

ARTIFICIAL INTELLIGENCE IN THE PUBLIC SECTOR- CHALLENGES, OPPORTUNITIES AND BEST PRACTICES

<https://doi.org/10.47743/jopafl-2024-32-29>

PANĂ-MICU Florentina

National University of Political Studies and Public Administration

Romania

florentina.micu@snsps.ro

Abstract: Artificial Intelligence (AI) is increasingly influencing the functioning of public institutions, offering innovative solutions to enhance governance, public service delivery, and operational efficiency. This article aims to explore best practices in the use of AI for public service delivery and identify the main advantages of using artificial intelligence in the public sector. Additionally, it examines how Romania is aligning itself in the process of integrating AI technologies through the adoption of the National Strategy on Artificial Intelligence 2024-2027. Therefore, the purpose of this research is twofold: on one hand, analyzing key examples of best practices in AI integration within the public sector, and on the other hand, exploring how Romania is making considerable efforts to reform public services through the use of new AI technologies.

Keywords: artificial intelligence, public sector, innovation, chatbot, optimization

Introduction

At its core, AI refers to the ability of machines to simulate human intelligence, enabling them to perform tasks that traditionally require human cognition, such as learning, reasoning, and problem-solving. Through advanced algorithms and data analytics, AI has the capacity to analyze vast amounts of data, identify patterns, and make predictions with unprecedented accuracy and efficiency. Based on European Parliament Report "Artificial Intelligence in smart cities and urban mobility", AI applications can be categorised in the following seven dimensions:

AI for governance e.g.: urban planning, tailored subsidy provision, disaster prevention and management.

AI for living and liveability, safety, security and healthcare e.g.: smart policing, personalised healthcare, noise and nuisance management and improved cyber security.

AI for education and citizen participation e.g.: locally accurate, validated and actionable knowledge supporting decision-making.

AI for economy e.g.: resource (cost and time) efficiency and improved competitiveness through, sharing services, efficient supply chains and customer tailored solutions.

AI for mobility and logistics e.g.: autonomous and sustainable mobility, smart routing and parking assistance, supply chain resiliency and traffic management.

AI for infrastructure e.g.: optimised infrastructure deployment, use and maintenance, including waste and water management, transportation, energy grids, and urban lighting.

AI for the environment e.g.: biodiversity preservation, urban farming and air quality management. (European Parliament, 2021)

According to authors Yan, Z., Jiang, L., Huang, X. et al., AI can be expected to contribute to the development of digital twin in various areas such as: urban planning and management, predictive maintenance and infrastructure management, energy optimization,

disaster simulation and response, traffic and transportation systems, public safety and security, environmental monitoring and sustainability, economic modeling, healthcare services, governance and regulation, integration with IoT and smart devices and education and training. (Zhenjun, et al., 2023)

AI Watch Report, “European Landscape on the Use of Artificial Intelligence by the Public Sector”, offers a few recommendations for the policymakers and public managers dealing with AI implementation. It suggests that AI should be considered not only as a research and innovation tool but also as a practical technology to enhance public administration. Public organizations are encouraged to build in-house expertise to manage AI projects, guide external suppliers, and improve procurement processes. Additionally, as AI will impact employees' daily tasks, it is important to promote a basic understanding of how algorithms work. Lastly, the report highlights that implementing AI goes beyond technical coding, requiring organizational adjustments, including new roles and task reallocations (European Commission, 2022).

In the OECD working paper titled “Hello, World: Artificial intelligence and its use in the public sector”, the organization highlights how governments across the globe are adopting AI technologies to enhance public services and policy-making. AI is being applied to improve the efficiency of administrative processes, optimize decision-making, and strengthen relationships with both citizens and businesses. Furthermore, it is being used to address key challenges aligned with the United Nations Sustainable Development Goals, focusing on sectors like health, transportation, and security. These initiatives are part of a broader effort to modernize governance and deliver innovative solutions to complex public sector issues. (OECD, 2019)

On the other hand, within the same report developed by the OECD, attention is drawn to the potential challenges in implementing AI digital solutions in the public sector, among which are: the creation of legal and ethical frameworks for the use of AI, the development of strategies to ensure the proper management of data while protecting privacy and security, as well as the allocation of internal and external funds and capacities to provide specialized human capital capable of utilizing AI technologies. (OECD, 2019)

Thus, the use of AI in the public sector as a driver for innovative solutions, which on one hand supports the development of public administration infrastructure to provide services more efficiently, and on the other hand increases citizens' satisfaction with public services, is an extremely important solution for the public sector, as we will see from examples of best practices. However, at the same time, it also presents a challenge in addressing the main issues related to AI implementation. The OECD Recommendation on Artificial Intelligence (OECD, 2019) offers five key recommendations for policymakers concerning national policies and international cooperation for trustworthy AI: investing in AI research and development, fostering a digital ecosystem for AI, shaping an enabling policy environment for AI, building human capacity and preparing for labour market transformation and establishing international co-operation.

