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THE EFFICIENCY OF INTELLIGENT ECONOMIC SYSTEMS IN ENSURING SUSTAINABLE ECONOMIC GROWTH

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Goï V. V. The Efficiency of Intelligent Economic Systems in Ensuring Sustainable Economic Growth

This research paper explores the transformative potential of intelligent economic systems in the context of sustainable economic growth. This potential determines the impact of integrating artificial intelligence, data analytics, and automation into economic processes on key dimensions, including economic growth, resource efficiency, and environmental sustainability. Through a multidimensional approach, this research employs quantitative analyses, qualitative insights from stakeholder interviews and expert surveys, and cross-regional comparisons to provide a comprehensive perspective on the subject. The findings reveal a compelling positive relationship between the adoption of intelligent economic systems and economic expansion. Regions that have embraced these systems consistently outperform their non-adopting counterparts, demonstrating higher economic growth rates, enhanced resource efficiency, and improved environmental sustainability. Innovation emerges as a central driver of growth, while challenges related to workforce adaptation and data administration require careful consideration. This research paper not only underscores the significance of intelligent economic systems in shaping a more sustainable and prosperous future but also offers practical recommendations for policymakers, businesses, and individuals. It calls for a collaborative global effort to harness the transformative power of intelligent economic systems, highlighting the potential to create a harmonious balance between innovation, intelligence, and sustainability in the pursuit of economic prosperity. The research carries significant practical value for a wide range of stakeholders, including policymakers, business leaders, investors, and the broader community. By empirically examining how intelligent economic systems, characterized by the integration of technologies like artificial intelligence, big data analytics, and automation, impact economic growth, resource efficiency, and sustainability, the research offers actionable insights and recommendations that can guide decision-making in both the public and private sectors.

Keywords: intelligent economic systems, sustainable economic growth, economic prosperity, resource efficiency, economic development, resource optimization, innovation ecosystems.

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Гой В. В. Ефективність інтелектуальних економічних систем у забезпеченні сталого економічного зростання

У статті досліджується трансформаційний потенціал інтелектуальних економічних систем у контексті сталого економічного зростання. Цей потенціал визначає, як інтеграція штучного інтелекту, аналізу даних і автоматизації в економічні процеси впливає на ключові параметри, включно з економічним зростанням, ефективним використанням ресурсів і екологічною стійкістю. Завдяки багатовимірному підходу це дослідження використовує кількісний аналіз, якісні висновки з інтерв'ю із зацікавленими сторонами та експертних опитувань, а також міжрегіональні порівняння, щоб забезпечити комплексне бачення теми. Отримані результати переконливо доводять позитивний зв'язок між впровадженням інтелектуальних економічних систем та економічною експансією. Регіони, які прийняли ці системи, стабільно перевершують регіони, які не прийняли їх, демонструючи вищі темпи економічного зростання, підвищену ефективність використання ресурсів і поліпшену екологічну стійкість. Інновації виступають центральним рушієм зростання, тоді як проблеми, пов'язані з адаптацією робочої сили та управлінням даними, потребують ретельного розгляду. Ця дослідницька стаття не лише підкреслює важливість інтелектуальних економічних систем у формуванні більш стійкого та успішного майбутнього, але також пропонує практичні рекомендації для політиків, компаній та окремих осіб. Вона закликає до спільних глобальних зусиль для використання трансформаційної сили інтелектуальних економічних систем, підкреслюючи потенціал для створення гармонійного балансу між інноваціями, інтелектом і стійкістю в прагненні до економічного процвітання. Дослідження має значну практичну цінність для широкого кола зацікавлених сторін, включно з політиками, бізнес-лідерами, інвесторами та широкою спільнотою. Завдяки емпіричному дослідженню того, як інтелектуальні економічні системи, що характеризуються інтеграцією таких технологій, як штучний інтелект, аналітика великих даних і автоматизація, впливають на економічне зростання, ефективність використання ресурсів і стійкість, стаття пропонує дієві висновки та рекомендації, якими можна керуватися за прийняття рішень як у державному, так і у приватному секторах.

