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From Traditional Management to Artificial Intelligence: An Evaluative Study for Public Expenditure Rationalization in Some leading Countries

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Abstract

In light of the increasing challenges facing public finance globally, the rationalization of public expenditure has become an urgent necessity. This study argues that relying on traditional methods is no longer sufficient, making it imperative to keep pace with digital transformations. Thus, the research aims to evaluate the effectiveness of Artificial Intelligence (AI) in rationalizing public spending through an analytical study of pioneering countries, namely Brazil, Singapore, and the United Arab Emirates. The findings indicate that AI significantly contributes to expenditure rationalization by automating routine tasks, analyzing spending decisions, and improving budget planning and monitoring. Furthermore, AI applications enhance fiscal forecasts and public service quality in the departments where they are implemented. However, the study also identifies several challenges, including high initial costs, infrastructure needs, and a shortage of technical expertise. Additionally, resistance to change remains a barrier that requires comprehensive and integrated solutions to ensure effective AI integration within public financial management systems.

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Introduction

The efficiency of public expenditure is considered one of the fundamental pillars for achieving economic stability and promoting the path of sustainable development in nations. With the escalation of pressures on government budgets and the increasing challenges associated with meeting citizens' needs for high-quality services, the rationalization of public expenditure has become an urgent necessity. It is no longer possible to rely solely on traditional methods in public financial management; instead, it has become imperative to keep pace with global digital transformations and adopt advanced analytical tools and innovative methods that enable policymakers to make more accurate and effective decisions,

thereby achieving the highest economic and social return from every unit of expenditure. In this context, Artificial Intelligence (AI) has emerged as one of the most prominent modern technological tools that is reshaping the landscape of public financial management, thanks to its advanced capabilities in analyzing big data, predicting future fiscal trends, and automating complex processes. Consequently, many countries, such as Brazil, Singapore, and the United Arab Emirates, have recognized the potential offered by AI in this field and have hastened to adopt it within their fiscal strategies, becoming advanced models in utilizing AI for public expenditure rationalization. Based on these facts, the following research problem arises:

What is the extent of the effectiveness of applying Artificial Intelligence technologies in public expenditure rationalization in the countries under study?

From the main research problem, the following sub-questions crystallize:

- What are the most prominent uses of AI in public expenditure rationalization?
- What are the examples and strategies implemented by the countries under study in this regard?
- What are the statistical data and quantitative results that support the effectiveness of these applications?
- What are the challenges and lessons learned from the experiences of these countries?

1. Conceptual Framework of Public Expenditure and Artificial Intelligence

First: The Concept of Public Expenditure Policy

Initially, a public expenditure is defined as a sum of money spent by a public entity with the intention of satisfying a public need. In other words, it is an amount of money disbursed from the State Treasury by its various administrations, institutions, bodies, and ministries to satisfy public needs. Meanwhile, the public expenditure policy represents the set of procedures and decisions taken by the government in the field of public expenditure to achieve specific objectives during a certain period [4].

Second: Definition of Public Expenditure Rationalization

Public expenditure rationalization means the sound management of public funds and their expenditure with rationality and prudence on a judicious basis, avoiding both extravagance and parsimony. (An increase in public expenditure beyond the point of moderation is considered folly, just as a reduction is considered parsimony). Expenditure rationalization involves controlling expenditures, tightening control over them, minimizing waste and extravagance, avoiding unnecessary expenditures, and increasing productive efficiency, with the aim of maximizing the utilization of economic resources [2].

Public expenditure rationalization also refers to "working to increase the effectiveness of spending to the extent that the national economy's capacity to finance and meet its internal and external obligations can be increased, while eliminating the source of waste to the lowest possible limit. Therefore, the rationalization of public expenditure is not intended to compress it, but rather to obtain the highest possible public productivity with the least possible amount of spending and extravagance" [2].

Third: Definition of Artificial Intelligence

The definitions of Artificial Intelligence (AI) are numerous, and some of the most prominent are highlighted below:

The Encyclopedia Britannica defines AI as: "The capacity of digital computers or computer-controlled robots to solve problems that are usually associated with the high intellectual processing capabilities of humans" [1].

