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STRATEGIC DIGITAL CITY: BRAZILIAN CASES[1]

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Abstract

Cities and their citizens interact socially through information and public services, physically or digitally, preferably based on city strategies that use information technology resources. The objective is to analyze city strategies, city information, public services, information technology resources, and relationships with strategic digital city (SDC) subprojects. The research methodology includes action-research in the cities of Rio de Janeiro and São Paulo, using a qualitative and quantitative research protocol, based on two case studies. The results obtained, based on the hundred numbers of items mapped and analyzed, revealed the existence of non-formal SDC projects, but with particularities relevant to each city. In Rio de Janeiro, 17 strategies were identified among 7 different municipal themes. In São Paulo, 56 strategies were identified among the municipal 18 different themes, portraying their respective similarities and divergences analysis. The conclusion reiterates the relevance of the aforementioned subprojects as processes of citizen democratization and constitute city public policies as a form of urban management, contemporary and innovative, where citizens can have a better quality of life and city management can be more appropriate.

Keywords: Digital City; Information Technology Resources; Public Policies; Public Services; Urban Management.

Resumo

As cidades e os seus cidadãos interagem socialmente por meio de informações e serviços públicos, de forma física ou digital, preferencialmente com base em estratégias da cidade que se utilizam dos recursos da tecnologia da informação. O objetivo é analisar estratégias da cidade, informações da cidade, serviços públicos municipais, recursos de tecnologia da informação e suas relações com subprojetos da cidade digital estratégica (CDE). A metodologia da pesquisa contempla uma pesquisa-ação nas cidades do Rio de Janeiro e São Paulo, utilizando um protocolo de pesquisa qualitativo e quantitativo, baseado em dois estudos de caso. Os resultados auferidos, a partir dos números de centenas de itens mapeados e analisados, revelaram a existência de projetos de CDE não formais, mas com particularidades pertinentes a cada cidade. No Rio de Janeiro, foram identificadas 17 estratégias entre 7 diferentes temas municipais. Em São Paulo, foram identificadas 56 estratégias entre os 18 diferentes temas municipais, retratando suas respectivas análises de semelhanças e divergências. A conclusão reitera a relevância dos referidos subprojetos como processos de democratização cidadã e se constituem em políticas públicas municipais como uma forma de gestão urbana, contemporânea e inovadora, onde os cidadãos podem ter mais qualidade de vida e a gestão das cidades pode ser mais adequada.

Palavras-chave: Cidade Digital; Gestão Urbana; Políticas Públicas; Recursos de Tecnologia da Informação; Serviços Públicos.

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INTRODUCTION

Cities and their citizens interact socially through information and public services, physically or digitally, preferably based on city strategies that use information technology resources, which advocate the concept, model, and subprojects of a strategic digital city, although not only information technology resources are relevant, all cities, in addition to being physical, are also digital, requiring the use of information technology resources for part of their functioning.

To offer adequate quality of life to citizens, even if the city does not have formalized participatory and democratic strategic planning, strategies, information, and public services are permanent challenges. Thus, city management tends to be more appropriate, requiring the participation of all citizens and respective public and private institutions, including social, environmental, financial, and political approaches. One of the ways to contribute to these challenges is through the collective, participatory, and formal elaboration of a strategic digital city (SDC) project, with 4 subprojects: city strategies, city information, public services, and information technology resources, where these assumptions, concepts, respective legislation, must be widely discussed, understood, and participative disseminated. Dialogues in cities suggest strategic projects with relevant public policies, in physical and digital approaches, but not based on partisan policies, but rather, emphasizing the needs of society in a democratic, participatory relationship. modern and inclusive of citizens and with the effective involvement of public managers.

On the other hand, smart and digital technologies are being instruments to facilitate city management and policies to democratize data, information, and services to citizens. Also, Cities called technologically innovative require the collaborative participation of all social actors and respective public and private organizations in the city.

Research problems reiterate that in cities there is frequent informality or lack of planning and management of urban strategies, city information, and public services to citizens through information technology resources, hindering the democratic and participatory management of cities through policies appropriate public policies, and sometimes disregarding citizens. In most cities, actions are short-term, long-term projects are rare, urban indicators are fragile, sustainability leaves something to be desired, technological innovations are not prioritized, and the public services offered do not always satisfy citizens.

Thus, the problem-question research emphasizes: city strategies, city information, public services, and information technology resources have relationships with strategic digital cities (SDC) subprojects?.

The objective is to analyze city strategies, city information, public services, information technology resources, and relationships with strategic digital city (SDC) subprojects.

