

INNOVATIVE SOLUTIONS IN PUBLIC ADMINISTRATION: A METHODOLOGY FOR PUBLIC SERVANTS AND INNOVATION PURCHASE NOTICES



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ABSTRACT

The article presents a new methodological approach as an innovative tool, highlighting the importance of public procurement for innovation (CPI) as an essential strategy to promote innovation in the public sector (ISP) and face complex challenges. The research is practical and applied, supported by a literature review. The mixed approach combines qualitative and quantitative methods to evaluate the effectiveness of the methodology in training public servants to participate in innovative procurement calls. The research is based on benchmarking of global practices, technological prospecting, and trend mapping, demonstrating the application of the methodology in the case of intrapreneurship. The results show that the proposed methodology not only improves CPI practices but also promotes a culture of innovation and collaboration between public agencies and partners. In addition, it identifies barriers and suggests directions for future studies, highlighting the strategic role of CPI in strengthening public management.

Keywords: Innovative Solution Contracts. Innovation Management. Innovation in the Public Sector.

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INTRODUCTION

Public procurement, traditionally focused on the acquisition of goods, works, and services on advantageous terms, has undergone a significant transformation. Today, it assumes a strategic role, responding to the need for innovation in the public sector and incorporating horizontal policy objectives such as regional development, social return, and sustainability. In this context, innovation is essential for technological development, competitiveness, and economic growth, as well as being a response to complex challenges such as climate change, energy transition, and the creation of digital governments. This scenario has driven interest in public procurement for innovation (PPI), an approach that uses public demand to stimulate innovation in the private sector (OECD Publishing, 2011; V. Lember et al., 2014).

Stimulating innovation through public procurement, the aim is not only to meet government demand but also to achieve strategic organizational goals in areas such as public safety, health, transport, and energy. Public procurement for innovation is therefore a tool that allows public organizations to integrate internal knowledge and expertise and that of private companies to develop innovative and long-term solutions.

Public intrapreneurship has emerged as a fundamental element in this process, promoting the development of internal technological solutions that meet the growing demands of public administration and its citizens. As defined by the National School of Public Administration (ENAP), public intrapreneurship consists of encouraging civil servants to innovate within the public sector, creating effective and creative responses to organizational challenges. With the ability to improve the efficiency and adaptability of institutions, public intrapreneurship offers an essential path for governments to remain agile and efficient in implementing solutions that benefit society as a whole.

In 2019, Brazil allocated approximately R\$710 billion to public procurement, representing 9.2% of GDP, while the budget for the National Fund for Scientific and Technological Development (FNDCT) in 2022 was approximately R\$8.6 billion (IPEA, 2022). These figures highlight the magnitude of the resources allocated to public procurement and the need to explore their potential to drive innovation.

Given this scenario, the article proposes a new practical and replicable methodological approach to strengthen innovation management in public procurement of innovation. This solution consists of a toolkit composed of three main components: the

Playbook, the Future Step, and the Application Paths, providing tools to structure strategies aimed at facing the challenges of innovative procurement in the public sector.

LITERATURE REVIEW

PARADIGM SHIFT: THE REVOLUTION OF PUBLIC PROCUREMENT OF INNOVATION IN THE GLOBAL CONTEXT

The implementation of public procurement of innovation, as defined by (Edquist et al., 2012), implies a true revolution in the way public agencies acquire products and services. The need for this paradigm shift becomes evident in light of the various forms that innovation can take, which do not always involve the creation of something completely new (Edler et al., 2006). Furthermore, the potential impact of this innovation on the public sector and its interactions with the private sector should be duly considered (Carayannis et al., 2018).

A study by the European Research Area and Innovation Committee (ERAC, 2015) highlighted the urgent need for reform, indicating the low use of innovation procurement in the European Union, particularly by small and medium-sized enterprises. This suggests a need for assessment and change in procurement practices and the environment surrounding them (Timmermans et al., 2013).

In addition, barriers to innovation procurement, such as the lack of skills on the part of buyers, need to be addressed. This involves more in-depth knowledge and appropriate organizational arrangements, as well as overcoming excessive specifications that may limit the freedom of supplier companies (Uyarra et al., 2014).

The importance of the paradigm shift is even more pronounced when we consider the impact that innovation procurement can have on knowledge-intensive entrepreneurship (KIE) (Carayannis et al., 2018). Similarly, given the high levels of corruption associated with procurement, it is clear that careful and transparent reform is needed (International Budget Partnership, 2021; Transparency International, 2021).

The potential for economic and competitive transformation through public procurement reform is a key issue for developing countries (World Bank, 2017). As innovative procurement practices become more common, one can expect to see increased interest and commitment in re-evaluation of the transformative potential of such initiatives. However, this requires a long-term commitment and the willingness to engage in a process of continuous learning and critical reflection on current practices (Edler et al., 2012).