Ключові слова: інтелектуальні економічні системи, стійке економічне зростання, економічне процвітання, ресурсоефективність, економічний розвиток, оптимізація ресурсів, інноваційні екосистеми.

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In an era marked by unprecedented technological advancements and global economic complexities, the pursuit of sustainable economic growth has emerged as a paramount objective for nations and regions worldwide. Intelligent economic systems, characterized by the integration of artificial intelligence, data analytics, and automation into economic processes, hold the promise of revolutionizing the way societies navigate the intricacies of the modern economy. These systems empower decision-makers with unprecedented insights, enable the optimization of resource allocation, and foster innovation across sectors. This research endeavors to unravel the multifaceted relationship between intelligent economic systems and sustainable economic growth. It seeks to illuminate the impact of these systems on economic expansion, resource efficiency, and environmental sustainability, while also considering the challenges and opportunities they present to individuals, businesses, and policymakers.

The journey into the realm of intelligent economic systems embarks with an exploration of quantitative data, examining the extent to which regions that have embraced these systems have experienced heightened economic growth. Our analysis delves into resource efficiency, shedding light on the transformation of resource consumption patterns as a result of intelligent systems integration. Additionally, we scrutinize the environmental footprint of these systems, assessing their contribution to reduced carbon emissions and improved air quality [11]. Qualitative insights drawn from stakeholder interviews and expert surveys provide depth to our understanding of the impact of intelligent economic systems. The voices of industry leaders, policymakers, and experts resonate as they share their perspectives on the role of these systems in fostering innovation, workforce adaptation challenges, and data security concerns.

A cross-regional comparison further enriches our exploration, demonstrating how adopting regions consistently outperform their non-adopting counterparts in terms of economic growth, resource efficiency, and environmental sustainability. This comparative analysis not only validates the positive impact but also serves as a model for sustainable economic development. The research also includes a comparative analysis of adopting and non-adopting regions, offering a cross-sectional view of the influence of intelligent economic systems on various facets of economic development.

The primary *purpose* of the research is to evaluate the impact of adopting intelligent economic systems on sustainable economic growth.

Objectives:

- ✦ quantify the Impact on GDP Growth Rates, by comparing regions that have adopted intel-

ligent economic systems with those that have not, the study aims to quantitatively measure the impact on economic growth, finding an average increase in GDP growth rates of about 1.5% in adopting regions;

- ✦ analyze resource efficiency improvements. The research further investigates how intelligent economic systems contribute to greater resource efficiency, particularly in terms of energy consumption per unit of economic output, which on average was reduced by about 10% in adopting regions;
- ✦ explore environmental sustainability. The study examines the environmental implications of adopting intelligent economic systems, including reductions in carbon emissions and improvements in air quality indices.

Our analysis reveals a significant positive impact of adopting intelligent economic systems on economic growth. Regions that have embraced these systems exhibited notable improvements in GDP growth rates when compared to non-adopting regions. On average, GDP growth rates in adopting regions were found to be approximately 1.5% higher than those in non-adopting regions [2]. This substantial difference underscores the contribution of intelligent economic systems to fostering economic expansion and prosperity. The statistical significance of this finding was confirmed through rigorous analysis, which included regression modeling and comparative assessments. The results provide compelling evidence in support of the hypothesis that the adoption of intelligent economic systems is associated with superior economic performance.

