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INNOVATION AND TECHNOLOGY ARE THE KEY TOOLS TO REDUCE BUDGET DEFICIT AND ENHANCE FINANCIAL SECURITY OF THE COUNTRY

ІННОВАЦІЇ І ТЕХНОЛОГІЇ ЯК КЛЮЧОВІ ІНСТРУМЕНТИ ЗНИЖЕННЯ БЮДЖЕТНОГО ДЕФІЦИТУ ТА ПОКРАЩЕННЯ ФІНАНСОВОЇ БЕЗПЕКИ КРАЇНИ

In a world where technology is advancing at an incredible pace, states face a new challenge: how to leverage innovations not only for economic growth but also to address pressing financial issues. The budget deficit, which has affected both developed and developing countries, has become a global issue. While the specific figures and scale of the deficit may vary, the overall trend is concerning. The aim of the article is to explore the role of innovations and technology as tools for reducing the budget deficit and improving a country's financial security. It has been proven that the strategic implementation of innovations and technology into the economy is crucial for modern states. It contributes to improving the efficiency of public administration, increasing tax revenues, creating new sources of income, and reducing government spending. The prospects for further research lie in developing a methodology for quantitatively assessing the impact of innovations on the budget deficit, tax revenues, and other macroeconomic indicators.

Key words: digital development, public debt growth, inflation, decline in investments, political instability, loss of sovereignty, economic dependence.

У світі, де технології розвиваються з неймовірною швидкістю, держави стикаються з новим викликом: як використовувати інновації не лише для економічного зростання, а й для вирішення нагальних фінансових проблем. Бюджетний дефіцит, що охопив як розвинені, так і країни, що розвиваються, став глобальною проблемою. Хоча конкретні цифри та масштаби дефіциту можуть відрізнятися, загальна тенденція є тривожною. Метою статті є вивчення ролі інновацій і технологій як інструментів зниження бюджетного дефіциту та покращення фінансової безпеки країни. Доведено, що кероване впровадження інновацій та технологій в економіку є стратегічно важливим для сучасних держав. Воно не лише сприяє покращенню ефективності державного управління, підвищенню податкових надходжень та створенню нових джерел доходу, а й забезпечує зниження витрат на державне управління. Однак, для досягнення максимального ефекту (саме, щодо параметрів фінансової безпеки країни), нові технології та інновації мають органічно інтегруватися в наявну економічну систему. Тільки за умови гармонійної взаємодії з традиційними секторами економіки, інновації можуть стати потужним драйвером економічного зростання та підвищення добробуту населення. Звернено увагу, що нові технології та інновації є основою для посилення фінансової безпеки країни, однак їх ефективність безпосередньо залежить від чіткого стратегічного планування та ефективного управління. Для досягнення мети зниження бюджетного дефіциту та підвищення фінансової безпеки, ці складові мають бути спрямовані на конкретні сектори економіки та державного управління, які мають найбільший потенціал для генерування додаткових доходів та оптимізації витрат. Констатовано, що нові технології та інновації не повинні бути просто "нашаровані" на стару економічну систему, а мають стати її органічною частиною, посилюючи її сильні сторони та усуваючи слабкі. Доведено, що нові технології та інновації слід впроваджувати поетапно. Необхідно забезпечити навчання персоналу для роботи з новими технологіями. Також важливе створення законодавчих та регуляторних умов, які стимулюють інновації та інвестиції.

Ключові слова: цифровий розвиток, зростання державного боргу, інфляція, зниження інвестицій, політична нестабільність, втрата суверенітету, економічна залежність.

Statement of the problem. In a world where technology is advancing at an incredible pace, states face a new challenge: how to leverage innovations not only for economic growth but also to address pressing financial issues. The global issue of budget deficits has impacted both developed and developing countries. While the specific figures and scale of the deficit may vary, the overall trend is alarming. Eurozone countries such as Greece, Italy, Portugal, and Spain have long struggled with high levels of public debt and budget deficits, although the situation is gradually improving. The United States, the largest economy in the world, also faces budget deficit issues exacerbated by rising public debt. Many Latin American and African countries, including Argentina, Brazil, and most African states, have chronic budget deficit problems that hinder their economic growth. This issue is often exacerbated by low commodity prices and political instability. The budget deficit is not only widespread but also negatively impacts the financial security of countries. It is becoming evident that reducing the budget deficit and strengthening financial stability can be achieved through innovations and modern technology implementation. Singapore and South Korea are prime examples of countries that have successfully used these elements to address financial challenges, demonstrating that they can be drivers of economic growth and effective tools for overcoming situations where budget expenditures exceed revenues.

