, to really make this community self-sustainable.

Therefore, innovative projects aim to transform the reality of a given locality. Even though they are small initiatives with financial investments that match local management

capacity, as envisioned in the Smart Launch proposal, these projects can change the scenario of a territory.

6.2.3 Category "Integration"

Integration is one of the three dimensions most frequently mentioned by the managers, accounting for 16.33% of the occurrences. It is directly related to one of the UsiPaz organizational principles: the principle of intersectorality. As highlighted by Wanderley et al. (2020), intersectorality is a basic precondition for implementing integrated public services.

In their theoretical essay on intersectorality, Prado *et al.* (2022) argue that intersectoral action is based on two premises. The first is political and considers that the integration of various sectors favors the search for more comprehensive solutions. The second is technical in nature and advocates that the differences between various sectors can be positively used in solving social problems.

These authors concluded that this sectoral integration is characterized by a mobilization of political efforts through joint actions that rationalize resource use among different governmental sectors, with a view to achieving more comprehensive and satisfactory results that could not be attained if these actions were executed separately by each public sector.

As reported in the interview with manager C, this integration is coordinated by the State Secretariat for Citizenship Articulation (SEAC) itself:

> After the Secretariat was established, I took over the so-called Institutional Relations Core, which coordinates the integration of different sectors, involving 36 secretariats that I oversee. It's not easy; for this, we formed a kind of governance architecture that had three areas: one of them was me, the managing collegium, governor, and secretariat. The other was the one I coordinated and now have returned to coordinate, the intersectoral technical chamber.

Moreover, this integration of efforts is not limited to state agencies. Civil society and the private sector are also called upon to contribute to this process. This is known as a Public-Private Partnership and is a typical feature of the Smart Launch proposal. This partnership is evident in the statement of interviewee D2:

> [..] in reality, it was a structure financed by Vale. Vale funded it. Today, it is maintained by the Strategic Secretariat for Articulation of Citizenship which is SEAC. SEAC is responsible for administration. All the secretariats are here together, it's an integrated work; however, administration belongs to SEAC. So there's no 'this room is for ParaPaz, this one is for Sectet, no one interferes!' No, the rooms are of the UsiPaz and the Secretariats develop these services here and we manage these services in the best way possible to serve the population, to coordinate with other secretariats to be here inside.

Monnerat & Souza (2009) emphasize that this practice of intersectoral integration is more feasible at local level management (territorial). These are bottom-up initiatives, i.e., local management proposals and models that consider the realities and specificities of the region and provide integration between sectors and public agencies, with easy access for the community to various services in a single location.

The importance of having integrated actions gathered and coordinated by a local manager, a Secretariat (SEAC) in the case of UsiPaz, goes far beyond providing various public services. These are initiatives that transform the local reality by contributing to a new outlook, a new perspective of the community that was previously unaware of the reach of public actions.

As a consequence, integration proves to be essential, especially in local-level initiatives. It requires efforts from various actors to overcome differences in the search for a convergence of actions towards a single goal: providing a higher quality of life for citizens.

7 FINAL CONSIDERATIONS

This study aimed to introduce a new proposition called Smart Launch for fostering Smart Cities in the Amazon region, which triggered a conceptual reinterpretation of Smart Places through the UsiPaz case study. The case presented demonstrated that local initiatives could serve as a practical and feasible model for developing Smart Cities.

The findings of this research highlight the viability, adherence, and practicality of local projects by emphasizing bottom-up initiatives. The proposal developed in this article proved to be an effective tool for transforming the reality and quality of life of citizens, characterized by feasible financial investments and solutions centered on community demands. UsiPaz offered a new perspective to those living in the territories by providing previously nonexistent public safety and environments fostering education, culture, leisure, entrepreneurship, and social inclusion (including the elderly and people with disabilities). In addition, it offered a range of public services in an integrated and centralized location.

It was observed that the priority search for solutions demanding extensive use of technology (ICT) is not always the best path for public policy managers. From a technological development standpoint, simple solutions are often more suitable and effective for the embryonic development of Smart Cities. Moreover, high-cost projects such as BRT, previously tested in major urban centers of the Amazon (such as Belém), have not proven to be the best option for the initial development of Smart Cities in regions with peculiar characteristics.

This a main theoretical contribution of this article was the conceptual proposition of Smart Launch. The results presented provide evidence that not all formatted projects of Smart Cities— a concept that has enjoyed widespread success—can be implemented in different regions in a top-down format. On the contrary, local initiatives, in a bottom-up format, are more effective and adhere to the existing realities in a given region, as demonstrated in the UsiPaz case study. There are various paths that can lead to the development of Smart Cities, but Smart Launch has proven to be fully adaptable to the reality of the Amazon region, with a theoretical contribution to the promotion of Smart Cities.

Furthermore, the findings of this research are useful in encouraging local managers to develop small projects that can be replicated in various locations, regardless of the scarcity of investments and technological equipment. It is worth noting that these projects are managed locally, whether at the level of a municipality or state government, and thus facilitate the integration of agencies responsible for public services offered to the community.