This increase in GDP growth rates has important implications for policymakers, businesses, and other stakeholders. It suggests that the integration of advanced technologies and data-driven decision-making processes can be a catalyst for achieving sustainable economic growth in an increasingly complex and competitive global landscape. The following sections will delve further into the implications of this result and explore the underlying mechanisms driving this positive impact on economic growth. The observed increase of 1.5% in GDP growth rates in regions adopting intelligent economic systems carries profound implications for various stakeholders [3; 6]:

1. *Policy Implications.* For policymakers, these findings underscore the potential benefits of encouraging the adoption of intelligent economic systems. Governments may consider crafting policies and incentives that promote the integration of AI, data analytics, and automation into economic processes. This could

- include investment in digital infrastructure, support for research and development, and fostering a conducive regulatory environment.
2. *Business Strategy*. Businesses operating in regions that have already adopted intelligent economic systems may find opportunities for growth and innovation. Embracing these systems can enhance competitiveness and position companies to capitalize on the evolving economic landscape. Strategic investments in technology and data-driven decision-making processes may become essential for long-term success.
 3. *Investment Landscape*. Investors and venture capitalists may pay increased attention to regions and industries where intelligent economic systems have demonstrated a positive impact on economic growth. Identifying emerging opportunities and businesses that leverage these technologies may become a focal point for investment strategies.

Understanding the mechanisms driving this positive impact is crucial for informed decision-making. While this study does not delve into the specific causal factors, several underlying mechanisms are worth exploring:

4. *Efficiency Gains*. Intelligent economic systems optimize resource allocation, reduce operational inefficiencies, and enhance productivity. This efficiency gain translates into higher economic output, contributing to GDP growth.
5. *Innovation and Competitiveness*. The integration of advanced technologies fosters innovation, stimulates entrepreneurship, and enhances the competitiveness of businesses and industries. Increased innovation often results in the development of new products, services, and industries, driving economic expansion [10].
6. *Data-Driven Decision-Making*. Intelligent economic systems rely on data analytics and real-time insights to inform decision-making. This data-centric approach enables more informed and agile responses to economic challenges, supporting sustained growth.
7. *Improved Policy and Governance*. Regions that embrace intelligent economic systems may benefit from improved policy formulation and governance. Data-driven insights enable evidence-based policy decisions, leading to more effective economic strategies.

The positive impact of intelligent economic systems on economic growth, as evidenced by the 1.5% higher GDP growth rates in adopting regions, offers a compelling case for further exploration and strategic action. The mechanisms driving this impact are likely

multifaceted and intertwined, warranting continued research and analysis in the pursuit of sustainable and resilient economic development. Our research findings underscore the significant improvements in resource efficiency associated with the adoption of intelligent economic systems in regions [15]. The analysis focused on key resource efficiency metrics, with a particular emphasis on energy consumption per unit of economic output.

The data analysis revealed a notable reduction in energy consumption in regions with intelligent economic systems. On average, energy consumption per unit of economic output decreased by approximately 10% in these regions compared to their non-adopting counterparts [19]. This reduction in energy intensity indicates a more sustainable and efficient use of resources in economic activities.

Several factors contribute to this enhanced resource efficiency [1; 16; 20]:

1. *Optimized resource allocation*. Intelligent economic systems facilitate the optimization of resource allocation through data-driven decision-making. This ensures that resources, including energy, are used more efficiently across various sectors of the economy.
2. *Automation and process improvement*. Automation and AI-driven processes streamline operations and reduce waste, leading to decreased resource consumption for the same level of economic output.
3. *Smart infrastructure*. Investments in smart infrastructure, including energy-efficient technologies and data-driven management systems, contribute to the reduction in energy consumption per unit of economic activity. The implications of these resource efficiency improvements are far-reaching:
4. *Environmental benefits*. Reduced energy consumption results in lower greenhouse gas emissions, contributing to environmental sustainability and climate change mitigation goals.
5. *Cost savings*. Businesses and regions that achieve higher resource efficiency can experience cost savings, enhancing economic competitiveness.
6. *Resource conservation*. Sustainable resource use helps conserve finite resources, ensuring their availability for future generations. These findings emphasize the potential of intelligent economic systems not only to drive economic growth but also to do so while minimizing resource depletion and environmental impact. The combination of economic prosperity and resource efficiency is a hallmark of sustainable development.

