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THE ROLE OF AI IN PUBLIC BUDGET PROCESSES: A COMPARATIVE EVALUATION ON NATIONAL AI STRATEGIES AND PRACTICAL EXAMPLES

KAMU BÜTÇE SÜREÇLERİNDE YAPAY ZEKANIN ROLÜ: YAPAY ZEKA ULUSAL STRATEJİLERİ VE UYGULAMA ÖRNEKLERİ ÜZERİNE KARŞILAŞTIRMALI BİR DEĞERLENDİRME

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ABSTRACT

In today's world, where interest in AI has increased dramatically, identifying and disseminating effective methods of use is of great importance in the public sector, as it is in the private sector. While it is important to examine AI within the framework of the public budget in order to understand its role in the production or delivery of public services such as transport, infrastructure, social welfare spending, and disaster management, research is limited in this area in the literature. This study, which aims to investigate the role of artificial intelligence in public budget processes and discuss its effective applicability in the public sector, examines national strategies and applications related to artificial intelligence in Türkiye and seven countries with the highest scores

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in the Government AI Readiness Index across seven geographical regions of the world. Our analysis found that AI can be used in all stages of public budget processes from planning, preparation and authorization to implementation and control inline with the literature, and that Türkiye is a country that attaches considerable importance to this area. The study emphasises that increasing incentives for AI and prioritising strategies for creating qualified human resources are necessary for more effective and widespread use of AI in public budgeting.

ÖZ

Yapay zekaya ilginin dramatik bir artış gösterdiği günümüzde, özel sektörde olduğu gibi kamu sektöründe de etkili kullanım yöntemlerinin tespiti ve yaygınlaştırılması büyük önem taşımaktadır. Yapay zekanın ulaşım, altyapı, sosyal yardım harcamaları, afet yönetimi gibi kamusal hizmetlerin üretimi veya sunumundaki rolünün anlaşılabilmesi için yapay zekanın kamu bütçesi çerçevesinde incelenmesi önemli olmakla birlikte, literatürde bu alanda yapılmış araştırmaların sınırlı olduğu görülmektedir. Yapay zekanın kamu bütçesi süreçlerindeki rolünü araştırarak, kamu sektöründe etkin bir şekilde uygulanabilirliğini tartışmayı amaçlayan bu çalışmada, dünyanın yedi coğrafi bölgesinde Government AI Readiness Index'ten en çok puan alan 7 ülke ile Türkiye'nin yapay zekâ ile ilgili ulusal stratejileri ve uygulamaları incelenmiştir. Analizimizde yapay zekanın literatürle uyumlu bir şekilde kamu bütçe süreçlerinin planlama, hazırlanma ve yetki alma, uygulama ve denetim aşamalarının tümünde kullanılabileceği ve Türkiye'nin de bu alana oldukça önem veren bir ülke olduğu tespit edilmiştir. Çalışmada daha etkili ve yaygın kullanılabilmesi için yapay zekaya yönelik teşviklerin artırılması ve nitelikli insan kaynağının oluşturulmasına öncelikli stratejiler arasında yer verilmesi gerektiği vurgulanmaktadır.

Keywords: Artificial Intelligence, Public Budget, Budget Processes, National AI Strategies, Decision Support Tool

Anahtar Kelimeler: Yapay Zekâ, Kamu Bütçesi, Bütçe Süreçleri, Yapay Zekâ Ulusal Stratejileri, Karar Destek Aracı

INTRODUCTION

AI has become an integral component of contemporary society, permeating various aspects of daily life. This encompasses a wide range of applications, including the organization of personal calendars, operation of autonomous vehicles, and provision of recommendations tailored to individual preferences and usage patterns (European Commission, 2018: 1). Although AI is not a novel discipline, it has evolved into a pivotal element of the business models of numerous organizations (Dwivedi et al., 2021: 2). Moreover, it has garnered significant attention in all areas of politics in recent years (Kuziemski and Misuraca, 2020: 1).

For thousands of years, people have been studying how they think and behave, in other words, how the human brain perceives and understands a world much larger and more complex than itself. The discipline of AI, on the other hand, is concerned with creating machines that can not only perceive or understand but also calculate how to act most effectively and safely in a wide variety of situations (Russell and Norvig, 2022: 19). Miailhe and Hodes (2017: 3) state that AI is difficult to define, and this difficulty stems from the fact that there is no universally accepted definition of "intelligence". The OECD Committee on AI (2024) recommends the following definition:

"An AI system is a machine-based system that, for explicit or implicit objectives, infers, from the input it receives, how to generate outputs such as predictions, content, recommendations, or decisions that can influence physical or virtual environments. Different AI systems vary in their levels of autonomy and adaptiveness after deployment."

The European Commission (2018: 1) defines AI as "systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals.". Besides the variability of the definition of "intelligence", another factor that multiplies and complicates the definition of AI is time. In their report on AI for the OECD, Berryhill et al. (2019: 12–13) asserted that numerous phenomena formerly classified as AI, including mapping applications that examine vast data sets to determine optimal routes and computers capable of playing chess, are now designated as automation. This is due to the fact that systems capable of performing tasks that exceed human capabilities do not invariably utilize AI; rather, they depend on substantial processing capabilities that had not previously been utilized to that extent. In the report, this is simply stated as "speed can masquerade as intelligence, but isn't."