Research justifications are based on the positive results and benefits obtained for citizens and city management, especially when social, political and technological investments are made that involve planning and managing municipal strategies, city information, public services for citizens and resources information technology, as well as when long-term actions in cities meet all the needs of society. The appropriate use of available digital technologies can minimize the social, economic, political, and environmental challenges of cities, as well as digital projects and strategic visions applied in cities, can provide more inclusive, effective, participatory, transparent, and democratic local management, as a consequence, decisions become more appropriate, generating greater well-being for everyone.

STRATEGIC DIGITAL CITY

The strategic digital city (SDC) concept is different from the smart city concept because its main focus is the technology and offering the Internet to citizens through conventional telecommunication resources (AHVENNIEMI, *et al*., 2017; ESASHIKA, MASIERO; MAUGER, 2021).

Essentially, SDC is based on the city's strategies to meet the objectives of the different city public thematic or municipal functions (REZENDE, 2023). The SDC concept coined by Rezende (2012), can be understood as the application of information technology resources in the management of cities and also in the information and services provided to citizens, based on the strategies of city management.

City public thematics or municipal functions are the macro activities present in all cities (or municipalities), they are not city areas and they are not municipal departments. Examples of city public thematics or municipal functions: agriculture; science, technology, and innovation; dissemination or marketing or commerce; culture; education; sports; housing; industry; legal affairs; leisure; logistics or materials; environment; health; sanitation; security; social; transit or transport or mobility; tourism; urban; and rural. Each one can be divided into modules or subsystems, which can also be called municipal affairs or subject, theme, or issue systematized and integrated (REZENDE, 2018).

The SDC can also be understood as a public policy for city management and urban planning (REZENDE; PROCOPIUCK; FIGUEIREDO, 2015). The SDC concept, model, and projects in different cities, have been consolidated in national and international literature for decades (REZENDE, 2016; FLORES; REZENDE, 2018; RIBEIRO; REZENDE; YAO, 2018; ALMEIDA; REZENDE, 2021;

FUMAGALLI; REZENDE; GUIMARÃES, 2021; FLORES; REZENDE, 2022; FUMAGALLI; REZENDE; GUIMARÃES, 2022; TEIXEIRA; REZENDE, 2023; REZENDE, 2024).

STRATEGIC DIGITAL CITY AND FOUR PROJECTS AND SUBPROJECTS

SDC is divided into four subprojects: city strategies (to achieve the city's objectives); city information (to assist in the decisions of citizens and city managers); public services (to increase the citizens' life quality); and information technology resources applied in cities (REZENDE, 2023).

For the adequate implementation of the SDC model (REZENDE, 2012) 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.

City strategies can be understood by means, pathways, or ways to achieve the city's objectives, and are also relevant in the development and execution of city strategic planning (REZENDE, 2012). The city's strategies come from the city's objectives and the city's analyses, and as a consequence, they generate actions in the cities, composing the city's strategic project, or global comprehensive city plan (ALIZADEH, 2017; MASIK; SAGAN; SCOTT, 2021; LEÃO *et al*., 2023; REZENDE, 2023).

City information can be understood as an entity with a meaningful value attributed or added to it and has a natural and logical sense for different uses by citizens and city managers to assist their respective decisions and further actions (REZENDE, 2012). The information comes from the city's data, and as a consequence, using or not using information technology resources, can facilitate decisions in the city, whether by citizens or public managers, composing the city's information project and its respective information systems (KITCHIN, 2014; BARTH *et al*., 2017; REZENDE, 2023). It also contributes to the elaboration and execution of innovative public policies (ARVIDSSON; HOLMSTRÖM; LYYTINEN, 2014; GALLAUGHER, 2018; LEE, 2023).

Public service can be understood as any service provided by the government, including cities, or by delegates under state standards and controls to meet the essential needs of the community or secondary or simple convenience of the State (REZENDE, 2012). In the city come from the needs of citizens so that their desires, mainly social, economic, and well-being, are accommodated, forming part of the city's public services project, preferably using the facilities and resources of information technology (LEONTEVA, *et al*., 2018; RAHIM; SHIRAZI, 2018; CHEN; WALKER; SAWHNEY,

2019; MOREL; NUAMAH, 2019; ALLEN *et al.*, 2020; MEIRELLES, 2020; CHEEMA, 2020; REZENDE, 2023; WITESMAN, WALTERS; CHRISTENSEN, 2023).

