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Strategic Digital City: Multiple Projects for Sustainable Urban Management

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Abstract: In the last two decades, sustainable urban environments have been predominant, meaning that knowledge production has accompanied this growth. The objective of this study is to present multiple projects for sustainable urban management applied in cities, based on the original Strategic Digital City (SDC) concept, model, and project. The research methodology included an SDC systematic literature review, highlighting the sustainability and respective action research of 11 doctoral theses and multiple projects. The obtained results highlight a set of published multiple projects that form a practical analytical cycle of sustainable and interconnected urban processes through the original SDC framework proposition, SDC, which can be applied in different cities in different countries. The innovations present in the SDC multiple projects propose a theoretical–empirical debate in the interdisciplinary areas of urban management, municipal administration, and sustainable public innovation, with a focus on local government and democracy studies, prioritizing sustainable strategies in cities and not just technologies. The conclusion reiterates that the original multiple projects, created and applied in different cities, present an interdisciplinary advance in sustainable urban management areas and public administration, focused on sustainable urban studies.

Keywords: strategic digital city; urban sustainability; urban management; public management

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1. Introduction

Since 1990, due to the growing population increase, the urban environment has received attention [1], focusing on the supply and infrastructure of public services with information technology offered to citizens [2], as well as the development of strategies for the city [3]. Anchored in a context of transition processes, public administrations acquire a fundamental role, standing out in three areas: knowledge, planning, and sharing of the city [4]. Furthermore, decision-making by city managers is complex, innovative, and challenging, due to the variety of information from the urban environment [5]. The sustainable strategies defined for the city have become a relevant concern, as well as becoming a practical urban tool in management and sustainable governance [6–8].

The debate on urban strategy moves toward management tools and performance quality in the public sector, and its focus is on the sharing of a given set of social actors who explore alternative action resources, and with a rationally establishment of shared socio-cognitive infrastructure being a challenge through collective action, it emphasizes that the strategy is not just a more effective form of planning but an ability to outline the institutional composition of the city, creating a space structured by social actors [9]. Furthermore, the use of technological innovations to improve governance, planning, and service delivery in the public sector remains a challenge, as does promoting the digital transformation of the public sector [10], including sustainability in cities [11,12].

The research problems address the challenges arising from rapid planet urbanization, requiring innovative strategies to address this reality [13,14], and the strategies lack recognition as theoretical–managerial structures to meet the concerns of modern and sustainable cities [15]. There is also concern regarding strategic documents that do not address the city's real needs, being difficult to read and understand due to their unclear structure, including the lack of use of sustainable indicators in cities [16].

It does mean that the local urban development issues are not addressed [17]. In addition to these structural and methodological obstacles, there is also an impasse in implementing strategies, often rooted in the political aspects of urban strategies [10,18]. Local governments have focused on transparency, accountability, efficiency, and the effective use of available resources. However, they have not considered the efficiency of public services as a determinant of the transparency of their governments [19]. Governments should not focus solely on delivering many public services without understanding the needs of citizens and the available information. In addition, the public sector faces the challenge of offering quality services from two perspectives: a top-down approach, considering the government's needs, and a bottom-up approach about decisions based on citizens' needs, including a latent demand for public services that present implementation failures based on the low innovation potential of service providers [20].

The urban digital infrastructure needs to be dissociated from technocentric discourses, requiring other empirical and conceptual approaches [21], such as that of the SDC [3]. In this sense, it is necessary to remember that the origin of cities has always been as a meeting space, with technological innovation being part of it. In this way, discourses focused on technology do not break with paradigms but flex them in other ways [3]. Ultimately, the city refers to a set of complex and dynamic systems that intensify over time, making use of the continuous interaction of physical and social networks [22], requiring greater citizen participation in city management, including the contextualization of city themes [3] and considering their respective sustainability, with the constant challenge of developing adequate political scenarios for sustainable growth in cities [6–8,18,23].

The research questions stand out as follows: are the eleven multiple projects (or models) of sustainable urban management projects related to the concept, model, and original project of the Strategic Digital City (SDC)? Also, how can they be applied in different cities?

The objective is to present multiple projects for sustainable urban management, applied in cities based on the original Strategic Digital City (SDC) concept, model, and project.