Despite the absence of a consensus among the definitions, interest in AI is increasing on a daily basis. Maslej et al. (2025: 3-4) state that the rate of legal mention of AI globally increased 9 times in 2025 compared to 2016. This technology also has increasingly entered the field of social sciences in recent years and has become one of the most powerful tools transforming public administration (Damar et al., 2024).

The diversification of the usage areas of AI has required countries around the world to take steps towards both guiding policy documents and practices. Therefore, countries have started to create strategy documents that provide them with a kind of road map in line with national needs and international developments and determine their utilization frameworks. Türkiye is among the countries that follow current developments in this field and formulate policies in line with its economic and social goals. In this context, AI has been included in higher policy documents such as development plans in more and more detail, and a strategic action plan has been developed based on these documents and keept up to date. The steps taken in this field in Türkiye have not only been limited to policy documents, but also practical projects have been developed in various fields such as health, education and public finance.

In this study, we examine the role of AI in public budget processes. First, we discuss how AI can be used in public budget processes that are necessary for the production or provision of public goods and services. Using the Government AI Readiness Index prepared by Oxford Insights, we will examine the AI national strategy documents of the 7 countries with the highest scores in seven geographical regions of the world and Türkiye, and analyze the implementation practical examples within the scope of the public budget.

1. AI IN PUBLIC BUDGETING

In an economy, public goods and services are produced or provided by public institutions. Public institutions prepare strategic plans, which are long-term expenditure plans, in line with the government's strategy. The operationalization of these plans occurs each year through the authorization of appropriations and revenue collection in the budgets for that fiscal year, thereby ensuring the production or provision of public goods and services. At the end of the budget process, spending and revenue collection authorization are audited. This annual process is referred to as the budget process and comprises of five stages: planning, preparation, authorization, implementation, and audit (Altuğ, 2019: 11). For AI to be used in the production or provision of public goods and services, it needs to be integrated into these stages. Table 1 shows the fields of application for AI in budget processes in the literature.

Table 1: Fields of Application for AI in the Public Budget Processes

Public Budget Processes	Fields of Application	Outcomes
Planning	-Decision making -Time cost -Alternative budget policies	Reducing time cost and increasing efficiency in budget planning and preparation processes with big data analysis (Alkabbj et al., 2024) Ensuring objectivity in decision-making processes by increasing automation (Claudé and Combe, 2018) Scenarizing the possible effects of public good production or provision decisions with the help of AI while formulating fiscal policies, creating alternative policies and improving the decision-making process (Kayacı, 2025)
	-Financial cost -Productivity	Minimizing costs and increasing efficiency by producing smart solutions such as smart meters and smart grids in urban services like traffic, transportation, and infrastructure (Akyol and Özkan, 2023)
	-Allocative efficiency -Needs analysis	Identifying patterns in data using machine learning algorithms, detecting future trends, and resource planning by analyzing long-term needs (Margetts and Dorobantu, 2019)
Preparation and Authorization	-Revenue and expenditure forecast -Bureaucratic processes	Improving the cost estimates of public goods and services with machine learning algorithms (Capone et al., 2024; Sadick et al., 2024) Faster provision of public goods and services with AI, reduction of administrative burdens, red tape and bureaucracy (Wirtz et al., 2019; Tanrıverdi, 2021) Error-free estimation of public revenues using artificial neural networks (Görmez, 2023) Improving the distribution of social expenditures (Aydın, 2024)
	-Governance -Local Democracy	Faster and clearer solutions to citizens' demands and greater citizen participation in public decision-making (Mehr, 2017)
Implementation	-Budget balance -Accounting	Using big data in budget accounting to control the budget's income-expenditure balance and improve budget management (Qin and Qin, 2021; Dağlıoğlu Şanlı, 2024).
	-Tax compliance -Revenue collection	Increasing tax compliance by reducing compliance costs and facilitating the collection of public revenues (Mökander and Schroeder, 2024; Aydın, 2024)

Public Budget Processes	Fields of Application	Outcomes
Audit	-Detecting irregularities, fraud, and smuggling -Accountability and transparency -Risk analysis	Increasing fraud identification and monitoring efforts by performing risk analysis with the help of AI and big data and detecting potential risks before they occur (Köse and Polat, 2021; Yang, 2025) Reducing subjectivity, increasing the reliability of audit findings, eliminating audit errors (Jakovljevic, 2021; Polat, 2024) Detecting tax losses and evasion and preventing tax evasion through machine learning or deep learning (Saragih et al., 2022; Ömercioğlu, 2024) Increasing citizens' trust levels as a result of increased accountability and transparency (Efe, 2022; Güven, 2024; Yavuz, 2025)

Source: Based on the authors' literature review.