INNOVATION OF PUBLIC PROCUREMENT STRATEGIES TO DRIVE INDUSTRY 4.0 IN THE PUBLIC SECTOR

IPC, as a general category: involves the development of entirely new products through creative processes that include technological applications, cooperation, and interactive learning between the organization and the market. It differs from regular public procurement by its qualitative differences in performance.

The following is the classification of modalities and subtypes of IPC standard international (OECD, 2021):

- Innovation Public Procurement: In this case, a public agency or unit places an order for a product with specific functions, but which does not yet exist on the market at the time of the order;
- Innovation-Friendly Regular Procurement: Regular public procurement is conducted without excluding or hindering new innovative solutions. It allows the inclusion of innovations or approaches without compromising the standard purchasing process;
- Innovation-Catalytic Public Procurement: This approach acts as a “catalyst” for the development of innovations intended for broader use, not just to meet the immediate needs of the contracting organization. The main objective is to mitigate global challenges;
- Direct Public Procurement of Innovation: These acquisitions do not require a bidding process and can be both incremental and radical;
- Pre-Commercial Procurement (PCP): Although they are not considered innovation public procurement, as they do not foresee commercialization, PCPs are a type of public procurement that does not involve the acquisition of a certain number of non-existent products. The only interest is Research and Development (R&D) efforts.
- Pre-Commercial Procurement of Innovation (PPIs) and Technology Orders: These are effective instruments that governments can use to acquire and implement emerging technologies. Through PPIs, governments can share the risks and benefits of innovation with private providers, stimulating the development of innovative solutions to public problems (OECD, 2017). Technology procurement, on the other hand, allows governments to incentivize innovation by commissioning the development of new technologies or solutions that do not yet exist on the market.

The advent of Industry 4.0 signals a fundamental shift in the way technology is incorporated, with applications ranging from mass production to the delivery of government services. As the primary purchaser in many economies, the public sector has a crucial role to play in promoting the adoption of emerging Industry 4.0 technologies through its public procurement of innovation policies (CPIS) (Uyarra et al., 2010).

A notable example is the city of Barcelona, which adopted a Public Procurement of Innovation (PPI) approach to implement IoT-based solutions to transform the city into a “smart city”. The project included installing sensors throughout the city to monitor everything from air quality to the use of public infrastructure. The initiative not only improved the quality of life in the city but also stimulated innovation by encouraging local companies to develop and implement new IoT technologies (Bibri & Krogstie, 2020).

Just as the city of Barcelona exemplifies the transformative power of Public Procurement for Innovation (PPI) by implementing solutions for a smart city, the methodology proposed in this article aims to systematize and expand these practices. The methodological approach presented aligns with the various modalities of PPI, highlighting how the public sector can adopt specific strategies to foster innovation and technology. This methodology offers public servants a structured model to explore, adapt, and implement strategic innovations, strengthening the public sector’s capacity to face contemporary challenges.

DIGITAL GOVERNMENTS AND INNOVATIVE PURCHASES

Brazil has faced delays in adopting technology for the benefit of citizens and in the digitalization of public procurement processes. Although we have the fourth largest connected population in the world, we only rank 44th in the E-Government Survey of digital governments, according to the United Nations (UN, 2022).

Innovation in public policies, specifically innovative procurement, has been strongly impacted by the global context of transformation and convergence of rules and procedures. This transformation is driven by the digitalization of governments, the globalization of markets, and initiatives for economic integration and trade openness (Arrowsmith et. al. 2003).

In addition, to the trend toward digitalization of governments, marketplaces in public procurement are becoming increasingly relevant. Es, creating opportunities for public

institutional businesses. This trend is a reflection of the advancement of digital technologies and the growing demand for more efficient and accessible public services.

In addition, Decree No. 10,996 of 2022 defines the Digital Government Strategy for the period 2020 to 2022, with application in all entities and bodies of the direct, autonomous, and foundational federal public administration. The strategy aims to accelerate the digitalization of public services throughout the country, responding to the growing demand for the transition to digital and efficiency in the public sector.

In this scenario of accelerated digitalization of governments, marketplaces for public procurement are becoming an increasingly important part. These online spaces represent new opportunities for public institutional businesses, reflecting the advancement of digital technologies and the demand for more efficient and accessible public services.

OPEN GOVERNMENT AND PUBLIC PROCUREMENT: ENHANCED INNOVATION THROUGH DEMAND-DRIVEN POLICIES

There is a general understanding that demand-driven innovation policies offer an opportunity for a more strategic use of the government's purchasing power. With the implementation of public procurement, there is a chance not only to encourage business innovation but also to improve public services offered to society.