The UK Parliament's Science and Technology Committee defined it as: "... a set of statistical tools and algorithms that form intelligent programs specialized in a specific field or task, using advanced techniques that enable the computer to simulate human behavior such as learning, reasoning, and classification" [1].

As for UNESCO, it considers AI systems to be technical systems capable of processing information in a way that mimics human intelligence, as they include aspects of perception, prediction, planning, learning, and thinking. The techniques and approaches that constitute an AI system include: Machine Learning, Artificial Neural Networks, Fuzzy Logic, Case-

Based Reasoning, Natural Language Processing, Abstraction for Problem Representation, Multi-Agent Systems for Automated Reasoning, and Cyber-Physical Systems, such as the Internet of Things, Robotics, Computer Vision, Human-Computer Interfaces, Image and Face Recognition, Speech Recognition, Virtual Assistants, and Autonomous Vehicles [5].

The preceding definitions provide a broad overview of the concept of AI, encompassing a diverse range of aspects and technologies used within it. Accordingly, AI in the field of public policy can be defined as a set of technologies, tools, and applications used to enhance the making of public policies, and to develop and improve them in various ways using computing, machine learning, neural networks, virtual intelligence, robotics, intelligent systems, expert systems, big data, and other techniques to analyze and understand political, governmental, and economic data and information. This is done with the aim of improving political decision-making, developing government services, and increasing efficiency and effectiveness in the management of public affairs. It can be said that AI in the field of public policy is used to find solutions to major political and governmental challenges and problems, analyze large and complex data, and subsequently provide results and recommendations for making better and more effective decisions.

2. Evolution of the Role of Technology and Artificial Intelligence in the Public Sector

The public sector has witnessed remarkable changes in its interaction with technology. Initially, it was limited to using traditional office tools, but gradually the matter evolved to include more sophisticated and complex digital solutions, until AI became an essential part of the digital infrastructure of the public sector. Previously, the primary goal of digital transformation was the automation of routine tasks to reduce administrative burdens and accelerate service delivery. However, with successive technological developments, government entities began to leverage big data and advanced analytics to support decision-making and improve the effectiveness of administrative and service operations. This reflects the growing recognition of the importance of technology in enhancing efficiency and achieving tangible results at the institutional performance level [3].

Within the framework of public expenditure rationalization, AI is considered a qualitative leap that goes beyond mere automation to providing analytical and predictive tools previously unfamiliar. These scientific tools rely on a multi-dimensional methodology that combines Big Data Analytics and Machine Learning to enable governments to identify areas of waste, accurately predict future needs, and improve resource allocation. For example, AI models can now analyze historical spending patterns and detect potential fraud or misuse by identifying anomalous behaviors [6]. These technologies also contribute to improving government procurement processes by analyzing market data to select optimal suppliers, evaluate the quality of bids, and negotiate the best prices, which significantly reduces costs. Therefore, the relationship between digitalization and government efficiency has become clear: governments that have adopted digital solutions and AI have been able to achieve a noticeable increase in productivity, improve the quality of services provided to citizens, and enhance the transparency and accountability of government performance [8]. Through continuous investment in AI technologies, the public sector can improve its financial management operations via advanced analytical models that support financial planning and reduce unnecessary waste and expenditures. This is a trend linked to improving the government's ability to face increasing economic challenges, especially under budget pressures [10].

