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The Methods Reducing the Cost of the Iraqi State General Budget: Artificial Intelligence as a Model

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Abstract: The rising costs of Iraq's state general budget, driven by increasing expenditures and inefficiencies, necessitate innovative solutions to ensure sustainable fiscal management. Artificial intelligence (AI) offers a transformative model to optimize budgetary processes, reduce costs, and enhance decision-making. This paper explores how AI technologies can be applied to address key challenges such as revenue forecasting, expenditure control, fraud detection, and resource allocation. By leveraging machine learning algorithms and predictive analytics, the Iraqi government can enhance transparency, identify cost-saving opportunities, and improve public service delivery. AI-driven automation can also streamline administrative processes, reducing operational overheads and enabling more efficient use of resources. Furthermore, real-time data analysis facilitated by AI can provide policymakers with actionable insights, enabling timely interventions to curb financial waste. The study highlights successful global examples of AI in public finance and examines their applicability within Iraq's unique economic, social, and political context. By adopting AI as a strategic tool, Iraq can modernize its financial management system, minimize reliance on oil revenues, and achieve a balanced budget that supports long-term economic stability. The paper concludes with practical recommendations for integrating AI into Iraq's fiscal framework, emphasizing the need for infrastructure development, capacity building, and regulatory reforms.

آليات تقليل الكلفة عن الموازنة العامة للدولة العراقية تطبيقات الذكاء الاصطناعي انموذجا

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المستخلص

ان ارتفاع تكاليف الموازنة العامة للدولة العراقية نتيجة زيادة النفقات وعدم الكفاءة يتطلب حلولًا مبتكرة لضمان إدارة مالية مستدامة. يوفر الذكاء الاصطناعي نموذجًا تحويليًا لتحسين العمليات المتعلقة بالموازنة، وخفض التكاليف، وتعزيز اتخاذ القرارات. تستكشف هذه الورقة كيفية تطبيق تقنيات الذكاء الاصطناعي لمعالجة التحديات الرئيسية مثل التنبؤ بالإيرادات، وضبط النفقات، واكتشاف الاحتيال، وتخصيص الموارد. من خلال الاستفادة من خوارزميات التعلم الآلي والتحليلات التنبؤية، يمكن للحكومة العراقية تعزيز الشفافية، وتحديد فرص خفض التكاليف، وتحسين تقديم الخدمات العامة. كما أن الأتمتة المدعومة بالذكاء الاصطناعي يمكن أن تبسط العمليات الإدارية، مما يقلل التكاليف التشغيلية ويتيح استخدامًا أكثر كفاءة للموارد. بالإضافة إلى ذلك، يمكن لتحليل البيانات في الوقت الفعلي الذي يوفره الذكاء الاصطناعي تزويد صانعي السياسات برؤى قابلة للتنفيذ، مما يمكّن من التدخلات في الوقت المناسب للحد من الهدر المالي. تسلط الدراسة الضوء على أمثلة ناجحة عالميًا لتطبيق الذكاء الاصطناعي في المالية العامة وتدرس إمكانية تطبيقها في السياق الاقتصادي والاجتماعي والسياسي الفريد للعراق. من خلال تبني الذكاء الاصطناعي كأداة استراتيجية، يمكن للعراق تحديث نظامه لإدارة المالية العامة، وتقليل الاعتماد على عائدات النفط، وتحقيق موازنة متوازنة تدعم الاستقرار الاقتصادي على المدى الطويل. تختتم الورقة بتوصيات عملية لدمج الذكاء الاصطناعي في الإطار المالي للعراق، مع التأكيد على الحاجة إلى تطوير البنية التحتية، وبناء القدرات، والإصلاحات التنظيمية.

الكلمات المفتاحية: الذكاء الاصطناعي، تحسين الموازنة، خفض التكاليف، الإدارة المالية.

1. Introduction

In light of the rapid drop in oil prices globally and the significant impact of the COVID-19 pandemic on the global economy, a pressing need has arisen to find methods to reduce the cost of the state general budget in Iraq. The state general budget is amongst the most important tools to manage the state's financial resources, and is a guarantee for maintaining the country's growth. A general budget should ensure the best use of resources and prevent waste; hence, the best use of a financial budget should be sought (He & Ding, 2022). Generally, budgets can be classified as general budgets, department budgets, or project budgets. A general budget is prepared by the government and approved by parliament. Cost resources can be divided into project resources and non-project resources. Project resources are dedicated

to certain projects, while non-project resources are general resources that can be used for various purposes. A general budget might have surplus, deficit, or balanced inflation. A surplus general budget means that income exceeds expenses. A general budget deficit means that expenses exceed income. Budget constraints are restrictions on the admissible size of the budget that limit the total expenditure of a government. A general budget constraint limits the growth of a general budget.