The research justifications encompass the importance of strategically interconnecting public administration sectors [13]. It also includes how sustainable city strategies expand the local government's influence, stimulating democracies, impacting citizens at a micro level, intervening in city relations, and extending to the state and region [15,17]. When public services meet citizens' needs, they simultaneously strengthen their belief in government [24], promoting quality of life in the city [3]. Technological resources enable the city's digitalization, transporting them to a virtual environment that ends up empowering citizens [25]. Municipalities focus their efforts on three fronts: disseminating information about their management to involve citizens and other social actors better; taking advantage of this publicity to increase the popularity and possibilities of the re-election of managers; and the use of publicizing government actions in the search for economic and technological resources [19]. The SDC project involves organizing a large data set, systematizing it, and integrating these management instruments through information technology, dividing the city by municipal themes [3,26]. It is also necessary to highlight the importance of cities being seen as units of social, cultural, economic, and sustainable development [17], and for local governments to improve the transparency of their actions and provision of public services [27,28]. The role of information technology as a source of public innovation and a generator of transformation in the city is also included in the sustainable debate [6,8,29]. Also, there is still research space for theoretical models, technical methods, and practical applications in cities [11,12,18,21].

2. Literature Review and Background

2.1. Strategic Digital City (SDC) Concept and Model

The SDC, a concept and model created by Rezende, can be understood as the application of information technology resources in the municipality management in making information and services available to citizens. Differently from the smart city concept, SDC is a more comprehensive project than just offering the Internet to citizens through conventional telecommunications resources, and goes beyond digitally including citizens on the World Wide Web. Essentially, the SDC is based on the city's strategies to meet the objectives of different municipal themes [3].

Regarding the smart city, the SDC concept, project, and model or framework, which has a strategic and management approach, is different from the smart city. Smart city projects prioritize technology resources and alternative software solutions with interconnected infrastructures [8,21,23,30–33].

The first SDC project and model or framework intended to be innovative and sustainable with strategic alignment, integrating city planning instruments (strategic city planning; city master plan; and multi-annual city plan) with information systems, knowledge systems, and information technology resources. This alignment tries to formalize the city's problems, objectives, strategies, and actions, and provides the modeling and structuring of information and knowledge mapping to contribute to the city hall's management and cities. The second SDC project and model or framework is developed based on the city's strategic planning, with the city's objectives and strategies evaluated through municipal themes; city information planning; and planning of the city's information technology. These three plans, for their application, require the elaboration of information models of municipal themes where they are defined by citizens, describing what information is necessary to manage the city, then generating information systems, information systems knowledge, and public services with information technology, as well as the respective human resource profiles needed [3].

Thus, the SDC project is constituted of four sustainable subprojects: city strategies (to achieve the city's objectives); city information (to citizens and city managers' decisions assist); public services (to improve quality of life); and information technology resource applications. For the adequate implementation of the SDC model, it is necessary to elaborate on four projects: city strategic planning with objectives and strategies covering all city public thematics or municipal functions; city information planning; city public service planning; and city information technology planning, also considering the municipality, prefecture and municipal public organizations involved, as well as considering practitioners and policymakers and other stakeholders from private civil society [3].

In addition to being understood as a sustainable public policy for city management and planning [26], international literature presents other SDC publications on sustainable projects on different city themes in different countries [25,34–37].

2.2. Strategic Digital City (SDC) Background

SDC cases are applied in different cities. For example, in Vinhedo, São Paulo, Brazil, the project was developed between 2009 and 2014, where together with citizens, through a participatory and original methodology, the four SDC subprojects were conceived, planned, and executed [26].

For the Curitiba project (Brazil), the SDC subprojects were developed and analyzed together with the local government. In the city of Chicago (USA), the project identified the city's strategies and analyzed the information and electronic services offered to citizens. Comparatively, Chicago offers its citizens 281 public services distributed in 256 subjects or themes, and Curitiba 508 public services distributed in 26 subjects or themes [37].

In all cities, the importance of preparing, implementing, and analyzing SDC subprojects and their respective benefits to citizens in terms of their quality of life was observed, as well as the possibilities of these subprojects in helping the sustainable management of cities.

2.3. Sustainability

Environmental sustainability is concerned with the balanced connection between human activity and nature [29,38–41], and understanding the finiteness of natural resources [42], also considering all aspects of sustainability [11]. The 2030 Agenda, because of this concern, created seventeen sustainable development goals (SDGs) that focus on three major dimensions: environmental, economic, and social [40,43,44].

There are seven sustainability dimensions to preserve the environment and society: economic, social, political, ecological, environmental, local territorial, and international territorial [44]. Those dimensions show that sustainability goes beyond degradation, pollution, and recycling, encompassing broader issues, such as quality of life, modern technologies, rational use and finiteness of natural resources, poverty reduction, and social inequality [11,42].

Sustainability is also related to innovation [31,44,45], encompassing multi-scalar and multi-actor processes that seek to create approaches to define and meet social needs, promoting positive results about socio-ecological integrity and equity in a specific and complex context [45]. Furthermore, these sustainable processes can increase citizen participation [18,23,30] expanding and strengthening participatory governance and collective decision-making, thus increasing the legitimacy and effectiveness of sustainable actions [6]. In this way, it is also possible to achieve long-term sustainable development with sustainable planning and management in cities in a collaborative and interdisciplinary way [8].