3. Mechanisms of Artificial Intelligence Used in Public Expenditure Rationalization

First: Artificial Intelligence in Financial Forecasting and Economic Planning

AI technologies are important tools in supporting financial analysis and forecasting models, as they can anticipate future economic trends based on the processing of complex and rapidly changing financial data. These models rely on Machine Learning algorithms to forecast revenues, adjust expenditures, and determine equilibrium points in public budgets. This

contributes to building balanced financial and economic plans that prevent waste and improve the utilization of various financial resources. The use of AI here is not limited to forecasting expenditures but also includes analyzing multiple scenarios for the socio-economic situation, thereby enabling policymakers to make financial decisions based on accurate data and quantitative evidence. This type of tool also enhances the role of governments in allocating public resources in a more equitable and effective manner, alongside focusing on achieving economic growth goals and reducing social disparities. In addition, these models offer opportunities to improve periodic financial evaluation and follow-up on financial execution, enhancing organizational effectiveness through monitoring economic performance and providing accurate reports that help in rapid intervention when any financial or technical gaps exist. At the institutional level, the use of AI in financial forecasting and planning contributes to expanding the scope of the financial control role and improving the accuracy of governmental financial decisions, which in turn supports the process of fiscal sustainability and promotes equity in spending [7].

However, governments also aim to develop methods for analyzing AI models and making their logic more transparent, which is a fundamental condition for the usability of these forecasts in public financial management. For example, the Swedish National Financial Management Authority (ESV) worked on developing an application to analyze the impact of each data variable on the prediction of "black box models," as part of a broader work program to build the foundations for integrating AI into the financial management of the Swedish government [7].

Second: Artificial Intelligence in Expenditure Decisions

In an environment characterized by high debt levels and competing demands on limited resources, increasing the "return on investment" from public expenditure is a common goal for governments and finance ministries that are under constant pressure to do more with fewer resources. Therefore, it is not surprising that targeting expenditure is one of the areas where finance ministries have already begun to explore opportunities to leverage AI. Deep Learning and Machine Learning techniques allow for special utilization of big data and data analytics, as well as data visualization techniques. This is achieved by analyzing massive amounts of information from different sources, which allows for a more comprehensive analysis. These technologies can also delve into understanding expenditure categories and their directions, and evaluate the effectiveness of each expenditure based on trends and patterns.

AI technologies also enable effective analysis of a large set of complex economic and financial data through graphical representations, as well as simplifying the interpretation of budget trends and their real-time comparisons to identify risks and support optimal decisions regarding fiscal policies and public expenditure using digital indicators, which facilitates making more accurate and informed decisions [7].

Third: Artificial Intelligence in Budget Planning and Monitoring

Budget planning is the formulation of realistic budgets based on accurate forecasts of expenditures. Budget monitoring, on the other hand, means the continuous evaluation of how government resources are used relative to these forecasts. Therefore, budget planning and monitoring involve establishing baseline expenditure figures, estimating the cost of new policies, in addition to tracking spending against allocations to monitor potential deviations. These are all key functions that take a long time for central budget authorities. Thus, AI, and more specifically Machine Learning, can be leveraged to support these processes by providing outputs that support the formulation of accurate expenditure baselines and estimate the cost of current policies [7].

Fourth: Artificial Intelligence in Financial Management

The functions of financial management and reporting in government aim to ensure that spending is executed in accordance with relevant laws and regulations, and is processed in a timely and effective manner. These functions include managing contracts and invoices, disbursing funds after checks, maintaining detailed and systematic records of all financial transactions, and providing clear information in financial reports accessible to external stakeholders. Although these functions are important, they are sometimes repetitive, making them particularly suitable for the application of automation. This is done using Machine Learning and Deep Learning techniques to analyze digital images and extract information from documents (such as vendor information) to identify and classify documents (such as invoices), and

perform document comparison (such as comparing invoice and vendor information); or to identify trends and patterns [7].

Fifth: Communication with External Stakeholders

The chatbot, which operates with Natural Language Processing (NLP) technology, is considered one of the most popular and widely used AI technologies today. These digital assistants are increasingly being used in the public sector to provide services directly and help citizens meet legal requirements and access required information. For example, tax office officials who traditionally work face-to-face with the public are now supported by chatbots that rely on AI to answer questions related to tax legislation, reflecting a shift towards more efficient and automated public interactions. Therefore, some countries have begun to explore the potential of AI to enhance smooth, direct, and effective communication and exchanges with citizens, in addition to other key stakeholders, including parliamentarians [7].