Information technology can be understood as computational and technological resources for data storage, generation, and use of information, based on four components: hardware and its devices and peripherals; software and its resources; telecommunications systems; data and information management (LAUDON; LAUDON, 2021; REZENDE, 2012; STAIR; REYNOLDS, 2017). The information technology project is the last project to be developed in the city, as it must be based on the three other projects, constituting a modern instrument suitable for all citizens' needs, respecting the reality of each city (WEBSTER; LELEUX, 2018; TOMOR *et al*., 2019; ENGIN *et al*., 2020; TURBAN; POLLARD; WOOD, 2021; REZENDE, 2023).

RESEARCH METHODOLOGY

The research methodology includes action-research in the cities of Rio de Janeiro and São Paulo, since 2019, using a qualitative and quantitative research protocol, based on two case studies.

The research method mixed different qualitative and quantitative research techniques in respective phases. The Literature Review was prepared through a bibliometric study (MORIN; OLSSON; ATIKCAN, 2021).

The research phases were: preparing data; collecting data; analyzing data; and documenting data. Also, different resources were used in the research analyses, integrating multiple approaches explained by eclecticism and integration of inseparable methods. The observation unit was the city documents and websites of the respective city governments, which were analysed through participative observation, including visits by the researcher to the respective cities (YIN, 2017; NACHMIAS; NACHMIAS, 2020; NICHOLS; EDLUND, 2023).

In addition to the research method, the data collection procedures were developed through a research protocol. The research protocol consisted of four subprojects of the strategic digital city concept and model. The research variables included: city strategy name; municipal themes name; and research source name. The qualitative and quantitative analyzes of the research variables were formalized. The primary and secondary data used, as well as the observation unit, were city hall websites, formal city documents, formal current legislation, and respective existing subprojects.

Such methodological procedures are in line with the fact that cities and SDC projects require applicable public policies (REZENDE; PROCOPIUCK; FIGUEIREDO, 2015; SENHORAS; NASCIMENTO, 2022). The research period ended in December 2023.

RESEARCH RESULTS

Rio de Janeiro analysis

Since 2019, In Rio de Janeiro, 17 strategies were identified among the municipal themes: environmental (6), government (3), social (3), health (2), finance (1), education (1), and safety (1).

These are the respective city strategies: 1. End poverty in all its forms, everywhere; 2. End hunger, achieve food security improve nutrition, and promote sustainable agriculture; 3. Ensure a healthy life and promote well-being for all, at all ages; 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all; 5. Achieve gender equality and empower all women and girls; 6. Ensure the availability and sustainable management of water and sanitation for all; 7. Ensure reliable, sustainable, modern, and affordable access to energy for all; 8. Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all; 9. Build resilient infrastructures, promote inclusive and sustainable industrialization, and foster innovation; 10. Reduce inequality; 11. Make cities and human settlements inclusive, secure, resilient, and sustainable; 12. Ensure sustainable production and consumption patterns; 13. Take urgent action to combat climate change and its impacts; 14. Opportunities for the conservation and sustainable use of oceans, seas, and marine resources for sustainable development; 15. Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss; 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels; 17. Strengthen the means of implementation and revitalize the global partnership for sustainable development.

São Paulo analysis

Since 2019, In São Paulo, 56 strategies were identified among the municipal themes: administration (7), education (7), government (6), science and technology (4), culture (4), health (4), social (4), sports (3), safety (3), services (3), environment (2), planning (2), urban (2), finance (1), legal (1), leisure (1), mobility (1), and rural (1).

The city's strategies were developed based on municipal themes. It is the same dynamic used in other Brazilian cities. It should be noted that they may vary from municipality to municipality, including or excluding themes according to the current government. The 56 strategies are, therefore, arranged into

18 thematic categories, with the following themes: administration (7), education (7), and government (6) having the greatest number of strategies adopted. The city planning is, therefore, based on municipal themes that can change over the 4 years of government. This dynamic is not anchored in long-term strategies, but in the short-term, where the focus is on the vision of political parties. Thus, every 4 years the strategies change dramatically.

Similarities and divergences analysis

In both cities, all city strategies (SDC subproject), directly or indirectly, are related to the other SDC subprojects (city information, public services, and information technology resources).

There are 3 sources of strategies in the Brazilian reality: 1) Annual Pluri Plan - focus on the public budget (municipal spending); 2) Master Plan - created for municipalities with more than 20 thousand inhabitants, physical-territorial view; and, 3) Government Plan - set of mayor intentions for 4 years of management, partisan view.

In Brazil, there is no specific and formal municipal strategic planning and, equally, there is no articulation of strategic planning with the local government plan. The strategies come from multiple urban facets that are not integrated, with each other. In addition, there is a lack of organization in the strategies of the Brazilian reality. The ideal in a developed country is that strategies are created based on comprehensive and inclusive strategic planning.