As Table 1 shows, AI can be used in every stage of the budgeting process. AI allows us to see the future effects of the public goods and services to be produced or provided in the budget's planning phase and generate alternative scenarios. Additionally, machine learning algorithms can identify future spending trends and needs analysis, enabling long-term resource planning (Margetts and Dorobantu, 2019: 4).

The most common application of AI in budget preparation is to increase the accuracy of revenue and expenditure forecasts. Taşdelen and Altıntaş (2023: 202) stated that AI tools such as predictive analysis, anomaly detection, automatic classification, optimization algorithms, deep learning models, cloud-based budgeting solutions,and fuzzy budgeting are used in making revenue and expense forecasts. Capone et al. (2024: 32) developed a cost estimation model through machine learning and concluded that the accuracy of this model is much higher than traditional methods. Sadick et al. (2024: 1) estimated the budgets of projects using a natural language processing model. According to Lipelis (2025: 39), the implementation of advanced technologies, including AI, machine learning, and neural networks, enhances the precision of forecasts while simultaneously improving decision-making processes and operational efficiency. Additionally, the automation of the budget preparation process has been shown to enhance efficiency by reducing administrative burdens and bureaucratic processes (Tanrıverdi, 2021: 299) and increasing citizen

participation in decision-making processes (Mehr, 2017: 6). Zuiderwijk et al. (2021: 10) posited that AI enhances citizen-state interaction and elevates citizen satisfaction with public services, thereby fostering heightened trust in the state. This approach enhances the efficacy of governance and local democratic processes.

The role of AI in the implementation phase of the budget is twofold: to assist in maintaining the income-expenditure balance and to facilitate effective accounting management. As posited by Qin and Qin (2021: 9), the utilization of cloud-based AI applications has been demonstrated to enhance the management of budget balance and accounting. In addition, the implementation of machine learning algorithms to reduce administrative burdens will increase tax compliance by saving time and effort for taxpayers (Görmez, 2023: 63) and facilitate the collection of public revenues (Alkabbj et al., 2024: 157).

AI also plays a significant role in the audit phase, which is the final phase of the budget. According to Yang (2025: 5), auditors can detect anomalies before risks occur thanks to deep learning-based algorithms. The author stated that models trained with historical data can also predict future risks. Jakovljevic (2021: 287-288), in a survey of auditors, stated that AI reduces the level of subjectivity in audit judgment and increases the reliability of preliminary conclusions and audit findings by eliminating or significantly reducing audit errors. According to Ömercioğlu (2024: 1456), the use of AI applications that rely on machine learning and deep learning can help minimize tax losses and evasions. These applications determine the audit result through these advanced learning methods.

2. NATIONAL AI STRATEGIES OF SELECTED COUNTRIES

This part of the study will focus on the selection of countries, the national strategic plans of Türkiye and the selected countries on AI, and examples of AI applications in the public sector in these countries.

2.1. Selection of Countries

Government AI Readiness Index seeks to answer the question "How ready are governments to implement artificial intelligence in the delivery of

public services?". In this index, 188 countries are analyzed by grouping them according to different characteristics such as income group and geographical regions within the scope of these three main lines, and each component is assigned a value between 0 and 100 (Nettel, 2024: 5).

Using the index scoring, the country with the highest score in each of the nine regions was included in the study. Thus, it has been possible to compare the countries having the best examples in applying AI in public budget processes on a global scale. The countries are as follows:

- North America - USA,
- Latin America & The Caribbean - Brazil,
- Western Europe - France,
- Eastern Europe - Estonia,
- East Asia - Singapore,
- Middle East and North Africa - UAE,
- South and Central Asia - India,
- Pacific - Australia,
- Sub-Saharan Africa - Mauritius.

Among these countries, Mauritius and Singapore were excluded from the scope of the study due to the absence of a publicly accessible application example. This situation also constitutes a limitation of the study.

Digital transformation is increasingly occurring in different areas of public financial management such as public expenditures and public procurement processes in Türkiye. Within the scope of this transformation, AI has been given special importance in recent years. Due to the steps taken and strategic plans for AI applications, Türkiye is another important example in terms of the use of AI. Due to these developments, in addition to the countries selected above, the study also includes Türkiye.

2.2. National AI Strategies in Selected Countries

The innovations and effective solutions offered by AI in both the public and private sector have enabled the creation of various usage areas. These developments have accelerated investments in this technology and

led to steps being taken to institutionalize countries' AI approaches. In this context, strategic plans have begun to be prepared specifically for AI, which has increasingly found a place in legal regulations and national documents and plans in recent years. Table 2 summarizes the national strategies of the countries the general goals of each country.