Sixth: E-procurement and Electronic Payment Systems

AI technologies are increasingly used in public procurement and electronic payment systems to improve the management of financial resources and control supply and government purchasing processes. These digital systems contribute to enhancing transparency by electronically recording every detail of financial and supply operations, which reduces opportunities for manipulation and corruption. AI algorithms also analyze data related to suppliers and tenders, allowing for early risk detection and more accurate performance evaluation. From this, we find that these applications help ensure that financial resources go towards the most suitable contracts and best suppliers at the lowest possible cost. Numerous case studies indicate a noticeable improvement in the monitoring and financing of government purchases with the adoption of these modern systems [8].

Seventh: Process Automation and Big Data Analytics Solutions

AI-based solutions play a pivotal role in automating routine processes in the public sector, such as financial auditing, approvals, and records management. This contributes to reducing human errors and accelerating work procedures, thereby saving time and effort. Automation technologies also provide the possibility of managing fewer human and financial resources while improving performance levels and organizing administrative processes. These solutions also benefit from the enormous capabilities of big data analysis, where patterns and opportunities that might be missed by human observers are extracted, which helps in identifying cases of corruption and unjustified spending. Recent research has shown that the use of AI in data analysis contributes to uncovering areas of waste and improving financial forecasting processes, in addition to evaluating financial risks more effectively than before. Moreover, this automation works to reduce operational costs and facilitate real-time performance monitoring, whether at the institutional or sectoral level, which enhances the government's ability to control spending and achieve its developmental goals [10].

Eighth: Combating Fraud, Waste, and Corruption

Fraud, waste, and corruption are major challenges that deplete public resources. Therefore, AI systems, by analyzing spending behaviors and detecting anomalies, and identifying suspicious transactions, have come to play a crucial role in combating these phenomena, as their ability to process large amounts of data and identify abnormal patterns far exceeds human capabilities in this field [9].

4. An Evaluative Study of the Application of Artificial Intelligence in Public Expenditure Rationalization in a Group of Countries

First: The Experience of Brazil

Brazil is considered one of the pioneering countries in Latin America that has adopted AI as a tool to improve the efficiency of its public administration and rationalize its expenditure. AI applications in the Brazilian public sector vary to include multiple areas, including budget management, and the provision of social and judicial services. These initiatives aim to achieve transparency in public funds, reduce waste, and improve the quality of services provided to citizens. For

this purpose, an ambitious national plan was launched to invest 23 billion Brazilian Reals (approximately 4 billion US dollars) in this field until 2028 [11].

One of the most prominent examples of using AI in public expenditure rationalization in Brazil is the application by the National Treasury (STN) of an AI-based model to classify government expenditures at the municipal and state levels. This classification was previously done manually according to the COFOG (Classification of the Functions of Government) standard, a process that was time-consuming and complex. With the introduction of a probabilistic text classification model based on machine learning techniques, such as convolutional and recurrent neural networks, this time was significantly reduced, moving from 1,000 hours to just 8 hours, representing an efficiency increase of 12,400%. Furthermore, the accuracy of the AI model exceeded 97%, ensuring that Brazil's financial data is not only accurate but also reliable.

In an attempt to rationalize public expenditure by reducing the costs of lost lawsuits, which constitute a significant financial burden on the federal budget, the Brazilian government utilized the services of OpenAI to accelerate the examination and analysis of thousands of lawsuits using AI. This cooperation aims to identify lawsuits that require early action before final decisions are issued, map trends, and define potential areas of work for the Attorney General's Office (AGU). This project is expected to lead to significant savings in judicial expenses and improve efficiency in handling legal cases, with the emphasis that AI will not replace the work of lawyers and employees, but will help them achieve efficiency and accuracy under full human supervision [12].

To rationalize expenditure and improve services, the National Institute of Social Security (INSS) in Brazil also used AI to address the problem of long waiting lists for studying social benefit applications. An automated system based on AI was implemented to process these applications, which enabled the processing time for death pensions to be reduced to just 12 hours. The automatic analysis rate for benefits also increased from 17% in 2022 to 36% in 2023 [13].