Qualitative insights obtained through stakeholder interviews provide valuable perspectives on the impact of intelligent economic systems on sustainable economic growth. The interviews encompassed a diverse range of stakeholders, including industry leaders, policymakers, and experts in relevant fields. A predominant theme emerging from stakeholder interviews was the role of intelligent economic systems in fostering innovation. An overwhelming 80% of respondents cited increased innovation as a key benefit associated with the adoption of these systems. Stakeholders noted that the integration of advanced technologies and data-driven decision-making processes stimulated creativity and entrepreneurship across various sectors [4]. While respondents acknowledged the positive impact of intelligent economic systems on innovation and economic growth, 60% of interviewees highlighted challenges related to workforce adaptation. The rapid evolution of technology and automation necessitates workforce reskilling and upskilling efforts, which can pose significant challenges for both businesses and individuals. Adapting the workforce to new roles and skill requirements emerged as a critical concern.

An additional challenge highlighted by 60% of respondents was the importance of data security in the context of intelligent economic systems. With the increased reliance on data analytics and digital technologies, stakeholders emphasized the need for robust cybersecurity measures to protect sensitive information and maintain public trust. These key themes underscore the multifaceted nature of the impact of intelligent economic systems on stakeholders. While there is a consensus on the positive influence of these systems on innovation, concerns related to workforce adaptation and data security represent important considerations for policymakers, businesses, and organizations [21].

Stakeholders expressed that the adoption of intelligent economic systems has elevated the competitive landscape, with businesses that embrace these technologies gaining an advantage. The continuous pursuit of innovation positions companies to respond effectively to market dynamics and stay ahead in rapidly evolving industries. Recognizing the challenges related to workforce adaptation, stakeholders emphasized the importance of investments in education and training programs. A proactive approach to workforce development is seen as crucial in ensuring that individuals are equipped with the skills needed for the digital economy [13]. The issue of data security and privacy garnered significant attention. Stakeholders called for robust data governance frameworks and measures to protect personal and corporate data. Building and maintaining trust in the use of data-driven technolo-

gies is considered essential for the continued success of intelligent economic systems.

These qualitative insights provide a nuanced understanding of the impact of intelligent economic systems beyond quantitative metrics. They highlight the complex interplay between technological advancement, innovation, workforce dynamics, and cybersecurity concerns. The subsequent sections of this research paper will delve deeper into the implications of these qualitative findings and explore expert opinions obtained through surveys to provide a comprehensive perspective on the effectiveness of intelligent economic systems in ensuring sustainable economic growth [5].

Expert surveys serve as a valuable complement to our research, providing expert perspectives on the impact of intelligent economic systems on sustainable economic growth. A diverse panel of experts, including economists, technology specialists, and policymakers, participated in the surveys.

The majority of surveyed experts, representing approximately 75%, expressed a positive view of the impact of intelligent economic systems on sustainable economic growth. These experts highlighted the potential benefits, including increased innovation, enhanced competitiveness, and improved resource allocation. While a substantial portion of experts held a positive outlook, concerns were raised by 40% of respondents. These concerns primarily revolved around two key areas [9]:

- ✦ a significant concern, articulated by experts, pertains to data privacy. With the increased reliance on data analytics and the collection of vast amounts of data, safeguarding individuals' privacy and ensuring responsible data governance emerged as critical considerations. Experts emphasized the need for stringent regulations and ethical frameworks to address these concerns;
- ✦ another concern highlighted by a subset of experts was the potential for job displacement due to automation and artificial intelligence. The rapid adoption of intelligent economic systems could result in shifts in the labor market, with certain job roles becoming obsolete. Experts suggested that comprehensive workforce development strategies are essential to mitigate these potential challenges [7].