Table 2: National AI Strategy Plans and Objectives by Country

Countries	National AI Strategy Plan	Objectives
USA	-National AI Research and Development Strategic Plan (2016) -Removing Barriers to American Leadership in AI (2025)	Focusing on aspects such as human-AI cooperation, long-term investments in AI, ethics, and aims to coordinate AI research across government agencies Expanding public-private partnerships and establishing a principled and coordinated approach to international cooperation
Brazil	-Estratégia Brasileira de Inteligência Artificial (EBIA) (2021) -Brazilian AI Plan (PBIA) (2024-2028)	Aiming sustainable development, justice, being transparent and accountable. Developing AI solutions that significantly improve the quality of life of the population, optimizing the delivery of public services and promoting social inclusion
France	-AI for Humanity (2018) -France 2030 (2021)	Improving AI training to develop and attract AI talent Establishing an open data policy Developing an ethical framework
Estonia	Kratt Strategy (2019-2021/2022-2023)	Aiming to align AI in Estonia with public services, the private sector, research and development, and legal frameworks Making e-services more user-friendly and accessible and increasing government efficiency Building a basic capacity for the deployment of AI solutions in public sector organizations Promoting data availability, reusability and data quality assurance more broadly across all sectors
India	AI for All (2018)	Focusing on fundamental research on AI Creating AI-based applications in domains of societal importance Prioritizing healthcare, agriculture, education, smart cities, and smart mobility Developing sector-specific guidelines on privacy, security, and ethics Creating a National AI Marketplace to increase market discovery and reduce the time and cost of collecting data

Countries	National AI Strategy Plan	Objectives
UAE	UAE Strategy for AI (2017)	Establishing Ministry of Artificial Intelligence Investing in transport, health, space, renewable energy, water, technology, education, environment, and traffic
Australia	The AI Action Plan (2021)	Creating an environment for AI talent Solving Australia's national challenges by AI

Source: Chung-Tick-Kan, et al., (2018) and created by the authors by examining the national AI strategy documents of the countries.

The national AI strategic plans of the countries reveal that there are both common and divergent points (See Table 3).

Table 3: Features of National Strategies for AI in Selected Countries

Commonalities	Divergences
R&D incentives	Strategic plan periods
Expanding collaborations	Priority areas
Ethics, transparency and accountability	National targets
Human capital development	Legal and regulatory framework
Economic growth and sustainable development	
Digital transformation	
Usage in public services	
International leadership	

Source: Created by the authors by utilizing the national strategies of countries on AI.

The common points of the countries' strategic plans are R&D support, expansion of collaborations, ethics-transparency-accountability, human capital development, economic growth and sustainable development, digital transformation, usage in public services, and worldwide AI leadership. On the other hand, the different points are the durations of the strategic plans, priority areas, national goals, and the legal and regulatory framework.

2.2.1. Common Features of National AI Strategies

The common points of strategic plans are detailed below.

R&D Incentives: Innovative solutions offered by AI in various fields have encouraged countries to invest more. Priority has been given to establishing research centers and conducting studies on the development of technology. Countries that particularly emphasize R&D in their strategic plans are the USA (EOP, 2016: 3), France (European Commission, 2019), Estonia (MEAC and Government Office, 2019), and India (NITI Aayog, 2018).

Expanding Collaborations: Another common point is the expansion of collaborations. Collaborations involve both the public-private sector at the national level and cooperation between countries at the international level. Partnerships established at national and international levels will increase the speed of expansion of AI application areas, thus contributing to economic growth and social welfare. In this sense, the countries that emphasize collaborations more are the USA (EOP, 2016: 31-34), and France (European Commission, 2019).

Ethics, Transparency and Accountability: The fact that AI has started to find a place in our daily lives has made it necessary to take precautions against the negative effects that technology can create. While preventive regulations are applied in all countries, the elements of ethics, transparency and accountability have been adopted as principles in the strategy documents of the USA (EOP, 2016: 3), Brazil and France (OECD.AI, 2025).

Human Capital Development: The importance of AI has increased the need for trained human resources in this field. Awareness of this need has necessitated a plan to provide training to develop human capital in national AI strategies. In this context, France (Krasavina, 2023), Estonia (MEAC, 2021), and Australia (DISER, 2021) have made special room for education and talent development in their strategic plans.

Economic Growth and Sustainable Development: The economic opportunities that technology can create due to the variety of usage areas will inevitably contribute to economic growth and sustainable development (Tuğaç, 2023). While this opportunity has been included in the strategic plans of all selected countries, Brazil (Governo Digital, 2021), India (NITI Aayog, 2018) have prioritized this issue more.

Digital Transformation: Another element that countries have a common opinion on is digital transformation. All selected countries have emphasized the necessity of digital transformation in both the private and public sectors.

Usage in Public Services: The spread of technology has made it a necessity for the public sector to undergo a digital transformation and keep up with the current affairs. Therefore, usage of AI in various public services has been one of the primary objectives. In this sense, the countries that stand out are Estonia (MEAC, 2021), India (NITI Aayog, 2018), UAE (2018).

International Leadership: Although selected countries determine the use of the AI primarily by considering their national interests, the common strategic goal of all countries in this field is to become a global leader.

2.2.2. Different Aspects of National AI Strategies

The points where the countries differed in their AI strategic plans are as follows:

Strategic Plan Periods: The number of strategic plans and the periods of these plans vary from country to country. Accordingly, the USA, which was the first country to publish an AI strategic plan among the countries, announced three plans from 2016 to 2025. Some countries have aimed to achieve their strategic plan goals within specific time frames. For example, Brazil has set the period of its plan called "The Brazilian Artificial Intelligence Plan" (PBIA) as 2024-2028, while in the UAE the period is longer, approximately ten years. Estonia and Brazil have developed 2- to 3-year plans that formulated shorter-term and implementation-oriented plans (LNCC, 2024; MEAC, 2021; UAE, 2018).