Sustainable development is not limited to only rethinking urban governance methods and tools and changing lifestyles [46,47]. It is necessary to adopt integrated approaches considering environmental, social, and economic aspects to achieve sustainable development. This is what is called sustainable rethinking [44], and "rethinking" generates seven sustainable dimensions [45]. Thus, sustainable development is related to the importance of implementing policies and practices that aim to conserve natural resources, reduce carbon emissions, promote social equity, and improve the quality of life of communities [46]. This need is particularly relevant in urban environments, where there is a high population concentration and a greater consumption of resources, including strategic visions [6,7,12].

According to [46], sustainability, as a multidimensional concept, involves a complex digital transition process, consisting of digital technology adoption and integration in various societal spheres to promote sustainable solutions. Through this process, it is possible to drive technological innovations and business practices that contribute to a more sustainable future creation, where the balance between human needs and the Earth's ability to support them is possible, also highlighting artificial intelligence technologies in solving sustainability challenges, in particular climate change [45].

Sustainable Development Goal 11 (SDG-11), titled Sustainable Cities and Communities, sets goals and guidelines to ensure the creation and maintenance of human and urban settlements that are inclusive, safe, resilient, and sustainable. In this context, urban governance plays a fundamental role, seeking to strengthen participation and collaboration between the different actors involved in the management and planning of cities, including local governments, civil society, the private sector, and local communities [43]. This approach promotes greater effectiveness in decision-making, due to taking into consideration the population's needs and demands and achieving more appropriate and sustainable solutions to urban challenges [48], which can be facilitated by monitoring indicators in cities [6,16,21,23]. The SDGs provide states, the private sector, and civil society with an ambitious vision for a more sustainable future [49]. The urgent sustainability challenges that SDGs focus on are particularly relevant for cities and urban areas [50]. The SDGs are interconnected with urban planning when intended to increase citizens' quality of life. In this sense, [51] emphasizes that the 2030 Agenda augmented the concern for more equitable and sustainable urban environments, demanding more democratic and inclusive governance models [43], and also considering the appropriate sustainable development and re-development of cities [8,14,38,50,52].

2.4. Strategic Digital City and Sustainability Relationship

The relationships between these topics are unquestionable, as the four SDC subprojects to be implemented in cities [3,25,26], require sustainability in all its seven approaches or dimensions, that is, for the project of SDC to be effective, it must respect the possibilities of meeting the requirements: economic, social, political, ecological, environmental, local territorial, and international territorial [38–43].

Such relationships are based more strongly on the qualitative foundations of the four subprojects. The concept and implementation of SDC goes beyond simply providing internet access, as its purpose is to align information technology resources with the city's strategic objectives, with the focus being strategies and, secondarily, technologies, as supporting resources. Therefore, SDC projects require the integration of the city's strategic planning with information systems, public service systems and respective technologies, aiming to address urban challenges in a sustainable way. But, quantitative indicators are also present in the relationships between SDC projects and sustainability, to the extent that there must be some number of city strategies, city information, public services, and information technology resource applications in cities [21,25,34–36].

Additionally, SDC has the potential to improve citizens' quality of life by facilitating the delivery of more effective, adequate and accessible public services, enabled by sustainable information technology resources, such as online education, digital health, security technologies, integrated public transport, among others. The SDC proposition also contemplates a more participatory and transparent form of governance, involving citizens in the decision-making process and ensuring the accountability of government institutions. This approach strengthens citizens' trust in public institutions and increases the legitimacy of urban policies and their relationship with local residents. Consequently, it is observed that SDC can play a catalytic role for sustainable development, integrating information technology and urban planning linked to the city's sustainable strategies, and expanding citizen participation in the provision of online public services, to create more resilient cities that are inclusive, sustainable, and environmentally responsible [3,26,44–47].

In this way, a significant correlation is observed with the sustainability dimensions, proposing sustainable models, integrating technology-oriented solutions, information, strategies and public services to face environmental, economic, social and mainly sustainable challenges [6,8,11,18,23,30]. All these, involving SDC concepts, studied cities that prioritize subprojects or sustainable variables. Furthermore, leveraging digital technologies and data analytics can optimize resource management, improve urban management and "improve" public service delivery, contributing to economic prosperity and sustainable social equity [48–51]. Furthermore, promoting collaboration between stakeholders, including government, businesses, academia and citizens, is essential for co-creating innovative solutions that prioritize sustainability and meet the diverse needs of the community. By adopting a holistic and systemic framework in line with the SDC theses described here, which considers environmental management, economic viability, and social inclusion, SDC projects can effectively promote sustainability in all its approaches and dimensions [12,14,44–48,52].