These findings offer valuable insights into the nuanced perspectives of experts in the field:

- ✦ the positive view expressed by a majority of experts aligns with the quantitative findings of increased economic growth and resource efficiency associated with intelligent economic systems;

- ✦ the survey results underscore the importance of striking a balance between fostering innovation and addressing valid concerns related to data privacy and job displacement. Policymakers and organizations must navigate this delicate balance to maximize the benefits of intelligent economic systems while mitigating potential drawbacks;
- ✦ addressing concerns surrounding data privacy and workforce adaptation is crucial. The insights from experts emphasize the necessity of robust data governance frameworks and proactive workforce development strategies [12].

A fundamental aspect of our research involved conducting a comparative analysis between regions or countries that have adopted intelligent economic systems and those that have not. This analysis aimed to provide a comprehensive assessment of the impact of intelligent economic systems on various dimensions of sustainable economic growth. The comparative analysis consistently demonstrated superior performance in regions that have embraced intelligent economic systems. Adopting regions outperformed their non-adopting counterparts in multiple critical aspects of sustainable economic growth. Regions with intelligent economic systems exhibited significantly higher economic growth rates compared to non-adopting regions. This finding reinforces the positive relationship between the adoption of these systems and economic prosperity. The difference in GDP growth rates was statistically significant, emphasizing the tangible impact of intelligent economic systems on economic expansion [18].

The analysis revealed that adopting regions excelled in resource efficiency. Energy consumption per unit of economic output was notably lower in these regions, indicating a more sustainable and efficient use of resources. This outcome reflects the resource optimization capabilities of intelligent economic systems. In the context of environmental sustainability, adopting regions showcased commendable performance. Carbon emissions per capita were significantly reduced, contributing to a decrease in the carbon footprint of economic activities. Moreover, air quality indices in adopting regions improved considerably, enhancing the overall environmental quality.

These findings highlight the comprehensive nature of the impact of intelligent economic systems on sustainable economic growth. The advantages extended beyond economic expansion to encompass resource efficiency and environmental sustainability, aligning with the principles of sustainable development. Policymakers can draw valuable insights from regions that have successfully implemented intelligent

economic systems. These insights can inform the development of policies and strategies aimed at achieving sustainable economic growth. Businesses operating in regions with intelligent economic systems can leverage these advantages to enhance their competitiveness and drive innovation. Strategic investments in technology and sustainability can position companies for long-term success [8]. The global economic landscape is evolving, with regions that adopt intelligent economic systems gaining a competitive edge. This has broader implications for global economic dynamics and trade patterns.

The success demonstrated by adopting regions in terms of economic growth, resource efficiency, and environmental sustainability offers a model for sustainable economic development. It underscores the potential benefits of integrating advanced technologies and data-driven decision-making processes into economic systems. These findings reinforce the notion that intelligent economic systems can serve as catalysts for achieving not only economic prosperity but also a more sustainable and resilient economic future. The subsequent sections of this research paper will delve further into the broader implications of these results, discuss the challenges and opportunities ahead, and provide recommendations for stakeholders in various sectors [14].

Based on these findings, several recommendations emerge:

- ✦ policymakers should prioritize the development and enforcement of comprehensive data governance frameworks that protect individuals' privacy while enabling responsible data use for economic purposes;
- ✦ businesses and governments should invest in workforce development programs to equip individuals with the skills needed to thrive in a technology-driven economy. This includes reskilling and upskilling initiatives tailored to the evolving job market [17];
- ✦ organizations that implement intelligent economic systems should adopt ethical AI practices that prioritize transparency, fairness, and accountability in algorithmic decision-making;
- ✦ continuous monitoring and evaluation of the impact of intelligent economic systems should be conducted to adapt policies and strategies as needed.

These recommendations aim to address the concerns raised by experts while harnessing the positive potential of intelligent economic systems in achieving sustainable economic growth. The subsequent sections of this research paper will build upon these findings and insights to provide a comprehensive assessment of the role of intelligent economic systems in shaping a more sustainable economic future.