Another point is that in Brazil there is no formal strategic digital city project, although it includes the 4 strategic digital city subprojects. In this case, there is still a lack of articulation between the 4 strategic digital city subprojects in the Brazilian reality.

In 2023, the strategies are emphasizing municipal themes of security, health, education, mobility, technology, and environmental sustainability.

Action research, in both cities, has been mapping and analysing more than 200 city information distributed among different municipal themes. And more than 100 public services, that is digital services using information technology resources, allowing citizens to interact with different government institutions and public organizations. Public services were mapped and analysed premised on the fact that public services should be transactional to differ from the information.

In terms of information technology resources available, the following stand out: Web, telephone, APP (smartphones), and Wi-Fi in cities, including physical spaces available to citizens.

DISCUSSION

Technology alone can be much more disruptive than providing a better quality of life to citizens. In the reality of the 2 cities, it is observed that the use of information technology resources strengthens social polarizations, as an inclusive public policy, allowing for more social equity, mainly by providing timely information and adequate public services to citizens. Such challenges are based on the strategies and objectives of both cities: quality of life for citizens.

The challenge remains in maintaining the city's strategies and respective public services and city information, beyond the 4 years of government, and with a long-term vision, maintaining the integrated city strategies that have been adequately achieved and expanding public services with opportune information with quality and at the timely moment of citizens' need.

It is necessary to move forward in the non-adoption of municipal themes exclusively focused on technology, much less, in the non-continuity of the appropriate city strategies of a government and excluded by the next government without relevant justification, leaving aside the purely partisan and individual political differences of mayors and governors. The focus must always be on the needs of citizens, focusing on solutions for all municipal issues and involving long-term visions.

The action-research demonstrated that from 2019 to 2023, the two cities seek to implement their city strategies and guidelines, their respective SDC subprojects, providing information and public services with information technology resources to the citizens who reside there, as well as to the citizens of respective metropolitan regions, constituting a governmental public policy, not just municipal policy.

CONCLUSION

Information and public services with strategies play an unquestionable role in cities that care about their citizens, providing opportunities for the strategic use of information technology resources.

The democratization and development of the two cities constitute a continuous challenge where the city's strategies, with their long-term planning, cannot focus only on short-term plans. The coherent satisfaction of citizens requires integrated projects across all municipal themes, demanding the appropriate use of information technology resources in both cities and as a consequence, the generation of unquestionable information and public services. In this context, the four SDC subprojects constitute fundamental resources.

With action-research in development, it is observed that public policies for structuring strategic digital city subprojects are being implemented at local and regional levels, aiming to formalize strategies

to improve public management processes and foster citizenship through planning, structuring, storing, and making available information and public services. As a public policy based on the strategies of the two cities, the concept, model and strategic digital city subprojects applied constitute a participatory tool.

Regarding the research objective, the action-research identified, mapped, and analyzed the SDC subprojects through the variables city strategies, city information, public services, and IT resources, describing the qualitative and quantitative results.

The results obtained demonstrate that quantitatively São Paulo offers more items compared to Rio de Janeiro, but these numbers do not distance the fact that both cities are in full development of their public policies inclusive of citizens in the parallel management of the cities in terms of strategies, information and public services. Qualitative analyzes show that the results are convergent, highlighting the democratization of access and use of information in cities and the use of public services offered. Furthermore, the advancement of intelligent and digital technologies has generated new opportunities in the way in which the two cities are planned, managed, and governed, facilitating communication between citizens and government, in the form of government public policy, mainly in physical spaces for citizens, in the social networks and other IT resources available.

The research contributions highlight action research in development since 2019, where urban management is applied in practice in two cities through studies of the 4 SDC subprojects, deepening academic and reality understanding of the topics researched. For the management of the two cities, the research has contributed to the generation of action research reports and the exchange of results between them, sharing knowledge of the results obtained. For the academy and the relevant studies of the aforementioned researched topics, the contribution lies in the methodological aspects, where science and research protocols are used and shared between managers and citizens of the two cities, between national and international researchers, and among involved students. For research topics, the contribution lies in research reports and scientific publications, open to interested parties. In this way, all citizens benefit from the results available, through monitoring the indicators of the cities involved.

Scientific limitations formalize that this research cannot be generalized to all Brazilian cities, as each city has its different reality and respective relevant public policies. Future work is aimed at continuing action-research and including other similar cities.

The conclusion reiterates the relevance of the 4 SDC subprojects as processes of citizen democratization and constitutes city public policies as a form of urban management, contemporary and innovative, where citizens can have a better quality of life and city management can be more appropriate.

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