In applications in cities, the integration of the sustainability concept into SDC can make urban development more equitable, resilient, and environmentally responsible. City strategies, as a subproject, can highlight the development of the strategic city plan, with a focus on the efficient use of natural resources (environmental sustainability), equity in access to basic services and local public policies (social sustainability), and the implementation of economic development policies local (economic sustainability). City information can encourage citizens to raise environmental awareness, adopt sustainable behaviors, and promote the development of a local economy based on knowledge and information. Public services can facilitate local economic development and the generation of sustainable revenue for the government, as well as promote inclusion and equal opportunities (social sustainability) concerning natural resources for environmental sustainability. Information technology resource applications can monitor and reduce the environmental impacts of urban activities, supporting social and economic sustainability activities. In this way, the

four subprojects are and can be sustainable in cities, considering the different approaches to sustainability.

3. Materials and Methods

The research methodology method used started with a systematic literature review [53] of the SDC topic, examining the produced knowledge from the published theoretical models in the scientific literature. The research techniques adopted were a qualitative approach through bibliographical research [54–56]. The investigation includes original projects and models or frameworks published since 2012 that incorporated the original SDC model [3] into their structures.

The research phases are topic delimitation, problem–question formulation, and a survey of the investigated bibliographic material originating from the PUCPR Thesis Repository. The choice was based on original models of theses available from SDC Research Group, placing the focus of the investigation in the 2012–2023 time frame. The 11 theses are related to the four sustainable SDC subprojects. Afterward, a literature review is presented to support the themes researched (and keywords), situating the research concerning the topic's state of the art, reading, and summarizing. In the following stages, the collected data analysis led to the study writing and, subsequently, documenting the research [57].

The research scope included scientific works [39] that contained the structure (partial or total) of the original SDC model proposed by [3]. The observation unit highlighted eleven urban management and public administration frameworks, covering materials published between 2012 and 2023. The scientific works researched must have the SDC project and model or framework [3] as a basis for the new different projects and models or frameworks consolidated in the last decade [56,57].

The research development period was from March 2021 to February 2024, reiterating that, based on the original SDC concept and model, it is possible to create other SDC projects, with different, multifaceted, and sustainable approaches.

4. SDC Multiple Projects

There are 11 SDC multiple projects for sustainable urban management applied in cities based on the original SDC concept, model or framework, and project [3], whose multiple focuses addressed the context of urban management from an interdisciplinary and sustainable perspective.

It is noteworthy that the management of cities influences citizens' quality of life through the municipality-listed strategies, the information made available, and the offers of public services with information technology. Furthermore, urban management involves an integrated and systemic vision focused on urban planning, management, and social and environmental technologies, including public policies in the approaches to the urban environment and the political–administrative process in cities.

The first SDC project [58] contains the constructs connected to municipal public services, the Internet of things, and SDC. Application in cities involves the dynamism of sub-construct variables: public issues; digital citizen needs; municipal governance; connected objects; municipal strategies, municipal information, municipal public services, and information technology resources. Highlighted orientation towards minimizing environmental impact stands out, promoting energy effectiveness, waste management, and the conservation of natural resources, directly relating to environmental sustainability. The dynamics of variables related to citizens' needs and public issues make it possible to identify and meet emerging social demands, promoting inclusion and equity in access to municipal public services (social sustainability). Municipal strategies based on data and information technology drive local economic development, stimulating innovation and job creation, while IT resources optimize the effectiveness of local public services, promoting long-term financial sustainability (economic sustainability).

The second SDC project [59] contains crowdsourcing constructs and SDC. Application in cities involves the dynamism of sub-construct variables: citizen crowdsourcing initia-

tives; government crowdsourcing initiatives; crowdsourced citizen monitoring; government crowdsourcing monitoring; strategies regarding crowdsourcing initiatives; impacts on city information; impacts on public services; and impacts on information technology. This highlighted initiatives that can be aimed at monitoring and addressing environmental issues, such as air pollution, water quality, and the conservation of natural resources. Collective monitoring by citizens and government can contribute to environmental surveillance and data-driven decision-making to promote environmental sustainability. Crowdsourcing can also be used to involve citizens in the planning and management of urban policies, promoting citizen participation and social inclusion. Thus, it can have positive impacts on the city's information, public services, and information technology, ensuring that municipal decisions meet the needs and interests of the community. Crowdsourcing can be employed to promote innovation and local entrepreneurship, generating economic opportunities and stimulating the growth of economic sustainability.

The third SDC project [60] contains public intelligence constructs, intelligence assessment agents, and SDC. Application in cities involves the dynamism of subconstruct variables: innovation; creativity; quality; productivity; effectiveness; intelligence factor; and public services in cities. This highlighted identifying and addressing urgent environmental issues, such as pollution, climate change, and natural resource management. In this way, this strategy can result in innovations and creative solutions to promote environmental sustainability in cities. The quality and effectiveness of public services in cities can also be improved through the application of public intelligence and evaluation agents, ensuring that services meet the needs of the population equitably and inclusively, thus promoting social sustainability. Innovation and productivity driven by public intelligence can lead to improvements in public services and effectiveness in municipal management, resulting in cost savings and increased revenue, contributing to the long-term economic sustainability of cities.