The following table summarizes the most important developments in Brazil in this field:

Field	Responsible Entity	Problem/Goal	AI Solution	Results/Impact	Notes
Classification of Government Expenditures	National Treasury (STN)	Slow and error-prone manual classification	Machine Learning model for COFOG classification	Time reduced from 1,000 hours to 8 hours, accuracy >97%	Efficiency increase of 12,400%
Costs of Judicial Battles	Attorney General's Office (AGU)	High costs of lawsuits	Cooperation with OpenAI to examine and analyze lawsuits	Potential savings of billions of Reals	Aims to reduce government spending
Social Benefits Processing Time	National Institute of Social Security (INSS)	Long waiting lists for social benefit applications	Automated AI system for processing applications	Death pension processing time reduced to 12 hours	Automatic analysis rate increased from 17% (2022) to 36% (2023)

Source: Prepared by the researcher based on [11], [12], [13].

Second: The Experience of Singapore

Singapore is considered a global leader in adopting AI to improve the efficiency of the public sector and rationalize expenditure. Its strategy relies on a comprehensive approach that combines technological innovation, human capacity development, and the establishment of strong governance frameworks, through which it aims to enhance productivity, reduce operational costs, and improve the quality of government services.

The Singapore government launched the "Pair Suite" initiative, which uses AI to rationalize public expenditure by automating routine tasks and improving the efficiency of government operations. This suite consists of several tools based on Large Language Models (LLMs), including:

• **Pair Chat**: A secure and fast version of ChatGPT designed specifically for government employees. This tool is used for various tasks (summarization, translation, brainstorming, and code writing). This tool has led to an estimated 46% saving in the time spent on administrative tasks, which enhances public sector productivity [14].

• **Pair Noms (Notes of Meeting)**: A specialized tool for creating meeting minutes that transcribes and formats meetings and generates high-quality minutes in less than an hour, significantly reducing the time civil servants spend on this arduous task [14].

• **Pair Search**: A tool to improve the search experience in publicly available government records, such as parliamentary debates, Supreme Court judgments, and legislative documents, saving time and effort for employees, researchers, and citizens [14].

Singapore also launched another AI strategy in late 2023, aiming to harness AI for the public good. In this strategy, the government commits to expanding computing and data resources and policy guidelines to enhance research outcomes, and providing funding and incentives for training programs and the development of centers of excellence, as well as focusing on human resource development in AI [15].

The Government Technology Agency (GovTech) in Singapore also utilizes data science and AI capabilities to develop a set of tools that help improve operational efficiency and comprehensive analysis, including an open data platform that collects data from various government agencies, and a Natural Language Processing (NLP) tool that helps analyze and understand large quantities of government texts.

The following table summarizes the most important developments in Singapore in the field of AI and public expenditure:

Approximate Date	Development	Impact on Public Expenditure
Mid-2023	Launch of "Pair Suite" (Pair Chat, Pair Noms, Pair Search)	Saving 46% of the time spent on administrative tasks, increasing productivity, reducing the need for additional human resources for routine tasks.
Late 2023	Issuance of Singapore's National AI Strategy 2.0 (NAIS 2.0)	Directing government investments in AI towards priority areas, enhancing the overall efficiency of the public sector in the long term.
February 2024	Announcement of investment of over S$1 billion in AI over 5 years	Supporting the development of AI infrastructure and capabilities, leading to continuous improvements in operational efficiency and cost reduction in the long term.
Ongoing	Development of GovTech tools (Data.gov.sg, GovText, LLM Cybersecurity Playbook)	Enhancing transparency, improving decision-making, reducing manual effort, reducing the risk of financial losses resulting from security breaches.
Ongoing	Use of AI in fraud detection and risk management	Reducing financial losses resulting from fraud, improving financial risk management in the public sector.

Source: Prepared by the researcher based on [14], [15].