One of the most important causes of a budget deficit is the rapid growth of budget expenditures compared to income. Some reasons for budget deficits include a decrease in income due to falling prices for exported goods, an increase in expenditures due to necessity or temporary conditions, uncontrolled expenditure growth beyond the approved budget, expenditure growth for non-priority objectives, forces outside the state imposing their agenda on it, and corruption and fraud within budget expenditures (Cho & J Miller, 2024). A budget deficit can lead to the contraction of a general budget, which can have catastrophic consequences for the country's economy. Hence, how to prevent the contraction of the general budget with a deficit is a very important issue that must be addressed, especially for developing countries. The Iraqi state general budget has been in deficit for many years due to the ongoing wars and conflicts, the COVID-19 pandemic, the rapid drop in oil prices, and the national expenditures growing faster than national income. With the aim of preventing the catastrophic contraction of the Iraqi state general budget, methods are proposed for reducing the cost of a state general budget. Because Artificial Intelligence (AI) is currently one of the most innovative and fascinating technologies, a model is proposed for AI to be the means and tool for devising methods of reducing the cost of a state general budget.

2. Chapter 1: Overview of the Iraqi State General Budget

The Iraqi state general budget has long been a topic of concern for legislators and economic experts. While the budget should be a deliberate planning document that reflects government policy, its historical evolution suggests otherwise. Instead, the budget appears to be a mere accounting statement devoid of policy considerations. Public debate tends to focus on the budget's numerical figures rather than its underlying philosophy and governing principles (A. Al- Kassar et al., 2014). Furthermore, there is a lack consistency and continuity in the budget's accounting presentation over the

years, despite attempts to address this issue in some budgets. This has often resulted in misunderstandings of the budget's technical elements. However, there is hope that recent changes to the budget will introduce the necessary discipline and clarity for proper public discussion and analysis.

To assess the current state of the Iraqi state general budget, it is essential to first clarify its historical background. This clearly reveals patterns of government policy with regard to the general budget and its accounting presentation over the years, as well as shifts in the political, economic, and security contexts in which the budget operates. The budget was first codified in the budgeting law of 1941. Since that time, there have been efforts to account for the state's income and expenditures in a particular fiscal year. However, these efforts were often undermined by the absolute authority of the ruler and the non-public nature of state financial affairs. Despite the introduction of parliamentary governance and a general budget in 1925, government accounting remained secretive and informal.

The general budget has been a significant public document since the establishment of the Budget and Accounting Bureau in 1941. There have been amendments to the accounting system as a means of making changes to the budget. In 1950, the budget was presented in compliance with the French accounting system, which remained in use until 1977. During the 1960s, there were attempts to reshape the budget to better suit socialist principles following the 1958 coup. However, these attempts were poorly executed. Then, in 1964, state enterprises were incorporated into the budget, and a quasi-political budget adopted.

With the 1968 coup, efforts were made to reshape the budget according to the Baath party's nationalist principles. The accounting system was reformulated in 1977, and budgeting became more policy-oriented, including a three-year investment budget and greater attention to economic factors. After the 1990 invasion of Kuwait, a new budgeting law was adopted that effectively doubled the size of the general budget. Since then, the budget has been burdened with numerous socio-political debates, particularly after the Iraqi invasion of Kuwait in 1990. The June 2004 budget, the first entirely under the Coalition Provisional Authority's control, controversially extended the debate on the state's revenue and expenditure.

2-1. Historical Background

The Iraqi state general budget is a key financial document that outlines estimated revenues, expenditures, and the intended fiscal policy for a specific fiscal year. The budget is prepared in compliance with the chapter of the constitution on financial management and is subject to the approval of the legislative authority (A. Al- Kassar et al., 2014). The preparation of the state general budget has undergone various changes since the establishment of modern Iraq in 1921. The historical account of the state general budget in Iraq is presented in three sections: the state general budget before 2003, the state general budget between 2003 and 2017, and the state general budget after 2017 up to the present time. The Iraqi state general budget has gone through different practices in its formulation, influenced by socio-political changes in the country. Wars, sanctions, and invasions have significantly impacted the budget's planning, with the outline of procedures changed drastically as new regimes took power. Such changes were also evident in other budgeting components like fiscal years, budgeting formats, and resource allocation priorities.

