

Leveraging Artificial Intelligence in Contracting: A Digital Transformation for Public Institutions

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Digital transformation is increasingly essential for enhancing efficiency and data security. This study explores the impacts that Artificial Intelligence (AI) may have on the control of public procurement under the New Bidding Law. A systematic review of the literature on AI and public agencies was conducted. The findings indicate that the use of AI to oversee administrative activities and public procurement is already a reality. Further research is needed to identify additional factors where this technology can serve as an innovative tool to support the efficiency of public procurement.

Keywords: Digital Transformation. Public Procurement. Artificial Intelligence. Public Agencies.

Digital technologies have grown exponentially, becoming an integral part of daily life. The development and implementation of information and communication technologies have become crucial tools for achieving the 17 goals of the 2030 Agenda for Sustainable Development. Public organizations, driven by the desire to provide quality services to society, are increasingly adopting Artificial Intelligence (AI) tools [1].

In Brazil, the new bidding law [2] has introduced technological and digital innovation to the public procurement market, focusing on modernizing procedures through electronic administrative processes [3]. According to the sole paragraph of Article 11, senior management is responsible for procurement governance and implementing processes and structures that achieve established objectives, such as encouraging innovation. Senior management must promote an enabling environment and ensure that contracts align with these objectives, promoting efficiency, effectiveness, and efficacy [4].

In this scenario of digital transformation within public administration, AI presents a challenge,

given its submission to the legal regime of public law. Adopting new technologies requires careful planning and adaptation of the administrative structure to absorb technology's benefits effectively [3]. These strategies necessitate organizational changes within institutions to establish a digital culture and foster intense cross-sector collaboration [5].

There is limited literature on implementing AI in public procurement processes as a prerequisite for digital transformation. However, more research focuses on AI implementation in controlling public procurement and the judicial sector within public organizations [6].

Given the recent changes in the regulatory framework for public procurement (new competition law no. 14.133 published in April 2021 with a deadline for application until 12/31/23), the public sector faces a significant challenge in implementing digital processes. Considering that not all countries adopt the same procurement strategies, this article investigates the impacts AI may have on controlling Brazilian public procurement based on the New Bidding Law through an integrative literature review. This becomes an even more significant challenge in the post-pandemic world.

Materials and Methods

The methodological approach used in this study was a literature review, which facilitated

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the presentation of the current state of the art on using AI to control public procurement. This approach contributes to identifying opportunities for improvement in the area and the development of new theories.

The literature review protocol was designed to achieve two main objectives: Reflect on the strategies and impacts of AI in the hiring processes of Brazilian public institutions. Map the strategies institutions adopt to navigate the new legal framework for public procurement. The search method employed a combination of topic-based searches, truncation, and Boolean operators. The keywords used in the research included "public governance," "public procurement," "government procurement," and "artificial intelligence."

Six articles relevant to the scope of this research were selected from the search. A qualitative analysis was then performed, focusing on change management and governance in public procurement.

The analysis of the identified works followed the phases defined in Figure 1, which outlines the structured approach for reviewing and synthesizing the literature.