The concept of "open government", as presented by (Noveck, 2009), refers to a governance paradigm that prioritizes transparency, citizen participation, and collaboration. This concept is at the heart of significant international debates, with the United States and the United Kingdom leading the discussions.

In September 2011, the Brazilian government, together with seven other countries (Indonesia, Mexico, Norway, the Philippines, South Africa, the United Kingdom, and the United States), initiated the Open Government Partnership (OGP). This movement, which now includes 67 countries, marks a commitment by national governments to promote transparency, combat corruption and increase citizen participation. Each country has outlined a national action plan to achieve the OGP objectives, using Information and Communication Technologies (ICTs) to make governments more accountable, open, and effective. Brazil is currently implementing its first action plan and developing a second (Open Government Partnership, 2015).

PUBLIC SECTOR INNOVATION – ISP

Public Sector Innovation (ISP) is fundamental to improving services provided to society. As defined by (Mulgan; and Albury (2003); and Albury 2005), it involves the creation and implementation of new processes, products, services, and methods that result in improved performance in the public sector.

Interest in PSI has grown among politicians and government officials throughout the formation of the modern State, including in Brazil, in response to the socioeconomic and environmental challenges faced in the national territory and international relations. PSI often arises from the need to solve problems of public interest, generally led by individuals with entrepreneurial characteristics in the public sector. This point of view is aligned with the work of (Roberts; and King, 1992; 1991), who describe entrepreneurship in the public sector as a process of introducing innovations in organizations and public policies, with the figure of the entrepreneur and innovator at the center of this process. In the public sector, innovation can be understood as the creation of new, or the improvement of existing, means to generate public value for society (OECD, 2017). This perspective is aligned with the thinking of (Schumpeter, 1982), which is of great importance in innovation studies. According to Schumpeter, innovation can be a new creation or an improvement in the productive and social environment that results in new products, services, or processes. Alternatively, innovation may also involve adding new features or characteristics to an existing product, service, or process, generating improvements and real gains in quality or performance.

Brazil has shown a strong interest in innovation in the public sector, as demonstrated by the signing of the Declaration on Innovation for the Public Sector in 2019 and its desire to become a member of the OECD in 2017. However, obstacles such as excessive bureaucratization, a risk-averse organizational culture, and a lack of investment in research and development can limit the implementation of innovations. To achieve its innovative potential, Brazil needs to overcome these challenges through a broad transformation that fosters a culture of experimentation, streamlines bureaucratic processes, and encourages collaboration between the public and private sectors.

REGULATORY FRAMEWORKS AND TYPES OF INNOVATION POLICY FOR INNOVATIVE PROCUREMENT

In Brazil, recent legal frameworks have been instituted to support this trend. Innovation. Among them, the following stand out:

1. Law No. 14,133/2020, which establishes the new law on Public Tenders and Contracts, represents an important regulatory advance to improve the efficiency and transparency of public sector procurement processes.
2. Decree No. 10,996 of 2022 establishes the Digital Government Strategy for the period 2020 to 2022, applicable to bodies and entities of the direct, autonomous, and foundational federal public administration. This strategy seeks to accelerate the digitalization of public services throughout the country.
3. The New Legal Framework for Startups, LC No. 128/2021, which establishes the legal framework for startups and innovative entrepreneurship. This legal framework supports the development and acquisition of innovative technological solutions, especially those that can contribute to the digitalization of public services.
4. Law No. 12,598/12, which establishes special rules for purchases, contracts, and development of defense products and systems; provides rules for incentives for the strategic defense area; amends Law No. 12,249 of June 11, 2010; and contains other provisions.
4. Law No. 10,973/2004, which provides incentives for innovation and scientific and technological research in the production environment and contains other provisions. It represents the main legislation for public acquisition of innovation in Brazil, enabling the public sector to make direct contracts, dispensing with the bidding process, to conducting research, development, and innovation (RD&I) activities.

When the legal aspects are taken together, what is observed is a recognition of the special nature of the innovative process and its relevance as a means for solving problems. (Rauen, 2022)

As for innovation policy tools and their legal instruments related to the types of public procurement contracts for innovation or “procurement for innovation”, there are two main approaches, according to (Rauen, 2015):

- Pre-commercial purchase (PCP): focuses on research and development (R&D) to address specific challenges through procurement. This approach aims to generate knowledge through these acquisitions, prioritizing development over research.
- Public Innovation Policy (PPI): here the public sector acquires products and services intended to meet market demands. Through these acquisitions, innovation can be stimulated, as pointed out by (Rauen, 2015).

These innovation-demand policies, aligned with the legal framework, have the potential to improve the quality of public services and ensure the strategic and developmental use of public resources. With this, it is also expected to foster interaction between governments and markets in the creation and implementation of innovative solutions.