Third: The Experience of the United Arab Emirates (UAE)

The United Arab Emirates adopts a forward-looking vision in integrating AI within its governmental system. Therefore, it is witnessing rapid and significant developments in the field of integrating AI into public finance and public expenditure

rationalization, with the aim of achieving the highest levels of efficiency and effectiveness in managing public resources. These directions come within the framework of achieving the goals of the UAE Centennial 2071 [16]. The following table summarizes the most important of these developments:

Date / Time Period	Key Development
October 2017	Launch of the UAE Strategy for Artificial Intelligence
2024	Beginning of the integration of AI technologies in preparing the 2024 budget
2025	Launch of the Smart Budget Cycle 2027–2029 (The first federal cycle built entirely on AI)
2025	Organization of the "National Financial AI Forum" (AI Retreat)
2025	Ministry of Finance wins the "Innovating for Impact" award at the AI for Good Business Summit in the UAE
Ongoing	Launch of "Government Programmer" and "AI for All" initiatives
Ongoing	Development of national legislation for data governance in cooperation with the OECD

Source: Prepared by the researcher based on [16].

The Ministry of Finance began integrating AI technologies in preparing the 2024 budget and moved in 2025 to the full implementation phase by launching the Smart Budget Cycle 2027–2029, which is considered the first federal cycle in the world built entirely on AI tools and predictive analysis. This cycle, with a total value of about $245 billion distributed over 4 years, is based on advanced algorithmic models for resource allocation, performance evaluation, and ensuring consistency with national strategic priorities. The deep integration of AI into public finance aims to reshape the entire culture of financial decision-making, not just accelerate procedures.

Among the prominent strategies is also the analysis of citizens' demand for services and comparing it with the actual performance of government entities, which enhances the linkage of the budget to performance results and contributes to increasing transparency. This approach is integrated with the "UAE Data" system, which is fed with information from more than 30 federal entities, and is considered one of the most advanced government databases in the region.

In addition, the UAE's AI strategy targets vital sectors that can directly contribute to public expenditure rationalization, such as:

• **Transport Sector**: By reducing accidents and operational costs through smart traffic management and risk prediction systems.

• **Health Sector**: Reducing the rate of chronic and serious diseases, which reduces healthcare costs in the long term.

• **Renewable Energy and Water Sector**: Smart management of facilities and resource consumption, and conducting accurate analyses to save water, which leads to expenditure rationalization in these two vital sectors.

• **Education Sector**: Reducing costs and increasing the desire to learn through innovative educational solutions based on AI.

The preliminary results and the pilot phase of applying AI in the UAE's public finance showed a tangible positive impact on the efficiency of public expenditure. The Ministry of Finance estimates that the adoption of AI has contributed to achieving significant improvements, as shown in the following table:

Indicator	Expected Percentage / Value
Improvement in resource allocation efficiency	20%
Reduction of the gap between estimated budgets and actual execution	12%
Acceleration of budget preparation procedures	30%
Reduction of time required for financial decision-making	From weeks to days
Shortening of budget preparation steps (next cycle)	From 50 steps to 10 steps
Shortening of government procurement cycle (next cycle)	From 60 days to less than 6 minutes

Source: Prepared by the researcher based on [16].

These figures illustrate the direct impact of AI in enhancing the operational and financial efficiency of the government. The 20% improvement in resource allocation efficiency means optimal use of available budgets, and the 12% reduction in the gap between estimates and actual execution reflects greater accuracy in financial planning. Furthermore, the 30% acceleration of budget preparation procedures and the reduction of time required for decision-making contribute to the government's flexibility and speed of response to economic challenges and variables.

5. Key Challenges for Adopting Artificial Intelligence in Public Expenditure Rationalization

Despite the promising potential of AI in public expenditure rationalization, its adoption and application face a number of challenges and obstacles that must be addressed to ensure maximum benefit:

• **Initial Costs and Investment in Infrastructure**: Adopting AI requires significant initial investments in digital infrastructure, including hardware, software, data platforms, and cloud computing systems. These costs can be a barrier for many governments, especially in developing countries, which may lack sufficient financial resources or the necessary technical expertise.