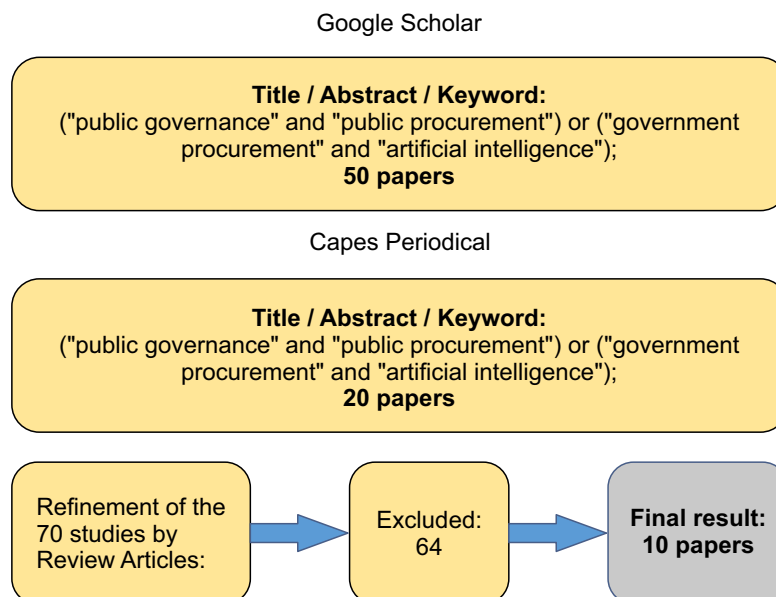
Results and Discussion

The New Bidding Law (Law No. 14.133/2021) introduced significant innovations aligning with the digital public administration paradigm. Article 174 of this law established the National Public Procurement Portal (PNCP) as the primary official electronic site for centralized and mandatory disclosure of procurement activities by public bodies [9]. This portal represents a significant step forward in streamlining and modernizing bidding processes.

A notable innovation introduced by Law No. 14.133/2021 is the competitive dialogue bidding modality. This modality facilitates contracting works, services, and purchases by allowing the public administration to hold dialogues with bidders selected based on objective criteria. The aim is to develop one or more alternatives to meet public needs, after which the bidders submit final proposals [2].

In addition, Law No. 14.129/2021, known as the Digital Government Law, was enacted on March 29, 2021. This law aims to facilitate the digitalization of Brazilian public administration, enhancing the efficiency of administrative activities and providing

Figure 1. Search and selection method.



public services. It aligns with the New Bidding Law by promoting digital processes in public procurement. SEGES/ME Ordinance No. 8.678/21 further supports governance in public procurement at the federal level, emphasizing the reduction of bureaucracy, encouragement of social participation, and the use of digital technologies [7]. Recent technological additions to the gov.br/purchasing portal include the Preliminary Technical Study, Risk Management Matrix, and Terms of Reference, all digitally linked to the Annual Procurement Plan (PGC). These functionalities aim to streamline procurement processes further. However, the digital transformation of public administration faces several barriers. Effective communication and experience-sharing between various societal sectors (public, academia, citizens, and companies) are crucial. The digital transformation process must comprehensively consider the organizational structure to benefit the public interest [8]. High-quality data is essential for artificial intelligence (AI) to function appropriately, necessitating access to comprehensive databases across all involved sectors. This requires strategic-level organization [9].

Public administrations face significant challenges in reconfiguring their internal and external activities to optimize the benefits of new technologies while ensuring sustainable and inclusive development. There is a risk of dehumanizing public administration if technology replaces human interaction entirely. For instance, valuable chatbots may not be accessible to illiterate users, potentially creating scenarios of discrimination and rights violations [5]. Electronic portals enhance technological tools for monitoring administrative activities, with AI supporting control agents in public bodies. Big data produced by the Brazilian public administration reinforces AI's instrumental role in fulfilling constitutional duties. The Federal Court of Auditors (TCU) exemplifies AI use in administrative control processes, with systems like Alice analyzing tenders and public notices to prevent fraud [6]. The New Bidding Law enhances transparency

and control in public procurement, prioritizing electronic procedures. This transition to digital formats will become the new norm for public procurement in Brazil, making public information more accessible and processable by AI.

To facilitate digital transformation and the adoption of complex technologies like AI, the Brazilian government has adopted strategic regulations. Vital elements of change management include stakeholder identification and involvement, leadership roles, effective communication of the shift to a digital mindset, and the allocation of resources (information, structure, and finances), as detailed in Table 1.

Although elements such as the importance of digitizing public institutions for society, identifying and engaging stakeholders, and providing necessary resources were mentioned, strategies for establishing a culture for digital transformation must be identified. BJERKE-BUSCH and colleagues suggest that leaders must gain change management skills to establish the necessary culture for digital transformation in institutions.

The COVID-19 pandemic has intensified the interaction between government and society through digital technologies. The use of AI will be increasingly discussed and evaluated in light of the challenges faced in Brazil and other countries regarding the regulatory framework and ethics in its application. However, Brazil is moving towards structuring public procurement to enable effective digital transformation by facilitating the use of AI in its processes.

Conclusion

The new bidding law includes a model for controlling public procurement to modernize these activities and make them more efficient and organized. It can be concluded that artificial intelligence, which requires electronic administrative processes, can support the work carried out by civil servants and units involved in public procurement control.

Table 1. Digital transformation public administration strategy and change management.