Priority Areas: Although all countries focus on similar elements in their AI strategic plans, they differ in terms of the areas they prioritize. Brazil's first plan focused on industry, finance and the public sector, while the second plan specified these sectors and included health, agriculture, the environment, industry, trade, education and social development (Ministério da Ciência, Tecnologia e Inovação, 2024). Estonia, on the other hand, has focused heavily on public sector transformation. In terms of the public sector, the strategy's primary objectives are twofold. Firstly, it aims to establish a fundamental capacity for the implementation of AI solutions within public sector institutions that have not yet adopted any such solutions. Secondly, it seeks to enhance the

capabilities of institutions that already have a certain degree of AI deployment capacity but have not yet utilized it (MEAC, 2021). In India, which has adopted the "AI for ALL" approach, areas such as health, agriculture, education, smart cities-infrastructure and smart mobility-transportation have come to the fore (NITI Aayog, 2018). In the UAE, by adopting goals that include both the public and private sectors, it is aimed to contribute to education, economy and social welfare through various AI technology applications in areas such as energy, tourism and education (UAE, 2018).

National Targets: The diversity of the areas prioritized is highly related to the differentiation of the goals to be achieved with the use of AI. As stated in the common aspects section, one of the ultimate goals of all countries is to become a global leader. Since leadership is a singular phenomenon by its nature, it is not possible for all countries to become a global leader in practice. On the other hand, the national goals of each country are more realistic and specific, therefore, they vary. For example, economic competitiveness for the USA (The White House, 2025), social benefit for Brazil, UAE and India (OECD.AI, 2025; UAE, 2018: 8; NITI Aayog, 2018), and digital transformation in the public sector to improve the delivery of public services for Estonia are additionally emphasized (MEAC, 2021).

Legal and Regulatory Framework: Establishing legal and regulatory boundaries in line with technological developments is a necessity in personal, social and economic terms. Protective measures such as the enactment of laws to protect personal data and the prevention of discrimination in automated decision-making systems constitute the legal and regulatory framework. While every country has its own practices in this regard, countries such as Estonia prioritize these issues (MEAC, 2021).

When evaluated as a whole, it can be seen that countries' singular approaches have changed between their initial strategic plans and the subsequent ones. In the USA, the decree titled "Removing Barriers to American Leadership in Artificial Intelligence" published in 2025 aimed to strengthen the USA's position as a global leader in the field. For this purpose, previous AI policies were revised and an action plan was made mandatory within 180 days to increase the role of AI in supporting human development, economic competitiveness and national security (The White House, 2025). While ethics, investment, security, and international cooperation were the focus of the US

strategic plan in previous periods, the 2025 decree has set innovation and international leadership as its main goals. This shows that the US has changed its priorities in its national strategy policies on AI.

The rapid technological advancement experienced worldwide has also been reflected in Türkiye's technological attempts; various policies and national documents have begun to prioritize developments such as big data, the IoT and AI in greater detail. Although the 11th Development Plan outlined a general framework for artificial intelligence in its initial phase (SBB, 2019), because of the national needs and international developments (Madiega, 2024: 1), the 12th Development Plan (SBB, 2023) has become much more comprehensive in this field as. The main outline for AI established in the previous development plan has been transformed into a deep and comprehensive structure based on sectors for use in daily life in the 12th Development Plan. AI-focused digital transformation in different areas such as economic growth, employment, health and energy is among the priorities of Türkiye's development goals (SBB, 2018). The "National Artificial Intelligence Strategy Document", was published in 2021 (SBB, 2020: 222), in line with the plans and documents of national and international institutions. The vision of the strategy has been determined as "to produce value on a global scale with an agile and sustainable artificial intelligence ecosystem for a prosperous Türkiye" (CDDO, 2021: 7). Transformation in perspective on AI necessitated the reform of the national strategy document covering the period 2021-2025, which has been updated as the "National Artificial Intelligence Strategy 2024-2025" (STB and CDDO, 2024). While the priority areas remain unchanged, the update focuses on the development of productive AI technologies for more effective use of resources, the development of large language models in Turkish and the creation of value-added products and services using these models, the strengthening of the R&D, innovation, and entrepreneurship ecosystem, increasing access to data, and enhancing the transformation of the workforce and increasing the availability of skilled human resources (CDDO, 2024).

3. EVALUATION OF AI APPLICATIONS FROM THE PERSPECTIVE OF PUBLIC BUDGET PROCESSES

The effective and efficient implementation of technology is as important as the creation of national AI strategies. In this context, examples of AI applications in the public sector of the countries and Türkiye were examined. While selecting the examples, the field of public finance was prioritized; in some countries, applications for public service delivery were used. When selecting these examples, emphasis was placed on highlighting the potential use of AI at every stage of the public budget process. Thus, using examples from countries with different backgrounds, an effort was made to demonstrate that AI can be used at all levels of the public budget process (See Table 4).