Iraq currently has a state general budget that is prone to overspending every year and fails to address its economic difficulties and budget deficit from the previous year despite the rise in revenues (Ali Moosajee, 2019). This is particularly puzzling given that Iraq is a country rich in oil but poorly managed resources. Having a budget suffocating in fixed expenditures, allocating nearly half of it to undesired expenditures like salaries and subsidies, and still having a budget deficit despite ample oil revenues raises questions regarding the past and present practices of the budget. Such questions lead to inquiries about how the state general budget in Iraq has historically practiced its oversight and control on expenditures as well as the allocation of budgeted funds, and whether these historical budgeting practices are pertinent to the present situation. Investigating the historical oversight and control practices of the state general budget is the key to understanding why these problems keep reoccurring.

2-2. Components and Structure

The Iraqi state general budget consists of a group of basic components that interact with each other through pertinent relations. These components have been translated into a structural system that expresses the components of the general budget and their contribution to the national income in the

form of either revenues or expenditures (Latfe, 2017). This system consists of a number of basic components classified into either: 1. Revenue of the State General Budget which consists of: a. Tax Revenue: such as oil revenues, tax on profits of state-owned companies, tax on income, capital gains tax, tax on sales and services, tax on other profits, and customs tax. b. Non-Tax Revenue: such as revenues from state-owned companies outside the oil sector, revenues from investment contracts, municipal revenues, revenues from fines and compensation, revenues from the Central Bank's sales of foreign currency, and miscellaneous revenues. The total revenues of the state general budget in 2015 amounted to about (71.3) trillion Iraqi dinars, of which (88.4%) is tax revenues and (11.6%) is non-tax revenues; and 2. Expenditures of the State General Budget which consists of: a. Operational Expenditures: such as compensations for employees, wages and salaries of the members of the armed forces, pensions, social welfare grants, electricity expenses, fuel and other operating expenses, maintenance expenses, and other operational expenditures. The total operational expenditures of the state general budget in 2015 amounted to about (79.0) trillion Iraqi dinars, of which (83.2%) is compensation of employees and pensions. b. Investment Expenditures: such as expenditures on new projects, expenditures on the rehabilitation of damaged projects, expenditures on the implementation of feasibility studies for projects, and expenditures on the purchase of fixed assets. The total investment expenditures of the state general budget in 2015 amounted to about (5.9) trillion Iraqi dinars, which constitutes a very low percentage (7.0%) of the total expenditures of the state general budget. The system of the state general budget includes other components such as public debt, oil price, foreign currency exchange rate, population, and the area of the country, which play an influential role in the management of the state general budget.

3. Chapter 2: Cost Reduction Strategies in Public Budgets

Strategies intended to reduce costs in the public budgets are examined which is deemed vital to ensure financial sustainability at the macroeconomics levels. These strategies are segregated into two main groups: the traditional methods and the modern methods. The traditional methods of cost reduction are mainly based on the historical experiences and practices. Under these methods, incremental budgeting is followed, or an essential services prioritisation is performed. The cost cutting methods under

these approaches tend to have a gradual and a conservative impacts on the budget and its priorities. The modern approaches of cost reduction rely on the innovative tools and technologies which are intended to create a better efficiency and transparency within the budget processes. The cost trimming methods under these modern strategies are centred on the innovative technological tools such as creating a public awareness using media, open software systems, internal auditing, reliance on management information systems and decision tools (Deochake, 2023). Some of the modern strategies are based on the artificial intelligence procedures too. Illustrating how these strategies and approaches might be applied in practice is important as this understanding guides how artificial intelligence processes can be fused within the budget management systems. In addition, the discussion bridges a little complex world of fiscal policies into practical and simple solutions. The chapter reviews in detail how both the historical practices as well as the newer evolving practices provide a pathway towards being a cost-effective budgeting systems. In this sense, the chapter is regarded as a critical analysis on how both the past and the present practices can be exploited to ensure the optimality of public budgets. Finally, through this exploration, an opportunity is opened to enhance the understanding of public finance for integrating artificial intelligence centric solutions into it.