Strategies	Change Management Element
Brazilian Strategy for Digital Transformation - Decree No. 9.139, of March 21, 2018	Integration of all sectors of Brazilian society in favor of digital transformation, with the establishment of goals and dissemination of results
Digital Government Law - Law No. 14.129/2021, of March 29, 2021 - provides for the principles, rules and instruments for digital public administration and for increasing public efficiency.	Strengthening the role of the leadership of public institutions in driving the digital transformation process
New Bidding Law - Law No. 14.133/2021 (i) the preferential use of the electronic administrative process to carry out public procurement, in all its phases (internal, external and contractual) and (ii) the creation of the National Public Procurement Portal - PNCP	Induction of communication channels thus increasing the quality of communication between stakeholders.
New Bidding Law - Law No. 14.133/2021 (iii) the new bidding modality called competitive dialog.	Inducing the participation of one of the stakeholders (supplier companies) in the process of selecting the best solution for a given application of digital technologies.
Innovation Law (Law No. 10.973/2004) Legal Framework for Startups (Complementary Law No. 182/2021)	Participation of the societal sector as a provider of technological development and knowledge transfer. Provision of budgetary resource for innovation.

The electronic administrative process is the ideal and necessary path for administrative acts and a requirement for implementing the digital public administration model. Only through electronic processes can administrative activities leverage modern technologies, such as artificial intelligence, aligning with the technological advancements of the 21st century. From the perspective of change management for digital transformation in public procurement, institutions are legally supported to face arising difficulties. However, coordinated actions must be established between the sectors involved to ensure compliance with the Brazilian government's strategic planning.

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References

1. Nações Unidas Brasil. Agenda 2030 para o Desenvolvimento Sustentável | As Nações Unidas no Brasil. 2023. Available at: <https://brasil.un.org/pt-br/91863-agenda-2030-para-o-desenvolvimento-sustentavel>, <https://brasil.un.org/pt-br/91863-agenda-2030-para-o-desenvolvimento-sustentavel>.
2. Brasil. Lei nº 14.133, de 1º de abril de 2021. Lei de Licitações e Contratos Administrativos. Diário Oficial da União, Poder Legislativo, Brasília, DF, Seção 1, 01 abr. 2021, p. 1. Available at: http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2021/lei/L14133.htm.
3. Schiefler EAC. Controle das compras públicas, inovação tecnológica e inteligência artificial: o paradigma da administração pública digital e os sistemas inteligentes na nova lei de licitações e contratos administrativos. 2021. 218 f. Dissertação (Mestrado) - Curso Direito, Universidade de Brasília, Brasília, 2021.
4. Costa CCM; Terra ACP. Compras públicas: para além da economicidade. Brasília: Enap, 2019.
5. Bjerke-Busch LS, Aspelund A. Identifying barriers for digital transformation in the public sector. In:

- Digitalization: Approaches, Case Studies, and Tools for Strategy, Transformation and Implementation. Cham: Springer International Publishing, 2021. p. 277-290.
6. Toledo AT, Mendonça M. A aplicação da inteligência artificial na busca de eficiência pela administração pública. *Revista do Serviço Público* 2023;74(2):410-438. Escola Nacional de Administração Pública (ENAP). <http://dx.doi.org/10.21874/rsp.v74i2.6829>.
 7. Gov.br. Portaria SEGES/ME nº 8678 de 19 de julho de 2021. Available at: <https://www.gov.br/compras/pt-br/aceso-a-informacao/legislacao/portarias/portaria-seges-me-no-8-678-de-19-de-julho-de-2021>.
 8. Brega JFF. Governo eletrônico e direito administrativo. 2012. 336 f. Tese (Doutorado) - Curso de Direito, Universidade de São Paulo, São Paulo, 2012.
 9. Monteiro V. Monitoramento digital das contratações públicas: governo como plataforma de dados. *JOTA, Publicistas*. 29 set. 2020. Available at: <https://www.jota.info/opiniao-e-analise/colunas/publicistas/monitoramento-digital-contratacoes-publicas-29092020>.
 10. Wirtz BW, Weyerer JC, Geyer C. Artificial intelligence and the public sector—Applications and Challenges. *International Journal of Public Administration* 2019;42(7):596–615. doi:10.1080/01900692.2018.1498103.