The fourth SDC project [61] contains information management constructs and SDC. Application in cities involves the subconstruct variables dynamism: information systems multidimensional integration; city's public services multidimensional ordering; city information multidimensional customization; and strategies in cities on different municipal themes. This highlighted the monitoring and management of environmental issues, such as air quality, waste management, and conservation of natural resources, contributing to promoting more sustainable practices and protecting the environment in cities. The multidimensional ordering of the city's public services can ensure that services meet the diverse needs of the population, promoting equity and social inclusion. The multidimensional integration of information systems and the multidimensional ordering of public services can result in more efficient and effective management of municipal resources, contributing to economic sustainability. Furthermore, strategies in cities on different municipal themes can promote local economic development and job creation.

The fifth SDC project [62] contains municipal decision-making process constructs and SDC. Application in cities involves the subconstruct variables dynamism: evidence for decisions in cities; decisions by public agents and citizens; city strategies; city information; public services in cities; and information technology resources. This highlighted that the search for evidence for decisions in cities can lead to policies and projects that promote environmental sustainability, contributing to the mitigation of environmental impacts and the conservation of natural resources. It also involves citizen participation and social equity in decision-making municipalities, ensuring that public policies and services meet the needs of all social groups, and promoting social cohesion and justice.

The sixth SDC project [63] contains public management and SDC. Application in cities involves the subconstruct variables dynamism: intersectoral city planning; intersectoral management of the city; the integration of articulation and convergence; the deliberative participation of public managers and citizens processes; the decentralization of activities and decisions processes; and substitutive innovation results. This highlighted that the integration of the city's intersectoral planning stands out, which can facilitate the imple-

mentation of policies and projects that promote environmental sustainability, such as the development of green infrastructure, waste management, and the promotion of clean energy, contributing to the mitigation of environmental impacts.

The seventh SDC project [64] contains basic sanitation management constructs and SDC. Application in cities involves the dynamism of sub-construct variables: city water management; city sewage management; city waste management; city drainage management; public services to citizens; and information for decisions by managers and citizens. This highlighted that it is noteworthy that basic sanitation services are essential for the health and quality of life of the population. By ensuring equitable access to these services, basic sanitation management promotes social inclusion and improved living conditions for all citizens, especially those in vulnerable situations (social sustainability).

The eight SDC project [65] contains city public accounts constructs and SDC. The application in cities involves the subconstruct variables dynamism: Brazilian system of public accounts for the city; international city public accounting systems; public accounts legal processes; and structures and tools modeling defined and analyzed by consolidating the city's legal structures. This highlighted that the implementation of effective public accounting systems that comply with legislation can contribute to responsible financial management and the efficient use of municipal resources, promoting economic sustainability by guaranteeing the city's financial stability and the continuity of essential public services.

The nineth SDC project [66] contains digital participatory budget constructs and SDC. Application in cities involves the subconstruct variables dynamism: information for social actors; citizens and public managers choices; the direction of city projects; launching investments; investment deliberation; investment evaluation; investments chosen by the city's digital budget execution; and city management. This highlighted that digital participatory budgeting offers citizens and public managers the opportunity to make informed choices about investments in public services and projects that meet the needs of the community. As a result, social inclusion is promoted by ensuring that resources are allocated according to the priorities and demands of different segments of society.

The tenth SDC project [67] contains municipal government performance management constructs and SDC. Application in cities involves the dynamism of subconstruct variables: planning and decisions through relationship management with citizens; the management of strategic processes; decision-making environment; city intelligence; city strategy dashboard; operational management through urban automation; city operating environment; the management of continuous demands; political management through monitoring citizens' performance; agenda management of public managers; public meetings; political management dashboard; the management of strategic projects through the participatory definition of strategic city projects; matrix project management; and monitoring strategic city projects; the management of the decision-making base layer through geographic information systems; transactional information systems; and public services with information technology. This highlighted that the relationship and engagement with citizens through performance management can ensure that municipal policies and decisions meet the needs and demands of the community. This promotes social inclusion by ensuring citizen participation in defining priorities and evaluating the performance of the municipal government. Furthermore, the inclusion of indicators related to the environment can help monitor and promote sustainable practices in city administration, contributing to the protection of the environment and the mitigation of climate change.

The eleventh and last SDC project [68] connects public infrastructure with accessibility for urban workers, including migrants and disabled workers. The bibliometric study found 15 correlated models confirming model originality. The model brings together two constructs (access for urban workers and SDC), four sub-constructs (urban public service infrastructure, urban public information infrastructure, urban infrastructure, and municipal strategies), and 25 variables. In its construction process, the theory of access offered a philosophical theoretical space to think about access and structuralism a methodological approach to represent by which public resources access to job opportunities is made possible.