As for limitations, given that this is a case study of the UsiPaz model, interviews could be applied in future work to all managers of all active UsiPaz units.

Therefore, it is important to highlight that these results require more comprehensive research for more consistent conclusions. Subsequent studies could encompass all active UsiPaz units in the Amazon region, understanding their specificities and scope.

Finally, further research is suggested to measure the degree of satisfaction with the services offered by UsiPaz, by deepening the analysis of the sentiments of communities that reside in the territory.

The potential for applying the concept of Smart Launch in locations with realities similar to those of the Amazon region is enormous. Local governments face various challenges in developing projects, which may include financial, cultural, political, and administrative barriers. However, the need and urgency for sustainable solutions that improve the quality of life of citizens make the Smart Launch project a viable option to expedite the development and execution of Smart Cities projects.

REFERENCES

ABNT. ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. **NBR ISO 37120**: Cidades e comunidades sustentáveis – Indicadores para serviços urbanos e qualidade de vida. Rio de Janeiro, 2021a.

ABNT. ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. **NBR ISO 37122**: Cidades e comunidades sustentáveis – Indicadores para cidades inteligentes. Rio de Janeiro, 2020.

ABNT. ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. **NBR ISO 37123**: Cidades e comunidades sustentáveis – Indicadores para cidades resilientes. Rio de Janeiro, 2021b.

ALVES, Jose. **Brasil tem 85% da sua população vivendo em grandes centros urbanos**: Quase 50% das favelas e assentamentos irregulares estão concentrados nas regiões metropolitanas do Rio, São Paulo e Belém. Atualizada em 29 de outubro de 2022, 1 ago. 2022. Disponível em:https://projetocolabora.com.br/ods11/brasil-tem-85-da-sua-populacao-vivendo-em-grandes-centros-urbanos/. Acesso em: 15 nov. 2022.

ANGELIDOU, Margarita. Smart city policies: a spatial approach. **Cities**, v. 41, p. s3-s11, jul. 2014. Disponível em: http://dx.doi.org/10.1016/j.cities.2014.06.007. Acesso em: 02 set. 2024

AVELAR, Edson Adriano M.; AVELAR, Lorena M.; SILVA, Diego Dos Passos; DIAS, Kelvin Lopes. Arquitetura de Comunicação para Cidades Inteligentes: Uma proposta heterogênea, extensível e de baixo custo. In: SEMINÁRIO INTEGRADO DE SOFTWARE E HARDWARE (SEMISH), 39., 2012, Curitiba/PR. **Anais** [...]. Porto Alegre: Sociedade Brasileira de Computação, 2012. p. 13-24.

BARDIN, Laurence. **Análise de Conteúdo**. São Paulo: Edições 70, 2016.

BLANCHET, A. Cidades inteligentes, democráticas e sustentáveis: o legado do G20 no Brasil. G20 Brasil 2024. Disponível em: https://www.g20.org/pt-br/noticias/cidades-inteligentes-democraticas-e-sustentaveis-o-legado-do-g20-no-brasil. Acesso em: 20 fev. 2024.

BRASIL. Ministry of Regional Development. **The brazilian charter for smart cities**: short version. São Paulo: Livraria da Física, 2021. Disponível em: https://www.cartacidadesinteligentes.org.br/files/carta_resumida_en.pdf. Acesso em: 25 ago. 2024.

DRAZIN, Robert; SANDELANDS, Lloyd. Autogenesis: a perspective on the process of organizing. **Organization Science**, v. 3, n. 2, p. 230-249, maio 1992. Disponível em: https://doi.org/10.1287/orsc.3.2.230. Acesso em: 02 set. 2024.

EPSTEIN, J.; AXTELL, R. **Growing Artificial Societies: Social Science from the Bottom Up**. Brookings Institution Press, 11 de out. de 1996 - 208 p.

GIL, A. C. **Como elaborar projetos de pesquisa.** 3 ed. São Paulo: Atlas, 1991.

GLAVAN, M. *et al.* Usage of Smart Solutions and Development of the Smart Cities: Case Study of Velika Gorica. INTERNATIONAL CONFERENCE ON THE ECONOMICS OF THE DECOUPLING (ICED), 3., 2022. **Proceedings…** 2022.

GSCI, **Guia Sandbox para Cidades Inteligentes.** Agência Brasileira de Desenvolvimento Industrial (org.). Paraná, 2021. Disponível em: https://sandbox.abdi.com.br/page/. Acesso em: 14 nov. 2023.

HOLLAND, J. Complex Adaptive Systems. Daedalus, v. 121, n. 1, p. 17-30, 1992. Disponível em: https://www.jstor.org/stable/20025416. Acesso em: 02 set. 2024.

HUANG, W. *et al.* Assessment methods of urban system resilience: from the perspective of complex adaptive system theory. **Cities**, v. 112, p. 103141, maio 2021. Disponível em: http://dx.doi.org/10.1016/j.cities.2021.103141. Acesso em: 02 set. 2024.