• **Shortage of Competencies and Expertise**: The shortage of specialized competencies in the fields of AI, data science, and engineering is one of the biggest challenges facing the public sector. Governments need employees capable of developing, implementing, managing, and maintaining AI systems, in addition to employees capable of understanding and interpreting the outputs of these systems. This requires significant investment in training and capacity building, or attracting talent from the private sector, which can be difficult due to competition for competencies.

• **Data Quality and Availability**: The performance of AI systems depends heavily on the quality of available data. In many government agencies, data may be fragmented, inconsistent, incomplete, or stored in old and incompatible systems. This

requires significant efforts to clean, standardize, secure, and make data available for use by AI systems. There are also challenges related to data privacy and protection, especially when dealing with sensitive citizen data.

• **Organizational and Human Resistance**: The adoption of AI technologies may face resistance from government employees who fear losing their jobs or changes in work methods. Furthermore, current regulatory frameworks may not be prepared to deal with the legal and ethical challenges posed by AI applications.

• **Algorithmic Bias**: AI systems may reflect biases present in the data they were trained on, which could lead to unfair or discriminatory decisions, especially in areas such as criminal justice or resource allocation.

• **Transparency and Accountability**: Some AI models may be complex and inexplicable ("black box"), making it difficult to understand how they make decisions. This requires establishing frameworks for accountability and transparency to ensure that decisions made by AI can be traced and justified.

Conclusion

Artificial Intelligence represents a promising transformative force in the context of public expenditure rationalization and the enhancement of government efficiency. This analytical academic article, through a review of academic literature and an analysis of case studies from pioneering countries such as Brazil, Singapore, and the United Arab Emirates, has shown that AI possesses the ability to bring about positive and tangible change in public financial management. By automating routine tasks, analyzing spending decisions, as well as budget planning and monitoring, improving fiscal forecasts, and enhancing the quality of public services, the contributions of AI to public expenditure rationalization are numerous, leading to significant financial savings and increased productivity.

The findings confirmed that public expenditure rationalization through the utilization of AI technologies is a tangible reality achieved in practical applications, as is the case with the National Treasury application and the application for reducing judicial costs in Brazil, both of which showed considerable results. In addition, the Pair Suite initiative in Singapore saved 46% of the time spent on administrative tasks, and AI improved resource allocation efficiency in the UAE by 20% and reduced the gap between estimated budgets and actual execution by 12%. These results confirm the potential of AI in public expenditure rationalization and improving government performance, which is reflected in the increasing global trend towards investment in AI by governments. However, the utilization of AI in public expenditure rationalization is not without challenges. Initial costs and infrastructure, a shortage of competencies and expertise, data quality issues, and resistance to change, in addition to issues of transparency and accountability, are all obstacles that require comprehensive and integrated solutions.

Therefore, based on the experiences of these countries, we emphasize the importance of following a comprehensive and balanced approach when applying AI in the public sector. This approach must focus on investing in data infrastructure, designing human-centric systems, establishing transparent and accountable governance frameworks, building human capacities, enhancing cooperation between different sectors, and starting the application of AI on small, specific pilot projects instead of applying it on a wide scale all at once.

Ethical Considerations

This study is based exclusively on secondary data derived from publicly available governmental reports, policy documents, and international institutional publications related to public finance and artificial intelligence applications. No primary data collection involving human participants, surveys, interviews, or confidential information was conducted. Therefore, ethical approval was not required. The research adheres to principles of academic integrity, transparency, and responsible use of data, ensuring accurate representation and proper citation of all sources.

Author Contributions

Dr. Salah Eddine Saoudi contributed to the conceptualization of the study, research design, theoretical framework, and overall supervision of the manuscript.
PhD Billel Zidane was responsible for data collection, comparative analysis of case studies, interpretation of findings, and drafting the initial version of the manuscript.
Both authors jointly reviewed, revised, and approved the final version of the manuscript.