IMPLEMENTING INNOVATION IN PUBLIC PROCUREMENT: EVOLUTION OF INNOVATION DEVELOPMENT THEORIES

The development and promotion of innovation have been central themes in numerous studies and theories over the last decades. The Triple Helix Theory, proposed by Etzkowitz et al. (2000), stands out as an important model in this context, proposing an interactive synergy between universities, industry, and government to effectively catalyze innovation. Each of these actors contributes its expertise, resources, and perspectives to the interaction, stimulating a positive feedback loop that drives innovation. Applying the Triple Helix Theory to the context of public procurement reveals new possibilities for innovation. Research by (Rolfstam, 2009; Uyerra, 2010) shows how the experience and knowledge of universities can inform and enrich government procurement decisions, while industry, by providing goods and services, has the potential to introduce innovations. The government, in turn, holds the authority to enact policies that stimulate innovation in the public procurement sector.

The evolution of the socioeconomic and technological landscape has led to the emergence of the quadruple helix concept, proposed by (Carayannis; and Campbell, 2009), which adds the dimension of civil society as a fourth element of collaboration and innovation. The quadruple helix recognizes the importance of active participation and involvement of citizens, civil society organizations, and other relevant groups to promote innovation more comprehensively and inclusively. This evolution represents a paradigm

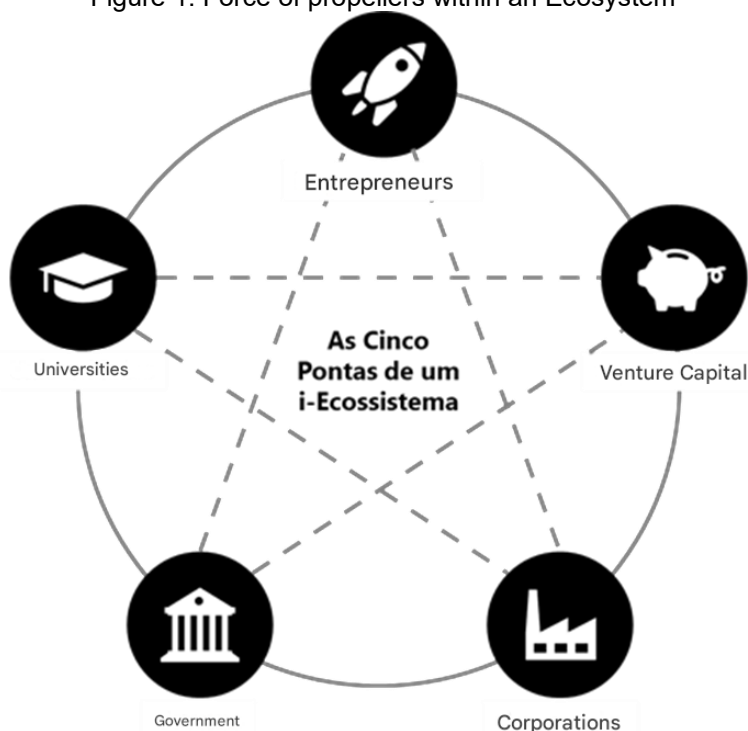
shift in the way innovation is conceived, valuing expanded collaboration and co-creation of solutions to address contemporary socioeconomic challenges (Etzkowitz; Leydesdorff, 2000; Carayannis; Campbell, 2009);.

However, the diffusion of innovation in public procurement presents its challenges. (Edquist ; Zabala; Iturriaga; Goitia, 2012) Identified several barriers, such as resistance to change, lack of knowledge about innovations, and regulatory bureaucratic limitations. However, they also highlight the ability of the helix force theory to help overcome these obstacles, as collaboration within an i-ecosystem of digital government has dynamic transformative capabilities.

There is concrete evidence of the success of the diffusion of innovation in public procurement through the application of the theory of the force of helices. (Lember; Kattel; Kalvet, 2011) Provided a valuable analysis through a case study in Europe, where a government agency successfully implemented a new energy efficiency technology.

The implementation was facilitated by the collaboration between the government agency, a university, and a technology company. Certainly driven by the strength of venture capital investment and strategic partnerships with other corporations. As evidenced by the Figure below. Demonstrating the evolution towards the fifth helix with the five actors necessary for the formation of an i-Ecosystem: Universities, Governments, Corporations, Entrepreneurs, and Venture Capitalists.

Figure 1: Force of propellers within an Ecosystem



Mendonça, H. (2022). Who's who in the formation of innovation ecosystems? MIT Technology Review Brazil. Retrieved from: <https://mittechreview.com.br/quem-e-quem-na-formacao-dos-ecossistemas-de-inovacao/>

METHODOLOGY

The methodology used in this article is a mixed approach, combining qualitative and quantitative methods to assess the effectiveness of the solution in training public servants for innovative procurement tenders. Using an applied typology, it sought to generate a practical and multidimensional solution, integrating research and development techniques with practices of public procurement policies for innovation observed globally. This combination aimed to develop a methodology that would enable strategic innovation in the public sector, anchored in international experiences and adjusted to the specific context of Brazilian public administration.