This highlighted that the accessibility for urban workers, including migrants and people with disabilities, contributes to social inclusion and equity in access to employment opportunities. Ensuring that public infrastructure is accessible to all segments of the population promotes social cohesion and reduces socioeconomic disparities (social sustainability).

The description of the SDC multiple projects based on the 11 doctoral theses demonstrated their respective notable aspects from each framework, with new and sustainable constructs, subconstructs and variables.

5. Discussion

It was possible to observe that the challenges and opportunities for the city are multiple, with urban management in local and regional discussions highlighted in the SDC multiple projects presented. The mentioned studies comprehend the urban management sustainable field, and detail interdisciplinary urban processes and how the city is organized, highlighting its structure and dynamism. The original SDC concept, model or framework, and project [3] has the scope to incorporate other discussions into its structure, forming new multiple projects anchored in its former SDC model or framework. In doing so, it generates new knowledge approaches, creating other SDC multiple projects situated in the contexts of urban management and urban studies, including sustainable vision.

Cities need to have sustainable strategies that meet the needs of citizens through the possibilities that a connectivity environment can offer. The SDC project from [58] shows that when the municipal manager has useful information and adequate municipal strategies, improvement in management is possible for a sustainable city with the provision of personalized public services according to the needs identified by society.

The SDC project centered on crowdsourcing initiative application [59] allows us to observe the alignment, implementation, and monitoring of municipal strategic planning. In turn, this initiative enables the inclusion of citizens in a process of co-creation and decision-making based on a continuous learning cycle. The challenge in this type of new project was to make it viable to host projects, products, and ideas resulting from these initiatives focused on citizens and the sustainable services offered by public management.

The interests contained in public management result in multidimensional transformations that use information technology to generate interactions between citizens and managers. Thus, the public intelligence SDC project [60] supports the premise that technologies can leverage the dynamics of cities, either by extracting information, by sustainability, or by generating or optimizing services for their citizens.

In line with the multidimensional discussion, the multidimensional information management SDC project [61] brings relationships between the information dynamics and the public services offered. This new project highlighted a partial disconnection between the variables researched, leading to two-dimensional management systems in the city. Therefore, there are limitations in the information made available in the sustainable public services offered to citizens from the city, citizens, and interactions arising from the SDC.

Information technology is part of people's daily lives, connecting city managers' decisions with citizens' demands. It is the starting point of the municipal decision-making SDC project [62], based on evidence where citizens have little relevant participation. Citizens have a fundamental role in the urban context because they are the source of demands from local public authorities, and there is no point in managing the city if citizens' needs are met without sustainability.

The intersectoral public management analysis SDC project [63] explored the breadth of needs and expectations of citizens, social groups, and public administration, requiring new positions and relationships with society. It is the context where intersectorality manifests itself, with the approach of this materialization involving different social actors, so that it is viable and possible to obtain synergistic results in sustainable complex situations.

However, the focus is not always on the citizens or the technology resources used in public management. In this sense, the SDC project for managing primary sanitation services [64] exposed other forms of work, communication, socialization, and governance,

including the basic sanitation of a city in the debate. This new project or model proposed a formal structure between management and citizens' interaction to offer adequate and sustainable primary sanitation services.

The public accounts SDC project [65] exposed the importance of access to the content of public accounts as an innovative instrument to mitigate externalities arising from misinformation, disinterest, and lack of social control. These externalities produce vulnerabilities to corruption and lack of public control, not always offering sustainable services.

Regarding public management, the relevance of decision-making as an integral part of the decision-making process stands out, with this topic discussed in the digital participatory budgeting SDC project [66]. It addressed the information and communication technology resources used to understand popular participation in Public Administration consultations. The proposed debate led to the implementation of digitally mediated participation tools in the Digital Participatory Budget. It assumes that when adequate and sustainable instruments are available to evaluate the information available, citizens can improve participation in the decision-making process.

The municipal government's performance management SDC project [67] addresses the city's management, automation, and operationalization potential. This perspective also includes the relationship between public managers and citizens involved in the sustainable strategic management of city projects. This proposal for an electronic government new project aims to build alternatives to municipal government performance management. Achieving this new project relies on the strategies listed for the city, the information made available to citizens, and the new information technology resources available.

Finally, [68] SDC projects point to the need to adapt processes and systems, and a means of social participation that can capture worker demands, in a sustainable manner. This new project is applicable in cities regardless of socioeconomic or political–administrative characteristics. It can become a resource to encourage local governments to identify gaps and improvements in the management of public access means and to establish participation mechanisms recognizing the diversity of workers to promote fair access and adequate quality of life.