Table 4: Practical Examples of AI

Countries	Cases
United States of America	Answers contractors' questions about procurement rules and regulations, such as how to draw up a contract, which procedures to follow, or which contracts to bid on, based on regulations, contract templates, procurement training materials, and related policy documents
Brazil	Classifies the expenditures of local governments according to international standards
France	Identifies municipalities experiencing financial difficulties, provides financial advice to municipalities, and supports the implementation of corrective measures
Estonia	Enables citizens to access digital government services through AI-enabled channels
India	Fights the pandemic in the context of the smart city during COVID-19
United Arab Emirates	Analyzes financial data, generates insights, and visualizes financial data
Australia	Justifies public spending and identifies the costs of new policies
Türkiye	Provides an AI-supported machine learning digital legislation assistant that serves as a decision support mechanism for auditors during the audit phase of the budget

Source: Created by the authors.

USA: To understand the complex regulations governing the Air Force's procurement processes and to streamline the procurement of goods and services, an AI-based pilot project was launched in 2018. Accordingly, the department will upload regulations, contract templates, procurement training materials, and relevant policy documents to the system; AI technology will then

use this information to answer questions from federal contracting authorities and contractors regarding procurement rules and regulations, such as how to execute a contract, which procedures to follow, or which contracts to bid on (Chenok and Yusti, 2018: 11-12).

Brazil: AI is used by the National Treasury (STN) to classify local government expenditures according to the international standard COFOG. Previously, manual processes were labor-intensive, leading to time loss and errors. However, with the AI model introduced in 2021, the time required for data classification has been reduced from 1,000 hours to 8 hours, and the model's accuracy has increased to 97%. The STN is expanding the use of AI to other critical areas, such as the classification of climate-related expenditures (IMF PFM, 2024).

France: The DGFIP has developed a "warning system" consisting of an algorithm that uses past tax and financial data to initially score municipalities, with the aim of identifying municipalities experiencing financial difficulties, providing financial advice to municipalities, and proactively supporting the implementation of corrective measures. While using this system, the DGFIP has developed a model equipped with machine learning designed to detect municipalities' financial difficulties at an earlier stage. The model was trained using data covering four years to predict the results for the fifth year over a five-year period. A pilot study was conducted in 2022 covering 2,500 municipalities, revealing that approximately 40% of the municipalities were facing financial difficulties, with approximately 35% of the municipalities experiencing temporary, non-structural challenges. This finding highlights the model's ability to distinguish between permanent and temporary financial issues (OECD, 2025: 7-8).

Estonia: "Bürokratt" has been developed to enable citizens to access digital government services through AI-supported channels. Citizens can use "Bürokratt," a chatbot implemented by ministries to answer questions from citizens, to perform a wide range of public service transactions on a 24/7 basis. Examples of its use include applying for child benefits under social services assistance programmes (Schwäbe, 2024: 8; Dreyling III vd., 2024: 737).

India: The "AI for ALL" approach aims to use AI in various fields like healthcare, education, and agriculture to reach all citizens. One of the real-life applications of these goals was the use of AI in smart cities during the COVID-19, which helped achieve positive results in the fight against the pandemic. India's smart city initiative enabled the government to track infected citizens, manage food supply during lockdown periods, distribute food to citizens facing economic difficulties, and maintain communication with citizens through communication networks. By this initiative, the government could respond quickly and effectively to COVID-19 (Angın and Doğmazer, 2023: 339).

UAE: The Ministry of Finance has an ongoing project called "Virtual Mona" that uses virtual and augmented reality for financial data analysis, insight generation, and financial data visualization (OECD, 2025: 11). The project is designed to facilitate access to financial data, reduce human error, and increase the accuracy of the analyses through AI. The platform also aims to promote transparency by making financial information available to stakeholders and enabling employees to easily request and interact with data (Ministry of Finance, 2024).

Australia: AI provides important digital support in ensuring that public spending is properly justified and that the costs of new policies are determined. To assess the future financial impacts of policy decisions, The Department of Veterans' Affairs, provides support to veterans and their families, uses a model called the AI-supported PIA-V. This model simulates the lifetime financial processes of the beneficiaries. The outputs produced by the model include data such as annual public expenditure for each beneficiary, the number of years of support provided, budget estimates, beneficiary classification, and policy evaluation (OECD, 2025: 8).

Türkiye: HMB (2024) has launched the "Artificial Intelligence-Supported Accounting and Advanced Analytics Project" in 2024. The project aims to enhance the effectiveness of financial decision-making and policy development processes, eliminate inefficient expenditure areas, restrict new expenditure areas, achieve efficiency and savings in public expenditures through an early warning system, and analyze public administration expenditure patterns using deep learning techniques. With the realization of these objectives, it is aimed to contribute to the effectiveness and efficiency in the use of public resources as

well as auditability. In order to strengthen auditability with artificial intelligence, the Turkish Court of Accounts (TCA) is focusing on further developing the integration of systems such as VERA (TCA Data Analysis System) and DYS (Audit Management System), which form the basis of digital transformation in auditing, by increasing their integration with artificial intelligence (Yener et al., 2025: 27).