In addition, the methodology was developed using several techniques, each contributing with a specific perspective to the proposition of the innovative solution in public procurement for innovation. First, International Benchmarking (Camp, 1989; Spendolini, 1992; Zairi, 1995) helped identify global excellence practices, with an initial analysis of the databases eafip.EU (European Union), upphandlingsmyndigheten.se (Sweden), and acqirc.org (United States), resulting in the segmentation and selection of the most relevant methodological studies. Next, Technology Foresight (Dodgson et al., 2015), through patent analysis and modeling, brought insights into innovation trends, using Spacenet data to

guide the development of innovative strategies. Trend Mapping (Cornelius et al., 2017) applied a structured approach to monitor technological advances and design solutions to meet emerging demands in the public sector. Using the Answer the Public technique (Christensen, 2015), a survey was conducted to understand the public's questions and needs regarding public procurement of innovation in Brazil. This approach revealed limited knowledge on the topic, especially about the 'technology orders' modality, indicating that the dissemination of information in this field is still insufficient.

Finally, meetings were held with experts (O'rourke et al., 2019), in which a creative framework was applied that included multi-agent brainstorming, allowing the selection of promising ideas to strengthen the design of the innovative solution.

DESCRIPTION OF THE METHODOLOGICAL SOLUTION FOR IMPLEMENTING INNOVATIONS IN PUBLIC PROCUREMENTS

The proposal presented in this article offers an accessible and replicable solution for innovation projects in public administration, specifically addressing the prospecting, experimentation and implementation of innovation strategies in public procurement (CPI). Structured to support project managers in innovative public procurement calls for proposals, it covers all the stages described in these calls for proposals: from identifying needs and developing the solution to proof of concept and eventual commercialization. The approach encompasses the initial diagnosis of challenges and requirements, through to implementation and possible adoption of the product or service developed.

This set of guidelines offers an end-to-end vision, covering everything from strategic planning to post-implementation and allowing for adaptations according to the particularities of each project and sector of public administration. The structure allows for iterative development and continuous learning, and is aimed at the entire spectrum of activities, such as challenges, pitches, hackathons and innovation competitions, promoting an adaptable approach to any type of public challenge. Flexibility makes it possible to adapt the solution to the various phases of a CPI call for proposals, from identifying complex needs to developing and executing strategies that meet specific requirements.

The approach emphasizes preparing for the long term, supporting managers in building realistic expectations and building capacity to face the incremental and prolonged nature of the process. With an iterative approach, managers can adjust development as

the project evolves, better dealing with the complexities and uncertainties of public innovation contracts.

Thus, the solution aims not only to offer technical support, but also to broaden the understanding of the process by the executors. A mindset of continuous adaptation and strategic vision is encouraged, helping managers to see challenges as opportunities for growth and strengthening innovation in the public sector.

To enrich the understanding of the proposed methodology, it is essential to consider the non-linear nature of the process of developing solutions in public innovation procurement. This approach follows a structure that involves the following principles:

First, it is suggested to incorporate the idea of "Missions" – that is, to structure each solution with a clear and transversal social objective, directed at specific challenges of public administration. This mission-oriented approach facilitates strategic alignment with public goals and needs.

In addition, it is recommended to formation of strategic partnerships. This collaboration with other organizations can amplify the scope of the mission, creating an environment conducive to shared innovation and resource optimization. Partnerships also help suppliers meet essential requirements, while maintaining the focus on creating solutions that truly impact.

Another central principle is the identification of needs, problems and functions. Before formulating a solution, the initial focus should be on an in-depth analysis of these elements, ensuring that proposals directly address the most urgent and complex challenges faced by public administration.

The methodology also proposes avoiding product specifications during the initial phases, encouraging managers to focus on a deep understanding of the challenges. This approach broadens the scope of innovation by encouraging managers to focus on the problem rather than a predetermined solution.

Finally, the importance of prioritizing the problem is emphasized. This guideline not only facilitates the adaptation of the solution to the reality of public administration, but also allows for the creation of proposals that are more aligned with the real demands of the sector.