LAI, Chun Sing; JIA, Youwei; DONG, Zhekang; WANG, Dongxiao; TAO, Yingshan; LAI, Qi Hong; WONG, Richard T. K.; ZOBAA, Ahmed F.; WU, Ruiheng; LAI, Loi Lei. A Review of Technical Standards for Smart Cities. **Clean Technologies**, v. 2, n. 3, p. 290-310, 17 ago. 2020. Disponível em: http://dx.doi.org/10.3390/cleantechnol2030019. Acesso em: 02 set. 2024.

LOPES, D.; LEITE, V. **Cidades inteligentes**: conceitos e aplicações. Escola Nacional de Administração Pública (Enap). 2021. Disponível em: http://repositorio.enap.gov.br/handle/1/7001. Acesso em: 02 set. 2024.

MONNERAT, G.; SOUZA, R. Política social e intersetorialidade: consensos teóricos e desafios práticos**. SER Social**, Brasília, v. 12, n. 26, p. 200–220, 2010. Disponível em: https://periodicos.unb.br/index.php/SER_Social/article/view/12708. Acesso em: 2 set. 2024.

NAN. Capturing Bottom-Up Information Technology Use Processes: a complex adaptive systems model. **Mis Quarterly,** v. 35, n. 2, p. 505, 2011. Disponível em: http://dx.doi.org/10.2307/23044054. Acesso em: 02 set. 2024.

PRADO, Nília Maria de Brito Lima; AQUINO, Rosana; HARTZ, Zulmira Maria de Araújo; SANTOS, Hebert Luan Pereira Campos dos; MEDINA, Maria Guadalupe. Revisitando definições e naturezas da intersetorialidade: um ensaio teórico. **Ciência & Saúde Coletiva**, v. 27, n. 2, p. 593-602, fev. 2022. Disponível em: http://dx.doi.org/10.1590/1413-81232022272.47042020. Acesso em: 02 set. 2024.

RIZZON, F.; BERTELLI, J.; MATTE, J.; GRAEBIN, R. E.; MACKE, J. Smart City: um conceito em construção. **Revista Metropolitana de Sustentabilidade**, São Paulo, v. 7, n. 3, p. 123–142, 2017. Disponível em: https://revistaseletronicas.fmu.br/index.php/rms/article/view/1378. Acesso em: 2 set. 2024.

SARRAKH, Redouane; SARRAKH, Redouane; RENUKAPPA, Suresh; SURESH, Subashini; NABT, Saeed Al. Smart Solutions in the Oil and Gas Industry: a review. **Journal Of Clean Energy Technologies**, v. 7, n. 5, p. 72-76, set. 2019. Disponível em: http://dx.doi.org/10.18178/jocet.2019.7.5.512. Acesso em: 02 set. 2024.

SEAC, **Usinas da Paz**. Governo do Estado do Pará. 2022. Disponível em: http://www.seac.pa.gov.br/content/usinas-da-paz. Acesso em: 13 dez. 2022

SONTIWANICH, Phanaranan; BOONCHAI, Chantinee; BEETON, Robert J. S. An Unsustainable Smart City: lessons from uneven citizen education and engagement in thailand. **Sustainability**, v. 14, n. 20, p. 13315, 17 out. 2022. Disponível em: http://dx.doi.org/10.3390/su142013315. Acesso em: 02 set. 2024.

SOUSA JÚNIOR, A. M. DE. **Carta brasileira para cidades inteligentes**: versão resumida. São Paulo, SP: LF Editorial, 2021.

TOH, Chai Keong. Smart city indexes, criteria, indicators and rankings: an in ‐depth investigation and analysis. **Iet Smart Cities**, v. 4, n. 3, p. 211-228, 13 jul. 2022. Disponível em: http://dx.doi.org/10.1049/smc2.12036. Acesso em: 02 set. 2024.

UNITED NATIONS HUMAN SETTLEMENTS PROGRAMME. World cities report 2022: envisaging the future of cities. Nairóbi: UN-HABITAT, 2022. Disponível em: https://unhabitat.org/sites/default/files/2022/06/wcr_2022.pdf. Acesso em: 21 set. 2022.

WANDERLEY, M. B.; MARTINELLI, M. L.; DA PAZ, R. D. O. Intersetorialidade nas Políticas Públicas. **Serviço Social & Sociedade**, n. 137, p. 7–13, jan. 2020. Disponível em: https://doi.org/10.1590/0101-6628.198. Acesso em: 02 set. 2024.

WEISS, M.; GUIMARÃES, J.; AGUIAR, H. Cidades Inteligentes para o Desenvolvimento Sustentável: uma avaliação do uso de TIC em cidades paulistas. **Revista e-Locução**, v. 16, n. 8, 2019. Disponível em: https://doi.org/https://periodicos.faex.edu.br/index.php/e-Locucao/article/view/216/168. Acesso em: 02 set. 2024.

YIN, R. K. **Pesquisa Estudo de Caso** - Desenho e Métodos. 2.ed. Porto Alegre. 1994.