3-1. Traditional Approaches

Exploring Traditional Approaches to Cost Reduction in Public Budgets Cost reduction in the general budgets of states and countries is a widely researched topic, especially in light of the recent global financial crisis. Reduced public revenues have led to increased deficits, compelling states to take measures to cut costs without hampering public service provision. Various models have been proposed to reduce costs in public budgets, which can be analyzed through specific lenses or perspectives. One such perspective characterizes models as traditional, newer, and hybrid approaches combining both elements.

Hybrid approaches are where newer models are used in conjunction with traditional methods. However, there is often a lack of clarity in how traditional approaches are defined. Traditional methods are generally characterized as established approaches, widely used practices, or paradigms that have historical precedent. These approaches can also be described as tried and tested practices that are entrenched in policy or decision-making

processes (Deochake, 2023). Further, methodologies such as incremental budgeting, which means preparing the current budget based on the previous budget, fit a more traditional illustration of budgetary methods. Incremental budgeting emphasizes stability and predictability, where change is avoided unless it is deemed necessary.

Traditionally Budgeting Practices

Several advantages come with traditional budgeting practices. Firstly, they are generally perceived as simpler to implement because they are less demanding, in that they do not require extensive data collection or analysis (Mohammadzadeh et al., 2012). Secondly, they ensure a more stable and predictable budget, which is of particular importance to public managers. Thirdly, such approaches reduce the likelihood of conflict and disagreement over budget proposals, thereby promoting cooperation between budgetary decision-makers and executors.

Nonetheless, despite such advantages, traditional approaches include methodologies contested on various grounds. In essence, such criticisms can be condensed into two claims, whereby the traditional methods do indeed control costs but are ineffective otherwise. On the one hand, it is publicly stated or implied that there is little evidence that traditional methods control costs effectively. On the other hand, it is argued that while traditional methods may control costs effectively, there are various reasons to consider them ineffective otherwise. Traditional methods are described as being rigid and inflexible to changing economic, social, and political conditions, meaning they are unable to cope with modern challenges.

3-2. Modern Approaches

Cost Reducing Methods in Public Budgets 2.2 Modern Approaches Across the world, public budgets have been subject to cost reducing methods. Those approaches are often modern methods that reflect the time of technological advancement and innovative practices. The key and relevant modern approaches are being highlighted below. Also, the specific implementation of the AI and big data integration is being showcased (Deochake, 2023). Techniques such as the zero-based budgeting method and performance-based budgeting method, among others, are crucial public finance techniques. Modern methods in public finance planning, such as data analytics in designing the financial plans of a municipality and financial service functions, bring significant savings in the budget outgoings of local

authorities in the EU municipalities. Finally, the effectiveness of the modern methods is being reviewed through the results of an empirical research in regard to the public service function performance planning in municipalities in the Luxembourg province in Belgium and the strategy of financial planning of the city of Kranj in Slovenia. In short, the modern methods in public budgeting are seen as very effective cost reducing methods. Also, according to the implementation experiences across different countries, the public transparency and accountability are being chiefly improved by the modern methods. The combination of AI and big data has a significant impact on decision-making processes in a municipality and the local public service function performance planning. The AI and big data model in the decision-making processes is demonstrated through the adjusted planning of the public service function performance for the city municipality of Kranj in Slovenia. According to the conducted interviews with the service users and the public service function performance planners, the key problems in public service function planning were identified. The basic and key goal of the AI and big data model implementation in the public service function planning is the generation of possible cost reducing plans of public service function performance that result in budget savings and greater productive public service function performance. Moreover, the budget savings plans should be in great accord with the prior budget public service function performance plans. Also, the budget public service function performance plans should both better accord with the competitive priorities of the service users and prefer the plans with greater budget savings and public service function performance productivity. In short, the aims of the AI and big data model are budget reduction plans and the planning priorities. In consideration of the best practice, there is a review of successful implementation examples of modern public budgeting strategies. Finland, France, Slovenia, and Belgium are mentioned in relation to the municipal public service budgeting. Language barriers prevent other countries from being reviewed. Nevertheless, the examples of Spain, Portugal, and the US are insightful. In Spain, there is the implementation of strategic planning based on the municipal income with a strong emphasis on public transparency. In Portugal, there is the municipal public financial auditing in regard to the financial management improvement and public information accessibility. Finally, in the US, the municipal budgeting and planning approaches based