These principles are translated into a set of practical resources, organized in the form of a Playbook, a Future Step and Application Tracks. The Playbook offers an overview of strategic topics, functioning as a reference guide that can be adapted to the specificities

of each project. The Future Step provides a repository of techniques and methods, based on global trends in innovation and technological prospecting. Finally, the Application Tracks offer specific support for the execution of public procurement innovation projects, being customizable to meet the objectives and needs of the challenges faced. In more detail, the Playbook serves as a strategic reference, addressing essential topics and providing a broad view of how innovation in public procurement has been consolidated. Divided into specific sections, it offers guidance and allows the content to be customized according to the specificities of each challenge, ensuring that managers access information adapted to their needs. The Future Step complements the Playbook with a detailed repository of international techniques, methods and practices. Here, managers have access to a collection of cases and tools that have been selected to facilitate the understanding of best practices and trends in public innovation. In addition to case studies, this repository includes a series of information on relevant players in the innovation ecosystem, allowing managers to acquire a solid foundation for practical and strategic application.

The Application Paths were designed to provide step-by-step guidance, necessary to implement solutions aimed at innovative public procurement notices. Adaptable according to the specific demands of each project, the paths allow targeted navigation through relevant content, promoting a systematization of knowledge and facilitating access to high-quality materials. Each path is planned to meet a specific challenge, guiding the manager from the initial stages to the completion of the project, always focusing on maximizing available resources and adopting good practices.

These three components are supported by fundamental pillars: Project, Time and People.

The Project pillar encompasses the ability to define themes, delimit problems and apply the appropriate tools, ensuring a targeted and strategic approach.

Time is a crucial consideration, since significant transformations can require years of implementation. The methodology emphasizes the importance of communicating realistic expectations and managing stages at different points in time – from preparation to post-intervention follow-up.

Finally, the People pillar highlights the role of “Agents of Transformation”, individuals who are engaged and qualified to lead innovative public procurement projects. This pillar addresses strategic capacity building, informed decisions and the development of a future-

oriented mindset, which are essential for the success of innovative initiatives in the public sector.

This integrated framework seeks to offer practical support to civil servants involved in intrapreneurship initiatives in public administration. The methodology emphasizes the development of essential skills to drive innovation within institutions, providing tools, guidance and a structured path that covers everything from initial formulation to implementation and impact assessment. By facilitating intrapreneurship, the creation of innovative and sustainable solutions that meet the needs of public administration is promoted, allowing civil servants to be protagonists of changes and improvements in the public sector.

ANALYSES ON THE APPLICATION OF THE SOLUTION METHODOLOGICAL APPLICATION

To demonstrate the applicability of the methodology proposed above, this section examines and demonstrates its application in a public project. The objective of the application is to examine the practice of the proposed method, evaluate the effectiveness of the innovative technological solution associated with it and prepare the solution for a public call submission, seeking to contribute to public intrapreneurship, in order to provide recommendations for the scalability of the public solution through innovative public procurement.

This application aimed to ensure impartiality and transparency, ensuring that its effectiveness and impact were not influenced by individual or institutional interests. The neutrality of the project is essential for its applicability in different contexts, subsequently enabling its scalability.

The requirements for choosing the project to be tested were:

1. Neutrality and Impersonality: Characterized as an innovative solution, with no direct ties to the team developing the method.
2. Applicability and Scalability: Guaranteed impartiality and transparency, allowing its application in different contexts and by different institutions and organizations.
3. Focus on Socioeconomic Issues: Aiming to positively impact society.
4. Ex Ante and Ex Post Control of Public Policy: Able to implement robust control mechanisms to assess and anticipate impacts, ensuring compliance with public objectives.

5. Involvement of Public Administration: Development of the solution within the scope of public administration, reaching the TRL 07 level (Technology Readiness Level 07) to ensure that the solution is tested in real conditions, as recommended by the OECD.
6. Testing in CPSI (Public Contract for Innovative Solution): Conducting tests in real conditions through CPSI, actively involving stakeholders and assessing the practical applicability of the solution.
7. Mission-Driven Innovation: The methodology was applied in a public project with the objective of optimizing the management of academic schedules in a technical education institution in Rio Grande do Norte, within the Education sector – EdTech. This project was conducted in the context of a Public Contract for Innovative Solutions (CPSI), aiming at an incremental solution, that is, a product or process that, although innovative for the institution, is not new to the market, as detailed in Table 1. This type of innovation allows available technologies to be adapted to the specific needs of a sector, maximizing the impact without depending on new technological development.

This stage focused on classifying the tested project in relation to the essential requirements that are common in public notices. The classifications cover the type of innovation, the type of innovation contract applied and the type of innovative solution proposed by the public project in the context of the challenge presented. The following are presented:

Table 1: Technical Classification According to Solution Type

Solution Type	Technical Classification According to Solution Type
Off-the-shelf solutions, fully possible for competition	Incremental products, services, or processes that are not new to the market (not new to the market)
New products, services, or processes in the market (technologically new)	

Source: (Author 2024)

Thus, the application followed a transversal approach, setting broad innovation goals with a focus on socio-economic impact. Given the complexity of the problem, which involved the efficient allocation of human and material resources for scheduling planning, the new public solution provided by the tested methodology adapted the institution to standards of digital, open, innovative, and agile government. In addition to optimizing the

workload, the integrated solution boosted adaptive management by connecting to innovative public procurement practices that overcome bureaucratic obstacles and increase operational efficiency.