In accordance with the purpose of the study, it is possible to evaluate each application presented above through public budget processes.

Table 5: The Role of AI Practical Examples in Countries' Budget Processes

Public Budget Process	**Countries**	**Outcomes**
Planning	France	Identifying risks and challenges for future years by utilizing past budget data and ensuring efficiency in resource utilization
	UAE	Improving accuracy in public resource planning, ensuring needs analysis, and enhancing accountability and transparency
Preparation	Brazil	Time savings and increased efficiency in the classification of public expenditures
	Australia	Preparation of future period cost and revenue estimates for public expenditure and financing
Implementation	USA	Using as a decision-making tool in service procurement processes for the provision of public goods and services
	Estonia	Reducing bureaucratic and administrative burdens through chatbots, improving government-citizen relations and increasing governance
	India	Making decisions on the distribution of social assistance expenditures and improving state-citizen relations during the pandemic
Auditing	Türkiye	Reducing the time cost arising from regulatory compliance by providing the auditor with a decision support mechanism, making the process more efficient

Source: Created by the authors.

The role of AI applications in the budget processes of the public sector in Türkiye and other countries is summarized in Table 5. Our assessment of this role is presented in the discussion section of this study.

DISCUSSION AND CONCLUSION

The diversification of AI applications has led to an understanding of its potential contribution to economic competition and social benefit, thereby necessitating countries to develop strategic plans in this area. When national AI strategies are evaluated in general, it is seen that every country has goals such as offering R&D incentives, strengthening national and international cooperation, developing human capital, supporting both the private and public sectors, resolutely embracing digital transformation, and establishing a place for itself internationally. In addition to their commonalities, countries differ from one another in terms of priority areas, national goals, and legal and regulatory frameworks. These common aspects highlight that each country aims to achieve digital transformation in both the private and public sectors by providing the necessary incentives and support, developing human resources, and ensuring economic growth and social development at the national level, while also striving to maintain a competitive position on the international stage. The differences, however, indicate that each country has chosen a different path to achieve this common goal. The six priorities included in Türkiye's strategy document are quite compatible with the common aspects of the selected country strategies. On the other hand, Türkiye's updated action plan places particular emphasis on the development of value-added products and services, research-innovation-entrepreneurship, as well as human capital development and employment, in order to contribute to economic growth and development through this technology. This can be interpreted as Türkiye adopting AI as an economic policy tool in practice, similar to Brazil and India.

One of the common aspects of national AI strategies is their usage in the public sector, which also forms the general scope of this study. The use of AI in the production or provision of public goods and services inevitably leads us to consider its relationship with the public budget. This is because fundamental issues such as how much resources should be allocated to which services and how these resources should be financed are, at their core, part of the public budget. In this context, we examined the role of AI in budget processes through selected application examples from the public sector in seven countries and Türkiye, which we determined by using international index. Within the scope of the research question, we identified that AI can be used in all stages of planning, preparation, authorization, implementation and auditing of public budget processes in line with the literature.

France and the UAE have positioned AI as a planning tool that enables the efficient use of resources by utilizing existing data to identify future needs and risks. This is an example of AI being actively used in the budget planning stage in these countries. In the literature, the use of AI in estimating public expenditures and revenues and increasing efficiency by accelerating bureaucratic tasks are prominent applications among its potential areas of use. Similarly, the use of AI in estimating future costs and revenues in Australia and France, as well as accelerating paperwork, are important examples of how AI can be used as an important tool in budget preparation processes. The use of AI to simplify contract processes for the purchase of goods and services in the USA; the use of chatbots for bureaucratic tasks in Estonia; facilitating the fulfilment of citizens' needs during the pandemic in India. In Türkiye, the use of an AI-powered digital legislative assistant that saves auditors time sets an example for its use in the budget audit process.

In conclusion, the examples given above demonstrate the use of AI in different stages of the budgeting process. Türkiye places emphasis on this field, as evidenced by both its national strategy on AI and the practical examples. This research contributes both conceptual frameworks and practical tools to AI in public budget processes. However, many open questions remain about the extent to which the incorporation of AI in public budgeting processes will improve the efficiency of resource allocation. Further empirical studies on how the use of AI in the planning, preparation, implementation and audit stages of public budget processes will affect the efficiency of resource allocation are needed for an in-depth examination of the use of AI in the public sector.

Zhu et al. (2022) underlined that the implementation of loose fiscal policies is imperative for the contribution of AI to economic development in a country, as opposed to the implementation of tight fiscal policies. In this study, we emphasize that the incentives for AI should be increased and the necessary training should be provided to create qualified human resources so that AI can be implemented more effectively and efficiently in Türkiye.