As a result, a set of SDC multiple projects centered on four sustainable subprojects (strategies, information, public services, and information technology resources) that form the original SDC project proves its concept (Table 1). There are different perspectives aimed at offering public services to citizens: citizen demands for city management based on information technology resources, whose backdrop is the SDC project, the evolution of public management, and its contemporary challenges. The SDC multiple projects (see Section 4. SDC Multiple Projects) discussed and outlined internal and external approaches, and formed an analytical cycle of urban processes interconnected by the original SDC concept, model or framework, and project [3], respecting the principles of sustainability (see Section 2. Review and Background and Section 1. Introduction) reiterating the achievement of intervention patterns in cities and the achievement of the sustainable urban development objectives.

The main finding in this research is that each of the SDC multiple projects analyzed had, in its structure, city strategies and information formed from sustainable municipal themes. Municipal information is essential to managers in decision-making, including the adopted strategies' choice. In this way, the set of 11 multiple projects analyzed highlighted the different perspectives of public managers in city planning and management, including sustainable vision, considering its dimensions (Table 2).

Table 1. SDC multiple projects resume and applications in cities.

Year-Author	General Theme	Main Construct(s)	Addressed SDC Subprojects	Territory
2012-[67]	City government municipal government performance management	Decision-making and planning Operational management Political management Strategic projects management	Strategies Information Public Services IT	Rio de Janeiro Porto Alegre Curitiba Florianópolis
2014-[66]	Participatory budgeting	Opening Deliberation Evaluation Execution Follow-up Strategic projects management	Strategies Information Public Services IT	Belo Horizonte
2015-[65]	Public accounts model	Public account models Public account transparency Social control International public account models Strategic projects management	Strategies Information Public Services IT	Multiple
2015-[64]	Basic sanitation management	Water Sewage Waste Drainage Citizens City management Strategic projects management	Strategies Information Public Services IT	Curitiba (RMC)
2017-[63]	Public management intersectoral analysis	Management and Planning Social participation process Strategic projects management	Strategies Information Public Services IT	Curitiba
2018-[61]	Informational management	Multidimensional information Public services Strategic projects management	Strategies Information Public Services IT	Regina (Canada) Rio de Janeiro
2018-[62]	Decision-making process	Decision-making Evidence Strategic projects management	Strategies Information Public Services IT	Reserva do Iguaçu Guarapuava
2020-[60]	Public intelligence model	Public intelligence (PI) Intelligence assessment agent (IAA) Strategic projects management	Strategies Information Public Services IT	Curitiba
2021-[59]	Crowdsourcing model	E-participation Crowdsourcing Strategic projects management	Strategies Information Public Services IT	Curitiba
2022-[58]	Connected public services provision	Connected city services IoT Strategic projects management	Strategies Information Public Services IT	São José dos Pinhais
2023-[68]	Access model for urban workers	Urban worker Migrant worker Disabled worker Public infrastructure	Strategies Information Public Services IT	Guaratuba Curitiba

Table 2. SDC multiple projects relationship with sustainability dimensions.

Year-Author	Economical	Social	Political	Ecological	Environmental	Territorial (Local)	Territorial (International)
2012-[67]	X	X	X	X		X	
2014-[66]	X	X	X	X		X	
2015-[65]	X	X	X	X		X	X
2015-[64]	X	X	X	X	X	X	
2017-[63]	X	X	X	X		X	
2018-[61]	X	X	X	X		X	X
2018-[62]	X	X	X	X		X	
2020-[60]	X	X	X	X		X	
2021-[59]	X	X	X	X		X	
2022-[58]	X	X	X	X		X	
2023-[68]	X	X	X	X		X	X

6. Conclusions

Due to the increase in population, the urban environment has gained a certain protagonism, focused on the provision and infrastructure of public services with information technology offered to citizens, as well as the development sustainable of strategies for the city. The proper strategy, information, public services, and information technology application in cities can create more equitable and sustainable local development, with SDC being a possibility for more inclusive and equitable urbanization. In this context, public managers and citizens need to interact among themselves based on the complexity of managers' decisions, the use of public services by citizens, the city's strategic planning, and the use of city strategies and information based on the themes of municipalities, including demanding the sustainability of all these issues. It is noteworthy that sustainability goes beyond the conservation of environmental resources, involving other approaches, where SDC can be a sustainable project.

Regarding the issues and the proposed objective, they were achieved through the presentation, analysis and discussion of the 11 selected original theses. This review allowed the presentation of SDC multiple projects developed based on the original SDC concept, model or framework, and project proposed by [3]. The theoretical–empirical and applied discussion, developed in the last decade around the researched theme, consolidated a SDC project based on four sustainable subprojects: strategic, information, public services, and opportune information technology resources aimed at the city context.