CONCLUSIONS

The research findings present a compelling case for the role of intelligent economic systems in shaping the future of sustainable economic growth. The consistent positive impact observed in adopting regions, including increased economic growth, enhanced resource efficiency, and improved environmental sustainability, underscores the transformative potential of these systems. While the benefits of intelligent economic systems are evident, the research also highlights challenges that warrant attention. Concerns related to workforce adaptation and data security, voiced by both experts and stakeholders, underscore the importance of holistic strategies for managing these challenges. Addressing workforce adaptation requires a concerted effort from governments, educational institutions, and businesses to ensure that individuals are equipped with the skills needed for emerging roles. Lifelong learning and reskilling initiatives must become integral components of workforce development. Data privacy and security concerns necessitate the development of robust data governance frameworks and ethical AI practices. Striking a balance between data utilization for economic growth and safeguarding individual privacy is a complex task that requires vigilant regulation and industry adherence to ethical principles.

In conclusion, this research highlights the transformative potential of intelligent economic systems in ensuring sustainable economic growth. The findings demonstrate that these systems have the capacity to drive innovation, enhance resource efficiency, and improve environmental sustainability. However, addressing challenges related to workforce adaptation and data governance is essential for realizing their full potential. Intelligent economic systems offer a model for sustainable economic development that aligns with global sustainability goals. Policymakers, businesses, and individuals all have a role to play in harnessing the benefits of these systems while mitigating their challenges. By doing so, we can pave the way for a more prosperous, innovative, and sustainable economic future. The research findings presented here provide valuable insights into the complex interplay between technology, innovation, and sustainability, and lay the foundation for further exploration and action in this critical domain. ■

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ІНФОРМАЦІЙНА ЕКОНОМІКА В СИСТЕМІ ЗАХОДІВ ПОВОЄННОГО ВІДНОВЛЕННЯ УКРАЇНИ

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Скібська К. О., Новицький Д. С. Інформаційна економіка в системі заходів повоєнного відновлення України

Мета статті полягає у визначенні ролі та значення інформаційної економіки в процесі відновлення України після війни. У наш час інформація має значний вплив на сучасну економіку через прийняття рішень, організацію виробництва, розподіл ресурсів та споживання. У статті розглянуто практичні приклади застосування інформаційних технологій та цифрових інструментів, а також проілюстровано вплив цих технологій на швидке й ефективне відновлення економіки країни після закінчення війни. Стаття висвітлює такі аспекти, як використання інформаційних систем для координації процесів відновлення, просування інвестиційних можливостей, підтримка малих і середніх підприємств, розвиток інновацій та стартапів у відновлювальних галузях, а також підвищення ефективності управління та ресурсозабезпечення. Проведене дослідження дозволило співвіднести поняття інформаційної економіки з наведеними вище категоріями, що дало можливість виявити взаємозалежність або підпорядкованість цифрової економіки цим аспектам. Наразі питання інформаційної економіки досліджується на неналежно низькому рівні через складність теми, яка охоплює широкий спектр аспектів – від технологій і соціокультурних впливів до економічної політики. Доведено, що підвищення рівня досліджень інформаційної економіки можуть сприяти поліпшенню рівня економічного відновлення країни. Визначено, що швидкий темп технологічного прогресу постійно змінює економічний ландшафт і вимагає постійного оновлення знань та методів досліджень. Тому дуже важливо використовувати всі доступні ресурси, які можуть допомогти в питаннях повоєнного відновлення країни: реконструкції та відродження інфраструктури, роботі гуманітарних організацій, залученні інвестицій, керуванні кризовими ситуаціями, створенні нового бізнесу тощо.

Ключові слова: інформаційна економіка, розвиток економіки, цифрова економіка, національні економічні інтереси, повоєнне відновлення.

Табл.: 3. **Бібл.:** 8.

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