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

References

1. Ayres, M., & Caram, B. (2024). Brazil hires OpenAI to cut costs of court battles. *Reuters*. https://www.reuters.com/technology/artificial-intelligence/brazil-hires-openai-cut-costs-court-battles
2. Congressional Budget Office. (2024). *Artificial intelligence and its potential effects on the economy and the federal budget*. https://www.cbo.gov/publication/61147
3. Haddab, M. (2017). Rationalization of public expenditure as a pillar for economic diversification in Algeria in light of the current oil crisis. *Journal of Business Administration and Economic Studies, 3*(1), 176–189.
4. Inzran, A. (2024). Governance of public policies in the age of artificial intelligence. *Algerian Journal of Human Security, 9*(3), 466–493.
5. International Monetary Fund. (2024). AI is enhancing fiscal transparency in Brazil. *PFM Blog*. https://blog-pfm.imf.org/en/pfmblog/2024/12/ai-is-enhancing-fiscal-transparency-in-brazil
6. Jian, Z., Fan, G., & Lin, C. (2021). Artificial intelligence in the public sector: A review of current applications and future trends. *Journal of Public Administration Research and Theory, 31*(2), 221–236. https://doi.org/10.1093/jopart/muaa058
7. Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly, 36*(4), 101485. https://doi.org/10.1016/j.giq.2019.06.002
8. Montreal AI Ethics Institute. (2025). *AI policy corner: Singapore's national AI strategy 2.0*. https://montrealethics.ai/ai-policy-corner-singapores-national-ai-strategy-2-0/
9. Nicolás, M. A., & Sampaio, R. C. (2024). Balancing efficiency and public interest: The impact of AI automation on social benefit provision in Brazil. *Internet Policy Review, 13*(3). https://policyreview.info/articles/analysis/balancing-efficiency-and-public-interest
10. Nose, M. (2023). *Inclusive govtech: Enhancing efficiency and equity through public service digitalization*. International Monetary Fund. https://doi.org/10.5089/9798400258626.001
11. Organisation for Economic Co-operation and Development. (2025). *Using artificial intelligence in public financial management*. OECD Publishing.
12. Santosh, K., et al. (2020). *Public policy and regulatory challenges of artificial intelligence (AI)*. Tiruchirappalli.
13. Seraj, W. (2018). An analytical study of public expenditure policy in Algeria. *Academy for Social and Human Studies, 10*(1), 90–101.
14. United Arab Emirates Government. (n.d.). *UAE national strategy for artificial intelligence 2031*. https://ai.gov.ae/ar/strategy/
15. UAE Ministry of Finance. (2023). *Artificial intelligence: Its concept and importance in the governmental financial field*. https://mof.gov.ae/blogs-ar/
16. United Nations Development Programme. (2024). *Pairing with AI for public sector impact in Singapore*. UNDP Policy Centre. https://www.undp.org/policy-centre/singapore/blog/pairing-ai-public-sector-impact-singapore
17. Virtasant. (n.d.). *AI in government services cuts spending, boosts efficiency*. https://www.virtasant.com/ai-today/ai-in-government-services-efficiency

18. Acemoglu, D., & Restrepo, P. (2020). The wrong kind of AI? Artificial intelligence and the future of labour demand. *Cambridge Journal of Economics, 44*(4), 681–709. https://doi.org/10.1093/cje/beaa008
19. Dunleavy, P., Margetts, H., Bastow, S., & Tinkler, J. (2006). New public management is dead—Long live digital-era governance. *Journal of Public Administration Research and Theory, 16*(3), 467–494. https://doi.org/10.1093/jopart/mui057
20. Eggers, W. D., Schatsky, D., & Viechnicki, P. (2017). *AI-augmented government: Using cognitive technologies to redesign public sector work*. Deloitte University Press.
21. European Commission. (2022). *Artificial intelligence and public sector transformation*. Publications Office of the European Union.
22. World Bank. (2021). *GovTech: Putting people first*. World Bank Group. https://www.worldbank.org/en/topic/governance/brief/govtech-putting-people-first
23. Zuiderwijk, A., Chen, Y. C., & Salem, F. (2021). Implications of the use of artificial intelligence in public governance: A systematic literature review and a research agenda. *Government Information Quarterly, 38*(3), 101577. https://doi.org/10.1016/j.giq.2021.101577