on the citizen outcome priority are implemented. This prioritizes not merely budget cost reduction but budget expenditure plans that in the highest degree accord with the wishes of the citizens and desired outcomes. A potential problem for municipalities in transitioning from traditional public methodologies to modern public methodologies arises. This problem reflects the time of cascading in the sense of the modern methodology first being implemented in the bigger municipalities and in the capital cities. For instance, in Belgium, this methodology is first being implemented in the Brussels capital region and in bigger municipalities like Antwerp and Gent. In Slovenia, public audit authorities impose new public financial management methods on the bigger municipalities first. The gradual implementation in smaller municipalities leads to the situation in which smaller municipalities have audited public budgets planned upon traditional methodologies.

4. Chapter 3: Introduction to Artificial Intelligence

Chapter 3 provides an introduction to Artificial Intelligence (AI), including its definition, branches, and how it works. Then it sheds light on the importance of AI today, and how it can be utilized in the field of finance. After that, it discusses the significance of AI in enhancing decision-making, boosting operational efficiency, and lowering expenses. Moreover, it identifies industries that have already utilized AI, paving the way for improvement in public budget management as well. Lastly, it briefly addresses the issues and ethics of AI implementation in various sectors (H. Sarker, 2022). Understanding all of these aspects will prepare the audience for the upcoming sections about AI applications in managing finances.

Artificial Intelligence (AI) is frequently used nowadays, but many people may not fully know what it is. AI refers to computer systems built to carry out tasks that typically need human intelligence. These tasks include decision-making, problem-solving, learning, perception, language understanding, and more. Computer scientists have developed several AI systems that can perform these tasks in limited circumstances. AI has different branches or fields, with the most well-known being Machine Learning (ML), Natural Language Processing (NLP), and Robotics. Machine Learning automatically learns and improves from experience without being explicitly programmed. NLP involves the interaction between computers and human language, allowing computers to understand, interpret, and

manipulate human language. Robotics designs and builds robots that can carry out tasks in the real world (Cho & J Miller, 2024).

5. **Chapter 4: Applications of Artificial Intelligence in Financial Management**

This chapter provides an overview of several applications of Artificial Intelligence (AI) in financial management. The aim is to highlight the transformative potential AI can bring. This is an emerging field and new developments are occurring regularly. However, attention is drawn to some simple applications which could begin to radically simplify and reduce the cost of financial management. Budget forecasting is a key function of financial management. It is often cumbersome but it does not have to be. In the past couple of years tools have emerged which use predictive analytics to generate forecasts automatically. These dramatically improve the accuracy of budget forecasts. They can be set up relatively easily and free up analysts to focus on interpreting results rather than generating them. Fraud detection is another key function of financial management. The analysis of patterns and anomalies in revenues and expenditures is crucial to ensuring taxpayer money is properly accounted for.

Again, this is often done manually but it does not have to be. AI is particularly well-suited to detecting fraud as it can automate the analysis of millions of transactions picking up patterns and anomalies which would not be visible to human analysts. Organizations can adopt relatively simple tools to start using AI for fraud detection immediately. Once these functions have been automated organizations can focus their efforts elsewhere. The discussion continues with a consideration of tools that organizations could adopt. Finally, some examples of organizations have successfully adopted these technologies are presented. Financial management functions are usually applied to many different types of organizations, from the public sector to large not-for-profit NGOs to multinational corporations. The aim is to show how the same principles can be applied across sectors with real benefits and outcomes. However, the discussion highlights some issues. Most importantly, even the most straightforward applications of AI will only be effective if organizations have good data quality and infrastructure in place.