Analysis of recent research and publications. The foundation of this article is based on scientific papers from several researchers. For instance, A.V. Vatulyov examined the specifics of financial-budgetary policy for economic development, as well as the relationship between budget deficits and the improvement of a country's financial security. Zh.V. Harbar and N.V. Kondukotsova [2] analyzed budgetary policy in the context of its transformation under the influence of the country's digital development. T. Kanjeva and A. Halaburda [3] dedicated their work to issues related to constructing state budget policy in the context of rising budget deficits.

Among foreign scholars who have addressed issues related to reducing budget deficits and improving national financial security are J. Furman and L. H. Summers [6]. However, the potential of using innovations and technologies as tools to reduce budget deficits and enhance national financial security remains largely unexplored in the scientific literature.

Formulation of the research task. The article aims to explore the role of innovations and technologies as tools for reducing budget deficits and improving national financial security.

Summary of the main research material. The budget deficit and a country's financial security are closely interconnected. A budget deficit occurs when government expenditures exceed government revenues. This imbalance can significantly impact the overall financial stability of a country, leading to a loss of its ability to function steadily and effectively [1]. As a result, it hampers economic growth and undermines the protection of the interests of all participants in economic relations. Indeed, the budget deficit affects financial security through consequences such as increased public debt, inflation, reduced investment, political instability, and sometimes even a loss of sovereignty (see Table 1).

The most alarming situation is when a country lacks sufficient financial resources to meet its obligations, cannot withstand financial crises and shocks, and its financial system is neither transparent nor accountable.

It is because the systemic overlap of these issues leads to a complete loss of national sovereignty. While earlier manifestations of this process included colonization, occupation, and protectorates, today are joined by economic dependence and political pressure (see Table 2).

It would not be an exaggeration to say that the growth of the budget deficit disrupts key parameters of financial security, namely [3–4]:

1. Stability of the financial system. This includes turbulence in currency exchange rates, inflation, and the overall stability of the banking system.

2. Balance of the state budget: Specifically, when government revenues are lower than government expenditures, it indicates a lack of financial discipline by the state.

3. Level of public debt. A high level of public debt can constrain flexibility in fiscal policy and increase the risks of a financial crisis.

4. Public financial management. Specifically, factors such as the lack of transparency in budget processes,

Table 1

The nature of the impact of budget deficit on a country's financial security

Consequences of rising budget deficit	Impact of the budget deficit on financial security.	Consequences of the budget deficit
Increased public debt	To cover the deficit, the government is forced to borrow funds, which leads to an increase in public debt.	High public debt can burden the budget with interest payments and limit opportunities for investing in economic development.
Inflation	If the government finances the deficit by printing money, it can lead to increased inflation.	Inflation devalues money, undermines trust in the national currency, and complicates economic planning.
Reduced investment	A high level of public debt can deter investors,	A decrease in investment negatively impacts economic growth.
Political instability	Problems with the budget deficit can lead to social tension and political instability.	This can deter investors and worsen the economic situation.
Loss of sovereignty	If a country is unable to service its debt, it may lose part of its economic sovereignty.	This can lead to a situation where the country is under external financial control.

Source: formulated by the author based on [2–3; 5]

Table 2

Manifestations of the loss of national sovereignty as the most severe form of budget deficit and critically low financial security of a country

Manifestations of the loss of sovereignty	Characteristics of the loss of sovereignty	Consequences of the loss of sovereignty
Colonization	Historically, the most common example of the loss of sovereignty was colonization. For several centuries, European powers seized lands on other continents, establishing colonies and depriving local populations of their autonomy.	Loss of the ability to independently make decisions regarding internal and external affairs.
Occupation	Military occupation of one country by another results in the loss of sovereignty.	Economic dependence on stronger states.
Protectorates	A protectorate is a form of dependency in which one state (the metropolis) takes another, less developed state (the protectorate) under its protection. In this arrangement, the metropolis typically exerts significant influence over the internal politics of the protectorate.	Changes in social and cultural values and loss of national identity
Economic dependence	Countries that have significant economic dependence on other states may lose part of their sovereignty. For example, countries with substantial external debt may be forced to comply with the demands of creditors, which restricts their flexibility in making economic decisions.	Political instability and social conflicts.
Political pressure	Large states can exert political pressure on smaller countries, compelling them to make decisions that align with the interests of the more influential players.	External control that restricts opportunities for economic development and modernization

Source: formulated by the author based on [3–4; 6–7]

inefficient use of funds, and corruption are elements that hinder economic growth, entrepreneurial development, and investment attraction.