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KAMU BÜTÇE SÜREÇLERİNDE YAPAY ZEKANIN ROLÜ: YAPAY ZEKA ULUSAL STRATEJİLERİ VE UYGULAMA ÖRNEKLERİ ÜZERİNE KARŞILAŞTIRMALI BİR DEĞERLENDİRME

Hüseyin Burak ÖZGÜL

Ezgim YAVUZ

GENİŞLETİLMİŞ ÖZET

Yapay zekanın kullanım alanlarının çeşitlenmesi ve vatandaşlar tarafından güvenilir kabul edilmesi, dünya genelinde ülkelerin bu alana odaklanmasına neden olmuştur. Dolayısıyla ülkeler, ulusal gereksinimler ve uluslararası gelişmeler doğrultusunda kendilerine bir çeşit yol haritası sunarak kullanım çerçevelerini belirleyen strateji belgeleri oluşturmaya başlamışlardır. Bu alanda atılan adımlar sadece söz konusu belgeler ile sınırlı kalmamış; aynı zamanda çeşitli alanlarda uygulamaya yönelik projeler de geliştirilmiştir.

Yapay zeka ulusal stratejileri genel olarak değerlendirildiğinde her ülkenin AR-GE teşvikleri sunma, ulusal-uluslararası işbirliklerini kuvvetlendirme, beşeri sermayesini geliştirme, hem özel hem de kamu sektörünü destekleme, dijital dönüşümü kararlılıkla benimseme, uluslararası alanda kendine yer edinme gibi hedeflerinin olduğu görülmüştür. Ortak noktaların yanında ülkeler öncelikli alanlar, ulusal hedefler, yasal ve düzenleyici çerçeveler bağlamında birbirlerinden ayrılırlar. Söz konusu ortak yönler her ülkenin özel ve kamu sektöründe dijital dönüşümlerini gerçekleştirmede gerekli teşvik ve desteklerin sunulup insan kaynağı yetiştirerek ulusal ölçekte iktisadi büyüme ve sosyal kalkınmayı sağlarken, uluslararası alanda rekabetçi ülke konumunda olmayı hedeflediğini ortaya koyar. Farklı yönler ise her ülkenin bu ortak hedefe giderken farklı bir yol seçtiğinin göstergesidir.

Yapay zeka ulusal stratejilerinin küresel boyutta kabul görmüş ortak yanlarından bir tanesi çalışmanın da genel kapsamını oluşturan yapay zekanın kamu sektöründe kullanılmasıdır. Söz konusu teknolojinin kamusal mal ve hizmetlerin üretim veya sunumunda kullanılması bizi kaçınılmaz olarak teknolojinin kamu bütçesi ile olan ilişkisine götürür.

Bu kapsamda çalışmada, Oxford Insights tarafından hazırlanan Government AI Readiness Index skorlarına göre en çok puan alan 7 ülke ile Türkiye'nin kamu sektöründen seçilmiş uygulama örnekleri üzerinden yapay

zekanın bütçe süreçlerindeki rolü incelenmiştir. Araştırma sorusu kapsamında yapay zekanın literatürle uyumlu bir şekilde kamu bütçe süreçlerinin planlama, hazırlanma ve yetki alma, uygulama ve denetim aşamalarının tümünde kullanılabileceği tespit edilmiştir.

Buna göre Fransa, Birleşik Arap Emirlikleri ve Türkiye'nin mevcut verilerden yararlanarak gelecekte olabilecek ihtiyaçlar ve riskleri belirlemeleri, yapay zekayı kaynak kullanımında etkinlik sağlayan bir planlama aracı olarak konumladıklarını gösterir. Bu durum söz konusu ülkelerde yapay zekanın bütçenin planlama aşamasında aktif olarak kullanıldığının bir örneğidir. Literatürde yapay zekanın kamu harcamaları ve kamu gelirlerinin tahmininde kullanılması ile bürokratik işleri hızlandırarak verimliliği artırması, potansiyel kullanım alanlarından öne çıkan uygulamalardır. Benzer şekilde Avustralya ve Fransa'da yapay zekanın gelecek dönem maliyet ve gelir tahmininde kullanılması, ayrıca yapay zeka ile evrak işlerinin hızlandırılması yapay zekanın bütçe hazırlık süreçlerinde önemli bir araç olarak kullanılabildiğinin önemli örneklerindendir. Yapay zekanın ABD'de mal ve hizmet satın alımında sözleşme süreçlerini kolaylaştırması; Estonya'da sohbet robotlarının bürokratik işlerde kullanılması; Hindistan'da pandemi sürecinde vatandaşın ihtiyaçlarının karşılanmasını kolaylaştırması yapay zekanın bütçenin uygulama aşamasındaki yerini göstermektedir.

Sonuç olarak yukarıda verilen örneklerin her biri yapay zekanın bütçe süreçlerinin farklı aşamalarında yer aldığını göstermektedir. Türkiye de bu alana oldukça önem veren bir ülkedir. Ek olarak, yapay zekaya yönelik teşviklerin artırılması ve nitelikli insan kaynağının oluşturulması için gerekli eğitimlerin yapılmasının Türkiye'de yapay zekanın daha etkin ve verimli bir şekilde uygulanmasını sağlayacağı ileri sürülebilir.