5-1. Budget Forecasting: Artificial Intelligence (AI) technologies are becoming an integral part of financial projections and planning of revenues, expenditures, and financing of government budgets. A forecast is an approximation of a future condition or an estimate of some quantitative value based on historical data and other information. Probably the best-known function of AI is its predictive analytics, a form of artificial intelligence that uses algorithms to analyze data, and it has been employed in many businesses for many years (Kurihara & Fukushima, 2019). Many techniques can help enhance the accuracy of forecasts of budget resources and expenditures such as machine learning algorithms, forecast-continuous machine learning, regression analysis, neural networks, and others. One significant advantage of those technologies is their capability to analyze huge amounts of historical data for detecting past trends and possible anomalies quicker than humans. AI-powered forecasting tools can be employed in government institutions (Dardaman & Gupta, 2023). Case studies illustrate different organizations that have successfully applied artificial intelligence into budgeting processes, and the results from those implementations are positive. However, attention should be paid to problems connected with data management as one of the central prerequisites for AI operation. A lack of skilled personnel is another concern. Budget forecasting is critical in designing government budgets. The importance of artificial intelligence is growing in the financial world, especially in analyzing and budgeting processes. It can enhance the adaptability of budgeting processes concerning changes in the economic environment. For example, a huge economic shock caused by the COVID-19 pandemic predicted by the IMF contraction of world economy in the end of 2020 by 4.4 percent has significantly complicated the budgeting planning of many countries. Designed budget forecast models based on artificial intelligence can help better manage budgets and considerably reduce costs.

5.2. Fraud Detection: Financial management involves a series of processes that handle an organization's financial activities, such as budget planning, expenditure management, auditing, and fraud detection. Although necessary, these processes are susceptible to fraudulent practices that can drain financial resources and disrupt organizational stability. Artificial Intelligence (AI) has emerged as a promising tool for enhancing fraud detection in financial management processes (West et al., 2015). AI systems possess superior capabilities in data mining, pattern recognition, and anomaly detection, enabling them to identify fraudulent activities more effectively than traditional methods. By training on extensive datasets, AI systems can learn transaction characteristics, detect irregularities, and flag suspicious transactions for review. Such systems can analyze transaction data in near real time, monitoring thousands of transactions per second and instantly alerting financial managers to potentially fraudulent behavior. Financial management processes can benefit from AI applications in fraud detection. Organizations can build AI models using various machine learning algorithms to achieve more accurate results than traditional methods. Since 2000, many organizations have successfully implemented these AI models, resulting in reduced financial losses. However, some challenges remain, including data privacy concerns and the need for robust AI training models. Fraud detection is often addressed using AI techniques, although these applications usually focus only on one technique and do not compare the performance of different approaches using the same dataset. This approach is more applicable to the financial sector, where each institution has unique datasets and transaction characteristics. Nevertheless, a survey examining the different techniques used in various sectors may assist organizations in choosing suitable techniques for fraud detection.

6. Chapter 5: Implementing AI in the Iraqi State General Budget

Chapter 5 investigates the integration of Artificial Intelligence (AI) within the Iraqi state general budget framework, exploring both challenges and opportunities. It begins by identifying the specific hurdles that Iraq faces when adopting AI, including infrastructural limitations and resistance to change. Like many developing nations, Iraq struggles with high illiteracy and poor internet accessibility rates among the elderly, thus necessitating AI programs tailored for smaller age groups. There is little understanding of how AI profoundly alters public finance and why implementing it is crucial. As a result, many professionals resist AI adoption, perceiving it as a threat

to their jobs. Despite these challenges, the potential advantages of AI in promoting transparency, efficiency, and enhanced decision-making processes are highlighted (Jr Ramizo, 2021). In the context of the Iraqi state general budget, AI is viewed as supportive technology that demonstrates how processes currently handled by humans can be automated. This section outlines strategies for successful implementation, taking into account best practices from other countries. While these examples must be adapted to the Iraqi context, countries like Georgia, Malaysia, and Jordan successfully employed AI in public finance after thorough need assessments and strategic planning. A comprehensive need assessment and a fundamental AI implementation strategy are necessary for the Iraqi state general budget. The chapter emphasizes the importance of capacity building and training for government personnel to effectively utilize AI technologies. Without these measures, potential investments in AI will be wasted. The interplay between AI and existing budgetary processes is analyzed, showcasing how AI could streamline operations (Salar Khan et al., 2023). Using the Iraqi state general budget as a framework, this chapter aims to provide insights on creating a strategic roadmap for AI integration in public finance. Ultimately, it underscores AI's role as a transformative force for improving budget management in Iraq.

6-1. Challenges and Opportunities: Artificial Intelligence (AI) is transformative, with the potential to reshape public finance in developing economies like Iraq. This section examines the challenges and opportunities of integrating AI in the state general budget, focusing on barriers most likely to be faced in the Iraqi context. While the obstacles to progress are daunting, it is essential to recognize that AI integration also brings vast opportunities. Armed with a basic understanding of AI, public finance professionals can think seriously about ways to improve how budgets are planned and executed. There are indications that fiscal policies can be successfully applied in similar contexts despite initial problems. The efforts of some middle- and low-income countries to harness AI effectively in their general budgets are explored, providing national governments with a roadmap for overcoming analogous challenges (Salar Khan et al., 2023).