As a result of the application of the methodology, an initial idea from public servants, born out of the daily need to improve scheduling organization, transformed into a practical and efficient solution. Applications and functionalities are described in Table 2.

Table 2: Applications and Functionalities of the Public Project

Functionalities
Algorithms to optimize class distribution, avoiding conflicts;
Equitable distribution of rooms, teachers, and classes considering availability;
Ability to dynamically adjust the timetable in response to changes;
Algorithms that take into account constraints, such as teachers' preferences;
Balanced distribution of workload among teachers;
Automatic identification and resolution of conflicts in the timetable;
Automatic generation of detailed reports on resource allocation and workload;
Possibility of integration with other systems, such as academic and human resources systems;
Development of intuitive interfaces for easier interaction in timetable management;
Use of genetic algorithms or machine learning to improve process efficiency.

Source: (Author, 2024)

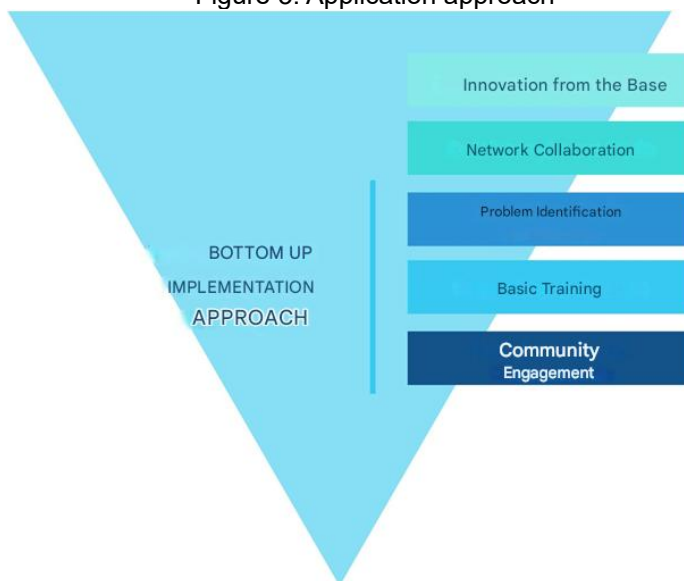
This new product, now validated, has brought greater efficiency and can be replicated in other public administration bodies, expanding its impact. By using CPSI, the solution becomes scalable and disseminable, offering employees from different institutions the opportunity to develop and apply their own innovations based on specific notices that encourage the creation of solutions adapted to the realities of public bodies. This approach not only promotes public intrapreneurship, but also fosters digital transformation and innovation management in the public sphere, facilitating the resolution of daily challenges through mechanisms that integrate CPSI and other contracting modalities.

APPLICATION CHALLENGES AND ANALYSIS OF RESULTS

After applying the methodology to the proposed public solution, it was observed that, in the context of innovative public procurement projects, challenges arose in the contracting of radical innovations, mainly due to the uncertainty and complexity associated with research, development and innovation (RD&I). In this scenario, incremental innovations proved to be more suitable for public administration. The innovative procurement approach, as advocated by Edquist et al. (2015), proved to be promising, as it prioritizes the functional characteristics of the results, facilitating the adoption of innovations in the public sector. Based on this, it is important to note that the public project

tested aimed at an incremental solution, that is, a product or process that, although innovative for the institution, is not new to the market. This aspect contributed to the fluidity of the project development. Once again, the innovative procurement approach, as advocated by Edquist et al. (2015), reinforces the literature review carried out throughout the formulation of the new methodology, which is the core of this article. Another point is that during the application of the methodology, the dynamic capabilities approach proposed by Mazucatto (2016) was used, which includes the phases of apprehension, transformation, creation and exploration. Highlighting the importance of the process of prospecting and searching for global trends. In addition to incorporating innovation management tools. During the implementation of the solution, a bottom-up approach was chosen, rather than a top-down one, which proved to be advantageous for the development and implementation of innovations. Figure 3 illustrates this approach, highlighting the progression from the conception of the innovative idea to the engagement of the community. This approach emphasizes that the participation of the community base is fundamental to identify specific problems and promote innovation. This choice was based on global best practices, with an initial analysis of the databases eafip.eu (European Union), upphandlingsmyndigheten.se (Sweden) and acqirc.org (United States), resulting in the segmentation and selection of the most relevant methodological studies. Figure 3 illustrates this approach, emphasizing the progression from the conception of the innovative idea to the engagement of the community, which, in this case, is composed of public servants, reflecting the phenomena of innovation in the public service and public intrapreneurship. The progression of the proposed flow emphasizes that the participation and involvement of the community base is crucial to identify specific problems and provide perspectives for innovation. Network collaboration can expand opportunities for sharing knowledge and resources, while grassroots capacity building can enhance the community's ability to contribute meaningfully to the innovation knowledge management process.