5. Development of the financial sector. Specifically, limitations in financial instruments and services reduce financing for the economy.

6. Resilience to external shocks. The inability of the economy to withstand negative external impacts makes it vulnerable to global financial crises, fluctuations in commodity prices, and other factors.

Considering the above points, countries worldwide must focus on significantly reducing budget deficits and improving national financial security. This is because improving financial security creates a favorable environment for investment and entrepreneurship (which promotes economic growth) and enables the provision of social guarantees for the population [6–7]. For example, the Baltic countries faced serious economic challenges after regaining independence, including high inflation and budget deficits. The successful implementation of market reforms, stabilization of finances, and attraction of foreign investment enabled these countries to overcome economic difficulties and achieve growth, facilitating their integration into the EU.

Moreover, countries with high levels of financial security are politically stable and have a better reputation on the international stage, which facilitates their ability to attract investment and secure international aid [3]. For example, Scandinavian countries are known for their political stability, high standard of living, and developed economies. They are examples of countries with high financial security and a strong international reputation. At the same time, the BRICS countries (excluding China) are large economies with significant potential; however, political instability hinders their economic development and restricts their access to international financial markets.

We emphasize the importance of innovations and technologies in reducing the budget deficit and improving a country's financial security, as these elements are closely related and interact with each other. We stress that innovations and technology implementation is a complex and multifaceted process that requires enthusiasm, clear planning, and effective management. Without a clear understanding of goals and priorities, innovations may develop chaotically and fail to deliver the expected results [7].

Specifically, the managed implementation of innovations and technologies in the economy should contribute to [5–6]: improving the efficiency of public administration; increasing tax revenues; creating new sources of income; reducing government management costs. For this to happen, new technologies and innovations must be seamlessly integrated into the existing economic system, rather than opposing it.

Improving the efficiency of public administration involves a set of measures aimed at optimizing the operation of government agencies, enhancing the quality of public services, and ensuring effective use of state resources. This improvement can be achieved through digital transformation and increased transparency and openness of data (see Table 3).

Effective public administration in the context of this study refers to optimized workflows, high-quality public services, and the efficient utilization of public resources.

Increasing tax revenues refers to the process of growing the amount of funds that the state receives from taxpayers as a result of the active implementation of blockchain technology and big data analytics in the financial sphere (Table 4). It is important to note that this increase is achieved without raising tax rates.

While focusing on the identified directions for increasing tax revenue, it should be taken into account that this requires significant investments and time. Additionally, it is necessary to ensure the protection of personal data and cybersecurity [2].

Creating new revenue streams is identifying and developing additional ways to generate financial resources for individuals, businesses, or governments. This can involve the growth of the digital economy as well as the sale of state assets (Table 5). It is important to note that the development of the digital economy and the sale of state assets are two promising directions that can contribute to economic growth, enhance the well-being of the population, and strengthen the state [4].

Reducing government administration costs is the process of optimizing budget expenditures aimed at

Table 3

Content of improving public administration efficiency through digital transformation and increased transparency and openness of data

Direction	Digital transformation	Transparency and Openness of Data	Developing advantages
Content of improving public administration efficiency	The shift to e-governance, the use of cloud technologies, and artificial intelligence for data analysis allows for the optimization of processes, reduction of bureaucratic barriers, and cost savings	The publication of open data promotes greater transparency in the use of budgetary funds, engages the public in oversight, and stimulates the development of innovative solutions.	Cost savings Improvement of citizens' quality of life Increase in trust in the government Attractiveness to investors

Source: formulated by the author based on [1; 3; 7]

Table 4

The overall impact of implementing blockchain and big data analytics in the financial sector is an increase in tax revenue

Direction	Blockchain technology	Big data analytics	Developing advantages
Transparency and transaction traceability	Creating an immutable record of all financial transactions on a blockchain prevents data manipulation and income concealment.	Analyzing large datasets of financial transactions allows for the identification of discrepancies and suspicious transactions.	Increasing the transparency of financial transactions, making tax evasion more difficult.
Automation of tax processes	Creating smart contracts for automated tax calculations and payments.	Utilizing machine learning algorithms for the automated classification and processing of tax returns.	Reducing administrative burden and minimizing errors in tax calculations.
Optimization of the tax system	Creating transparent and efficient tax systems that foster investment.	Analyzing data on economic activity allows for the identification of optimal tax rates and the structure of the tax system.	Increasing a country's investment attractiveness and improving the efficiency of public spending.
Combating the shadow economy	Creating transparent cryptocurrency exchange systems and tracking the origin of digital assets.	Analyzing data on consumption and household income to detect illegal income	Reducing the size of the shadow economy and increasing tax revenue from the informal sector.