Theoretical framework

Artificial intelligence- defining the concept

The technology underlying artificial intelligence was created by John Von Neumann and Alan Turing in the early 1950s. Alan Turing, through his article "Computing Machinery

and Intelligence," raises a particularly important question: "Can machine think?" thereby highlighting the notion that machines can think intelligently like humans (Haenlein & Kaplan, 2019).

Nowdays, artificial intelligence has become essential due to the fact that can analyze and extract information from large blocks of data, automatizes repetitive and time-consuming actions at the organizational level, creates personalized experiences for consumers, can provide costumer support and plays an important role in financial industry for fraud detection and risk assessment. The author Christian Schachtner in the article "Smart government in local adoption – Authorities in strategic change through AI" highlights the fact that AI can help in the design of processing processes of information, such as the collection of data from unstructured documents, the processing of business processes, and the automated preparation of reports and meeting documents (Schachtner, 2021).

There are many variations in the definitions and perspectives on artificial intelligence largely due to the difficulty in defining the concept of "intelligence". English mathematician Alan Turing developed a test, that was designed to determine whether a machine (computer) could be considered intelligent. The test involved three participants: a human evaluator would ask questions, and a human and a machine would type answers. The test defines an intelligent machine as a machine that produces answers which the evaluator cannot distinguish from those of the human respondent (OECD, 2019).

Artificial Intelligence (AI), a term coined by emeritus Stanford Professor John McCarthy in 1955, was defined by him as "the science and engineering of making intelligent machines (Manning, 2022). Nils J. Nilsson defines artificial intelligence as "that activity devoted to making machines intelligent, and intelligence is that quality that enables an entity to function appropriately and with foresight in its environment" (Nilsson, 2013).

European Comission's Communication on Artificial intelligence defines AI as "systems that exhibit intelligent behaviors by analyzing their surrounding environment and taking actions - with a certain degree of autonomy - to achieve specific objectives" (European Commission, 2018). OECD provides a definition of AI Systems applicable across all sectors : "a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy" (OECD, 2019).

AI technologies used in public institutions

AI technologies are used in different domains, from healthcare to enhancing public transport and safety. In a report by World Bank Group, "Artificial Intelligence in the Public Sector", it is highlighted that AI can be used as a tool that can deliver a personalized service delivery experience, improve efficiency of back-end processes, strengthen policy compliance and aid in the identification of fraud. (World Bank Group, 2020). The typology of AI technologies used in the public sector includes: chatbots that answer citizen queries and AI technology for sentiment analysis, AI technology for compliance and risk management, AI technology for fraud detection, prevention, and investigation, robotic process automation (RPA), AI technology for analytics and decision-making.

Italian Social Security and Welfare Administration (INPS)

One of the main channels that citizens use to communicate with INPS is via Certified Emails (CEs). Through them, citizens can contact the Institute to seek information or

transmit relevant paperwork to apply for welfare services or entitlements (e.g., civil invalidity benefits, unemployment benefits). During and after the pandemic the number of incoming CEs increased significantly, from 3 million in 2019 to over 6 million in 2023 leading to a significant surge in the workload for INPS employees. The Institute began evaluating various machine learning models and ultimately selected BERT, an open-source model developed by Google that can be exploited by software engineers to create ad-hoc codes to process natural language (OECD- Joinup, 2024).

Transkit, an AI-based tool that transcribes trials

The Basque Government Informatic Society (EJIE) is the technological management body of the Basque Government, that facilitates the digitisation of public services, and guarantees the quality, security and continuity of the information and communication technologies (ICT services) that support them. The solution provided by the Basque Government Informatic Society (EJIE) is an AI tool which uses neural networks to convert voice data into searchable and structured text, using an automated transcription service. The text is indeed extracted in text strings in a subtitle format and a web application is used to link the text with the exact minute of the video or audio recording. These transcriptions, in Spanish and/or Basque, can then be easily used for the judicial review purposes. (European Commission-Joinup, 2024)

Japan`s crisis management system

In Japan, cities have partnered with AI and chatbot developers to deal with crisis management in disaster-prone regions. By using AI, machine learning, and chatbot technology, the Japanese government can effectively inform citizens and visitors about disaster situations and aftermath support in various language (Japan International Cooperation Agency, 2024).

SURTRAC (Scalable Urban Traffic Control)

In the US, the City of Pittsburgh collaborated with Rapid Flow Technologies to develop SURTRAC (Scalable Urban Traffic Control), an automated traffic optimization and control software. City traffic control departments use SURTRAC to manage traffic flows through several intersections and use AI to optimize the traffic systems leading to reduced travel times, reduced number of traffic stops, and reduced wait times (Stephen , et al., 2013).