Figure 3: Application approach



Source: Authors.

This methodological choice provided greater flexibility and adaptability to the specific demands of the project, resulting in effectiveness and efficiency in achieving the proposed objectives. The results indicate that the explored solution has potential for future applications, especially when integrated with dynamic approaches to innovation management. The benefits of the applied method are presented in Table 3, highlighting the importance of a logical structure that guides the reader through the research narrative, facilitating the understanding of the challenges faced and the solutions found.

The benefits listed below, in Table 3, reflect the application of the methodological solution in the phases of a Public Procurement of Innovative Solutions (CPSI) call. This analysis seeks to highlight how each benefit contributes to the effectiveness and efficiency in implementing innovations in the public sector, offering strategic support at various stages of the non-linear process, connecting the entire CPSI ecosystem.

Benefits 1, 2, 3, and 4 are grouped under the axis of support and guidance in implementation, essential in the initial phases of a CPSI call. These include the opportunity for learning in innovation, support in executing proof of concept, and the analysis of successful cases, which facilitate the validation of proposals. It is crucial to conduct compliance tests before contract adjudication, as the absence of minimum requirements may render the contract unfeasible. In this context, having support in the pre-implementation phase is fundamental to ensure the eligibility of offers. Benefits 5, 6, and 7 focus on connection, emphasizing that public missions require collaboration. Strengthening partnerships between demanders, suppliers, and identifying sources of risk capital are

essential for the success of CPSI initiatives. Public Procurement of Innovation (CPI) also serves as a strategy to test innovations, integrating tools that promote the theory of change and achieve the established strategic objectives.

Finally, benefits 8, 9, and 10 reflect a convergence toward a deeper focus on the procurement niche, with an emphasis on promoting and publicizing the public project. This allows greater visibility of the implemented innovations and strengthens the technical capacity of the public administration to meet innovative demands, as established in important strategic documents.

Table 3: List of Benefits

No.	Benefits of the Explored Methodological Solution
1	Opportunity for learning in innovation and government through immersions, mentorships, and training;
2	Guidance and support in executing proof of concept and/or pilot tests, including technical information exchange;
3	Direction by analyzing successful case studies in similar challenges, facilitating tests, use cases, and pilot projects;
4	Application of the solution in controlled or real environments for testing and technical and market validation;
5	Connection with potential demanders, suppliers, and partners for scaling the implementation of the solution;
6	Identification of the need for risk capital and its main public sources;
7	Access to content and eventual support for innovation, depending on the proponent's potential;
8	Opportunity for exposure and publicity of the project implementation, with informative mention of its practical use;
9	Possibility of providing a certificate of technical capacity;
10	Opportunity to understand the priorities of innovative demands in the "Guide for Digital Educational Resources - Gov.br," one of the government's strategic documents.

Source: (Authors, 2024)

FINAL CONSIDERATIONS

This article presents a new methodological approach for public procurement of innovation (CPI), emphasizing its importance in a scenario where innovation is increasingly necessary to address complex challenges in the public sector. The proposed methodology not only offers practical tools for public servants but also fosters an environment of intrapreneurship, empowering professionals to seek and implement innovative solutions.

Despite the progress achieved, the application of the methodology also revealed limitations and challenges that need to be addressed. For public calls aimed at innovative procurement to become established in public administration, it is essential to overcome barriers such as the dissemination of regulatory norms, the democratization of training, the strengthening of cooperation between organizations (network capacity), and access to public risk investments. In this scenario, methodologies that organize innovation

management and encourage public intrapreneurship are fundamental to promoting a culture of innovation and collaboration in the public sector.

The results obtained indicate that the proposed methodology effectively responds to the challenges identified in the literature, reinforcing the transformation of public procurement of innovation as a crucial strategy to foster innovation in the public sector. Furthermore, the methodology aligns with global CPI trends, such as the principles of Digital Government and Open Government, promoting demand for technological innovations and strengthening demand-based policies. By empowering public servants to act as intrapreneurs, the methodology accelerates the development of sustainable solutions integrated into the regulatory environment.

For future research, it is suggested to investigate the application of the methodology in different contexts, as well as its adaptation to new demands and realities of the public sector. Additional studies on the impact of this approach on generating tangible and intangible results for innovation management would also be valuable. This article highlights the coherence and relevance of the proposal, demonstrating that innovation in public procurement is not only a necessity but also a strategic opportunity for advancing public management practices.

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