Source: formulated by the author based on [2; 5–6]

Table 5

Overall, the creation of new revenue streams involves both expanding the digital economy and selling off state-owned assets

Direction	Development of the digital economy	Sale of state assets	Developing advantages
Increasing revenue	Promoting the development and commercialization of digital goods and services, data sales, micro tasks	Privatization of state enterprises, sale of real estate, licensing of natural resources	Increasing state revenues, boosting corporate profits
Reducing reliance on traditional sources	Economic diversification, reducing dependence on raw material exports, reducing dependence on budget funds	Reduction of public debt, decrease in costs for maintaining inefficient enterprises	Enhancing economic resilience to external shocks, improving resource utilization efficiency
Funding new projects	Investment in innovations, research and development, and creation of new technologies in business	Funding infrastructure projects, social programs, reducing the budget deficit	Accelerating technological development, improving quality of life
Other benefits	Enhancing competitiveness, creating new jobs, developing an innovation ecosystem	Increasing asset management efficiency, attracting private investment, enhancing transparency	Increasing the country's investment attractiveness, enhancing the efficiency of public resource utilization

Source: formulated by the author based on [2; 4; 6–7]

enhancing the efficiency of government operations and decreasing the financial burden on citizens [5].

In the context of this research, it involves efforts to make the state more economical and efficient through the optimization of government procurement and improvements in energy efficiency (Table 6).

Optimization of public procurement and energy efficiency are crucial tools for reducing government administrative costs [5]. These measures lead to cost savings, improved transparency, efficiency in government operations, and support economic development and environmental preservation.

It is undeniable that new technologies and innovations are fundamental to strengthening a country's financial security; however, their effectiveness directly depends on clear strategic planning and effective management.

Conclusions. The study emphasizes the importance of innovations and technologies in reducing budget deficits and improving national financial security, highlighting how these elements are closely interconnected and mutually reinforcing. The following conclusions were drawn:

1. Managed implementation of innovations and technologies in the economy is strategically important for modern states. It not only contributes to improving the efficiency of government management, increasing tax revenues, and creating new sources of income but also helps reduce the costs of public administration. However, to achieve the maximum effect, particularly concerning the parameters of national financial security, technologies, and innovations must be seamlessly integrated into the existing economic system. Only with harmonious interaction with traditional sectors of the economy can innovations become a powerful driver of economic growth and improvement in the population's well-being.

2. New technologies and innovations are fundamental to enhancing a country's financial security; however, their effectiveness depends on clear strategic planning and effective management. To reduce the budget deficit and

Table 6

General concept of reducing public administration costs through the optimization of public procurement and energy efficiency

Direction	Optimization of government procurement	Energy efficiency	Developing advantages
Adjustment of budget revenues for other areas	Conducting competitive bidding, utilizing E-procurement, establishing Long-term contracts	Implementation of energy-efficient technologies, utilization of renewable energy sources	Freeing up funds for financing social programs, infrastructure projects, and scientific research
Adjustment of tax burden	Reduction of costs for maintaining the government apparatus, optimization of the tax system	Reduction of utility costs for residents and businesses	Reduction of tax burden on citizens and businesses, stimulating economic growth
Enhancement of transparency and accountability	Publication of procurement information, use of electronic accounting systems, conducting audits	Publication of energy consumption information, implementation of energy passports for buildings	Increasing public trust in government agencies, preventing corruption
Reduction of corruption	Decreasing opportunities for corruption in procurement processes, strengthening control over the use of budget funds	Reduction of opportunities for corruption in the procurement of energy-efficient equipment	Creating transparent decision-making mechanisms, enhancing accountability of officials

Source: formulated by the author based on [3; 5; 7] enhance financial security, these components must target specific sectors of the economy and public administration, focusing on generating additional revenue and optimizing expenses.

3. New technologies and innovations should not merely be "layered" onto the existing economic system but should become an integral part of it, enhancing its strengths and addressing its weaknesses. To achieve this goal, we should gradually implement new technologies and innovations, beginning with small pilot projects.

Future research prospects involve developing a methodology for quantitatively assessing the impact of innovations on budget deficits, tax revenues, and other macroeconomic indicators.

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