Virtual assistant Jamie

The Infocomm Development Authority of Singapore (IDA), along with Microsoft have developed a virtual assistant called “Ask Jamie”, with an aim to make online public service websites more accessible and engaging for all citizens. The chatbot can be implemented on the websites of other governmental agencies to answer questions in specific domains. When users visit the agency website, a chat window automatically opens up, and Jamie can respond to user inquiries by way of natural language generation leading to a seamless interaction experience (The Government Technology Agency of Singapore, 2024).

Bürokratt – a single chatbot for Estonia

The idea of Bürokratt is to allow citizens to have access to any public service needed (and potentially to relevant private services of interest) through one single communication channel and from any device thanks to one virtual assistant. Bürokratt is meant to be an interoperable network of public sector agencies attached to national information communication systems, as well as those provided by the private sector, that will be made accessible via one single chatbot(European Commission-Joinup, 2024).

The case of Romania

In Romania, the use of artificial intelligence in public institutions for providing information and services to citizens is still in its early stages. Several municipalities have accessed chatbot-based technology to facilitate the provision of information to citizens, for example:

The City Hall of Sector 3, Bucharest (<https://www.primarie3.ro/>)

Since 2023, Sector 3 City Hall has implemented an AI-powered chat system on its official website becoming the first administration to adopt such technology to enhance and streamline direct communication with sector residents.

Galicea Commune, Valcea County (<https://primariagalicea-valcea.ro/>)

Another example of a chatbot used at the level of municipalities in Romania is AI Galicea – an advanced chatbot available to the citizens of Galicea.

The City Hall of Cluj-Napoca (<https://primariaclujnapoca.ro/>)

Within the City Hall of Cluj-Napoca, the first “virtual public servant” in Romania named Antonia has been implemented.

To align with the new strategies at the European level, Romania has adopted the National Strategy in the Field of Artificial Intelligence 2024-2027.

The National Strategy in the Field of Artificial Intelligence 2024-2027 focuses on 6 general objectives:

Supporting education for AI and the development of specific AI-related competencies;

The development and efficient utilization of infrastructure and datasets;

The development of the national Research-Development-Innovation system in the field of AI;

Ensuring technological transfer through partnerships;

Facilitating the adoption of AI across society;

The development of a governance and regulatory system for AI. (The Ministry of Research, 2024)

Based on these objectives, the expected outcomes following the implementation of the strategy in Romania are:

“Development of the research, development, and innovation sector in the ICT field - human resources, expertise, national and international recognition

Strengthening the capacity for training and education of specialists in AI within the educational system

Generalization of basic knowledge and skills in AI among the population and businesses

Development of specific AI infrastructures (investments, regulation, datasets).

Development of the institutional ecosystem with AI expertise (research centers, companies, testing and experimentation spaces for solutions)

Adoption of AI solutions in the public sector for digital public services and in the private sector for economic competitiveness

Strengthening governance and regulation of AI”(The Ministry of Research, 2024).

While the Romanian Strategy on Artificial Intelligence 2024-2027 holds great promise for driving innovation and societal development, several challenges may arise during its implementation as: lack of funding, data privacy and security concerns, ethical considerations and digital divide.

To address these challenges, the government of Romania has to provide financial resources and adequate funding for AI initiatives, to develop a skilled workforce proficient in AI, to ensure compliance with data protection regulations and safeguarding sensitive information, to take into account ethical concerns, accountability, and transparency and last but not least to bridge the digital divide and ensure equitable access to AI education.

In the report of the European Commission “AI Watch European Landscape on the Use of Artificial Intelligence by the Public Sector”, it is highlighted that, although AI plays a crucial role in the development of all sectors,”the use of AI within government requires careful ethical considerations due to its unique role, legal status and expectations when compared with the private sector, and thus greater care and consideration should be given to upholding ethical concerns”.(European Commission, 2022)

The National Strategy in the Field of Artificial Intelligence 2024-2027 estimates that the use of AI-based technologies will bring non-discriminatory economic, social, environmental, and public health benefits to various segments of society, as follows: improved healthcare, safer and more environmentally friendly transportation (mobility) and enhanced public services and better working conditions. On the other hand, the public sector can benefit from multiple advantages, such as: improving the services offered and increasing public satisfaction, developing employees digital skills, implementing solutions for public and business access to open databases from various fields.

Conclusions

While the use of AI in the public sector offers numerous benefits, there are several challenges that organizations may encounter.

First of all, data quality and accessibility because AI-based technologies rely on large blocks of data, and ensuring data accessibility and quality is essential. Another challenge is dealing with privacy and security concerns of citizens and increasing their trust in the use of AI technologies.

On the other hand, there are some ethical and legal considerations such as accountability, transparency, and the potential for unintended consequences require thoughtful consideration to uphold public trust and ensure responsible AI governance.