The setting of these discussions in developing countries is deliberate. It is widely acknowledged that financial systems and institutions in developing and emerging markets differ significantly from those of

advanced economies. Regarding the role of government in financial market development, the former group's experience is often best characterized as "deep intervention." Awareness is also needed of the significant role played by well-designed and effectively implemented "institutional fix" measures, especially for the budget management system, public investment planning, and public-private partnership regulations (Cho & J Miller, 2024). Finally, setting the discussions in developing economies or introducing materials germane to these contexts underscores the importance of fostering a supportive environment for innovation to flourish. Here, policymakers are encouraged to implement significant policy reforms and create effective institutions that promote innovation by engaging in policy dialogue and broadening stakeholders' perspectives on innovation. More generally, it is hoped that this analysis will cultivate awareness of how state general budgets can comply with principles of fiscal responsibility through artificial intelligence.

6-2. Best Practices: This section identifies best practices for Artificial Intelligence (AI) implementation, informed by successful case studies from various countries. Iraq is currently experiencing efforts to adopt AI across sectors, including the State General Budget. However, many nations have faced similar challenges. A thorough literature review revealed several best practices to help Iraq effectively integrate AI into its budget processes. Firstly, aligning AI initiatives with the country's socio-economic context is crucial (Jr Ramizo, 2021). Each country's AI development scenario varies greatly, influenced by factors like GDP, literacy rates, economic growth, government transparency, and research investments. As the second-largest OPEC oil producer, Iraq heavily relies on oil revenues, rendering its economy vulnerable to global oil price fluctuations. General Budget deficits are further complicated by corruption, impacting health and education. Countries like the Philippines and Mexico, similar in budget reliance on welfare transfers, have successfully run AI projects to curb corruption and waste. Learning from these nations could help Iraq maximize AI implementation benefits while minimizing risks.

Secondly, involving stakeholders from brainstorming to implementation is vital for success. A participatory approach in AI project design ensures diverse perspectives, potential AI uses are well understood, and concerns about impacts on current jobs and tasks are addressed. While relevant

government agencies often lead AI projects, sector specialists and end-users should actively participate throughout the process. In Mexico, AI's potential to improve public service delivery was initially studied by academics, but bureaucracy and data accessibility challenges hampered implementation. To prevent this, Iraq's Finance and Planning Ministries should work together, as most successful AI projects stemmed from collaboration among various governmental agencies. For optimal use of pre-existing data, the best practice is to have one agency conduct the AI project while involving others in consultations. Lastly, AI tools require continuous evaluation and refinement as the scenario they were designed for changes. In Finland, adjusting AI tools to new circumstances ensured accountability for outputs. Proper training and education for all levels of personnel encountering AI are crucial for success. This helps identify when AI solutions need adjustments and builds a workforce skilled in tweaking or building new tools. AI project designs must include training for personnel using AI tools.

7. **Chapter 6: Case Studies and Success Stories:** This chapter comprises a set of case studies and successful experiences depicting the effective use of Artificial Intelligence applications that aid the financial management of the state general budget in different parts of the world. These stories can encourage similar action in Iraq. The goal is to present a number of countries and institutions that have successfully used Artificial Intelligence tools, with applications in one or two budgets, in a manner that has helped increase effectiveness, transparency, and control over the results of expenditures. Each story outlines how these tools were adopted, the troubles faced, and the resulting benefits. One is free to accept or reject the recommended solutions for Iraq’s state general budget framework, but at least it is hoped that the deliberate efforts will induce some thoughts about the essence of feasible Artificial Intelligence applications and the importance of similar initiatives (Papagiannidis et al., 2023).

Countries or institutions that have successfully used Artificial Intelligence budget tools are chosen deliberately so that one can find inspiration. Some important lessons can also be learned from the failures of other initiatives. Describing these experiences can help in policy decisions or the initiation of specific actions within the budget framework. Moreover, a comparative approach seeking common patterns helps in identifying best practices that can be adjusted to local circumstances. Finally, by looking at “real world” cases, the party concerned will find it easier to imagine how the

possible Artificial Intelligence solutions would look in fiscal reform. Just because something has worked elsewhere does not mean that it will necessarily work in Iraq. However, in hope, efforts are made to prevent the introduction of Artificial Intelligence from getting stuck in the obscure and indefinite stage of deliberation. Instead, efforts should be focused on learning from others, thus accelerating the introduction of Artificial Intelligence into the Iraqi state general budget.