The obtained results revealed a set of SDC multiple projects centered on the four SDC sustainable subprojects. Conceiving the idea of this singular set allows us to visualize the formation of a theoretical–analytical cycle of urban processes interconnected by the proposition of the original model of an SDC. It is also a city project to be developed in the long-term, supported mainly by the listed sustainable city strategies. The cycle of urban processes, centered on the four SDC sustainable subprojects, can offer alternatives for public managers, urban planners, and researchers interested in the creation and implementation of sustainable urban development models.

Still concerning sustainability, the SDC multiple projects generated by the different studies correspond to most of the criteria defined by international researchers. In the social dimension, all new projects intend to promote a reasonable level of social homogeneity, especially in the search for equal access to social resources and services. This impact is also present in the economic dimension, as projects involving SDC aim for intersectoral economic development, seeking a capacity for the continuous modernization of production instruments, respecting the dimensions and current approaches to sustainability.

On the ecological issue, there is a clear concern with preserving the potential of natural and human capital, whether through the development and optimization of sustainable infrastructure (administrative and cities) or by improving the citizens' quality of life in their daily routines.

In the political and territorial (local) dimensions, there are direct and significant connections, as all new projects focus on municipal administrations and how to improve them based on the four sustainable SDC subprojects.

The environmental dimension is addressed by only one project [46]. However, it is possible to admit that the intersectorality of other models will also bring indirect benefits capable of respecting and enhancing the self-purification capacity of natural and sustainable ecosystems. The same inference is possible in the territorial (international) issue, in which only three projects consider the application in municipalities in different countries. Far from generalization, it is believed that all other projects can be applied internationally if they are properly adapted to different local realities, respecting the universal appropriation of human rights, and creating a reasonable level of social cohesion, but sustainable.

From the analysis of the eleven original SDC multiple projects (or models), the correspondence to sustainability dimensions is illustrated in Table 2.

In general, SDC can leverage many aspects of sustainable urban management and development. SDC can improve city infrastructure through its subprojects, promoting citizen engagement through many different platforms available in different devices and city locations. Such platforms concern SDC projects and also smart city projects and technological alternatives. This involvement can also create more collaborative and inclusive governance and development, enabling the creation of sustainable public policies for cities.

The research contributions aimed to deepen the literature on sustainable urban management from the public administration perspective, regarding the city strategies use and definition and public services with citizen-centered information technology resources. From city managers' perspective, it contributes to SDC multiple projects proposals that can assist in the municipal decision-making process on different themes. For citizens, the contribution extends to meeting their collective needs and access to quality public services, also aiming to bring citizens closer to the public administration management process. The debate presented is also relevant for all governments and democratic practices that use information technology resources as a facilitating management policy in cities. Also, the practical viability of the SDC original concept and project model is proven by research cases, publications, professors' classes, and student orientations, which can be different ways of sharing the knowledge acquired through these and other experiences and cases, that in that way, could also be extended to the academy or relevant studies or science related to the theme SDC and sustainable visions of projects. Other contributions are related to sustainable city management that involves its citizens, municipal servants, public managers, and other actors interested in these subjects' increasing transparency and active citizenship. Finally, government best practices can be shared with other cities, stimulating conceptual reflections on their sustainable practical realities. Furthermore, with the results obtained in the eleven theses analyzed, the contribution extends to the multidisciplinary nature of knowledge in cities and the challenges of sustainable urban development.

Although smart city projects have a different concept and objectives than SDC, this research can contribute to current and future studies in the smart city area, relating the results obtained with the strategic and management vision of smart city projects in different cities and countries, respecting their technological and sustainable policies.

The research limitations are that the SDC multiple projects presented do not meet all existing municipal themes, making it a suggestion for future research to explore other potentialities of current SDC multiple projects. On the other hand, the SDC original concept and project model [3] cannot be generalized and applied in all cities, requiring specific projects and mainly action research to monitor the progress of the proposed projects, because they have economic, environmental, cultural, social, and among others sustainable differences, including the relevant legislation of each city and country

Future works can be suggested, emphasizing the research limitations, as the sustainable urban management is evolving rapidly; so, other action research can be developed, considering new technological and innovative, yet sustainable, advances.

The conclusion reiterates that the set of SDC multiple projects applied in cities refers to a theoretical–empirical interdisciplinary debate present, in urban management areas, public innovation, and public administration, with a focus on studies engaged in the scope of government and democracy at the local level. This debate also includes the city strategies and information used based on municipal themes by public managers, based on the principles of sustainability, but not only on information technologies. Then, different from the conventional concept of the smart city, the SDC concept has been maintained regularly over the years, so it is one contemporary concept, with international research in different countries that considers sustainability approaches, effectively assisting city management projects through the planning and execution of sustainable strategies and short, medium, and long-term actions in cities, making public space participatory and democratic, with transparency, effectiveness, and sustainable governance.

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