Also, we have to take into consideration the lack of skilled workforce because developing and implementing AI solutions in the public sector requires a skilled workforce with expertise in data science, machine learning, and AI ethics.

Another possible problem is in implementing AI technologies in public sector is consider to be interoperability and integration due to the fact that public sector organizations often operate multiple systems and platforms that may not be interoperable or compatible with AI technologies.

Addressing these challenges requires a collaborative approach involving government agencies, industry partners, academia, and civil society to develop policies, standards, and best practices that promote responsible AI deployment in the public sector. By addressing these challenges, AI has the potential to transform public service delivery, improve decision-making, and enhance citizen satisfaction.

References

1. AI Watch Report, "European Landscape on the Use of Artificial Intelligence by the Public Sector", online at : https://www.researchgate.net/publication/365276162_AI_Watch_European_landscape_on_the_use_of_Artificial_Intelligence_by_the_Public_Sector
2. European Commission, A definition of AI: main capabilities and scientific disciplines -online at https://ec.europa.eu/futurium/en/system/files/ged/ai_hleg_definition_of_ai_18_december_1.pdf
3. European Commission, "AI Watch European Landscape on the Use of Artificial Intelligence by the Public Sector," 2022, online at https://joinup.ec.europa.eu/sites/default/files/custom-page/attachment/2023-02/JRC129301_01_AI_watch.pdf
4. European Commission, "Joinup," online at: <https://joinup.ec.europa.eu/collection/public-sector-tech-watch/burokratt-single-chatbot-estonia>
5. European Parliament, Artificial Intelligence in smart cities and urban mobility, online at [https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/662937/IPOL_BRI\(2021\)662937_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2021/662937/IPOL_BRI(2021)662937_EN.pdf)
6. Galicea Commune, Valcea County website -<https://primariagalicea-valcea.ro/>
7. Haenlein, M., Kaplan, A., A Brief History of Artificial Intelligence: On the Past, Present, and Future of Artificial Intelligence online at https://www.researchgate.net/publication/334539401_A_Brief_History_of_Artificial_Intelligence_On_the_Past_Present_and_Future_of_Artificial_Intelligence
8. Japan International Cooperation Agency - https://www.jica.go.jp/english/overseas/philippine/information/press/2023/1516471_16864.html
9. Manning, C. online at : <https://hai.stanford.edu/sites/default/files/2020-09/AI-Definitions-HAI.pdf>
10. Nils J. Nilsson, The Quest for Artificial Intelligence: A History of Ideas and Achievements (Cambridge, UK: Cambridge University Press, 2010)
11. OECD, "Artificial Intelligence in Society," OECD Publishing, 2019
12. OECD, "Hello, World: Artificial intelligence and its use in the public sector", 2019 online at : <https://www.oecd-ilibrary.org/deliver/726fd39d-en.pdf?itemId=%2Fcontent%2Fpaper%2F726fd39d-en&mimeType=pdf>
13. OECD, Observatory of Public Sector Innovation - https://oecd-opsi.org/case_type/opsi/
14. S. Stephen, B. Gregory, X. Xiao-Feng and R. Zachary, "SURTRAC (Scalable Urban Traffic Control)," 2013. online at: https://www.ri.cmu.edu/pub_files/2013/1/13-0315.pdf
15. Schachtner, C., Smart government in local adoption – Authorities in strategic change through AI, 2021, online at : <https://scrd.eu/index.php/scrd/article/view/110>
16. Speeding up judicial proceedings with Transkit, an AI-based tool that transcribes trials - <https://joinup.ec.europa.eu/collection/public-sector-tech-watch/speeding-judicial-proceedings-transkit-ai-based-tool-transcribes-trials>
17. The City Hall of Cluj-Napoca website <https://primariaclujnapoca.ro/>
18. The City Hall of Sector 3, Bucharest website <https://www.primarie3.ro/>
19. The Government Technology Agency of Singapore (GovTech) - <https://www.tech.gov.sg/products-and-services/ask-jamie/>
20. The Ministry of Research, "National Strategy in the Field of Artificial Intelligence 2024-2027", online at : <https://sgg.gov.ro/1/wp-content/uploads/2024/07/ANEXA-1-10.pdf>
21. World Bank Group, "Artificial Intelligence in the Public Sector", online at <https://documents1.worldbank.org/curated/en/746721616045333426/pdf/Artificial-Intelligence-in-the-Public-Sector-Summary-Note.pdf>
22. Yan, Z., Jiang, L., Huang, X. et al. Intelligent urbanism with artificial intelligence in shaping tomorrow's smart cities: current developments, trends, and future directions. J Cloud Comp 12, 179 (2023). <https://doi.org/10.1186/s13677-023-00569-6>



This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution - Non Commercial - No Derivatives 4.0 International License.