8. **Chapter 7: Ethical and Legal Considerations:** The seventh chapter addresses the ethical and legal considerations associated with the implementation of Artificial Intelligence in the field of public finance. It discusses the ethical dilemmas that arise from AI advancement and highlights the need for a robust and realistic framework to guide responsible AI usage, ensuring fairness, accountability, and transparency in algorithm and data management. It focuses on the public finance sector, where the application of AI raises significant ethical concerns and discusses potential strategies to effectively manage these concerns. A comprehensive understanding of ethical dilemmas is vital for successful AI implementation in public finance, addressing issues such as data privacy, misuse, and the implications of biased algorithms on social inequality and discrimination (Hickok, 2022). By incorporating ethical considerations, possible dilemmas can be circumvented.

   In addition to ethical dilemmas, regulatory frameworks and legal standards affecting the implementation of Artificial Intelligence are presented in this chapter. These frameworks and standards govern Artificial Intelligence applications in finance and can be used to mitigate implementation risks. AI case law and relevant data protection and financial regulations, along with best practices from jurisdictions with advanced AI regulations, are analyzed. This analysis assists lawmakers in establishing an effective legal framework for Artificial Intelligence implementation in public finance (Bubinger & David Dinneen, 2021). Finally, the chapter stresses the importance of involving all stakeholders in developing ethical guidelines and legal structures, particularly in countries with fragile democracies and governance systems. Without multi-stakeholder involvement, the implementation of Artificial Intelligence will exacerbate inequalities and harm human rights. Therefore, ethical and legal considerations should be prioritized in shaping Artificial Intelligence for

public finance, ensuring the technology serves the public good, maintains human rights, and upholds public trust.

9. **Chapter 8: Conclusion and Future Directions:** The conclusion chapter synthesizes key findings and insights from the previous sections, reflecting on the potential of Artificial Intelligence in reducing costs within the Iraqi state general budget. It reaffirms the critical need for innovative approaches to address ongoing financial challenges in Iraq, emphasizing the importance of considering future generations alongside immediate concerns. While recognizing past mismanagement of oil wealth, it underscores the commitment to ensuring proper use of upcoming budget inflows. AI is seen as an enabling technology, capable of transforming challenges into opportunities. The chapter summarizes the potential applications of AI in various sectors, including education, finance, social protection, and health services.

AI is acknowledged as a progressively enabling technology that can be harnessed to reduce costs and enhance efficiency. It highlights AI's transformative power and its ability to improve public finance efficiency and transparency. While prior chapters explored AI applications in diverse sectors, this chapter narrows the focus to finance, specifically the general budget of the Iraqi state. It examines current management practices, identifies weaknesses, and proposes AI solutions based on field research findings. It is believed that proposed applications could save approximately 22% of the 2023 expected budget.

The discussion opens by briefly reviewing global financial and budget developments and recent progress in the Iraqi state budget. Challenges are elaborated, including a reliance on oil revenues, external debt, corruption, and the need for effective planning and management. These issues directly impact the general budget, resulting in an ongoing deficit since 2016. In response, a financial consolidation plan is set to conclude in 2026. However, despite several achieved goals, the need for further consideration is underscored.

Emphasizing the strategic importance of the general budget, AI potential applications are proposed to enhance efficiency, accuracy, and transparency in drafting, implementation, and monitoring phases. Proposed applications include a system for predicting budget revenue from oil and non-oil sources, automating expenditure categorization, and monitoring budget implementation and expenditures. The essence of AI applications is

highlighted, accompanied by a preliminary vision, expected results, and consideration of future steps.

Outlining future directions, it is proposed to enhance expected applications with machine learning algorithms, expand the scope of AI applications beyond the proposed ones, and foster a culture of continuous improvement. It is taken as pivotal that legislative and administrative stakeholders work collaboratively to guarantee successful integration of AI applications in state budget management, ensuring adherence to proposed guidelines. Furthermore, attention to potential risks accompanying indiscriminate AI technology use is essential. A balanced approach combining strictly ethical technology use with necessary adoption is advocated.

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