



Digital Transformation and Artificial Intelligence as Tools for Achieving Sustainable Development in Iraq: An Analytical Study.

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Article Information

Article History:

Received Nov 15, 2025
Revised Dec 04, 2025
Accepted Jan 12, 2026
Available Feb. 1, 2026

Keywords:

Digital Transformation,
Artificial Intelligence,
Sustainable Development,
Iraq,
Digital Infrastructure

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Abstract

The modern world has been witnessing major transformations as a result of rapid technological developments, particularly in the fields of digital transformation and artificial intelligence, which have become strategic tools for achieving sustainable development. This research explores the potentials of employing these modern technologies in Iraqi society and their role in promoting economic and social growth and improving quality of life. The study addresses three main themes. The first them focuses on digital transformation, defining it as the process of converting traditional systems into digital systems that rely on modern technology to improve performance and increase efficiency. The second theme discusses artificial intelligence, defining it as a technology capable of analyzing big data, making intelligent decisions, and solving complex problems with high efficiency. The third theme emphasizes the Iraqi context, where Iraq faces several challenges in integrating digital transformation and artificial intelligence, most notably weak digital infrastructure, a shortage of qualified human expertise, cultural resistance to change, and legal and regulatory constraints. The research came out with a set of important conclusions, including that digital transformation and artificial intelligence constitute strategic tools for enhancing sustainable development, and that their successful implementation depends on developing infrastructure, building human capacities, spreading digital culture, and strengthening local and international partnerships. The study also provided practical recommendations to accelerate the digital transformation process, such as developing digital infrastructure, creating specialized training programs, and enhancing supportive policies and legislation. Additionally, it proposed future steps that include conducting field studies, implementing pilot projects, and developing a national open data platform. Adopting digital transformation and artificial intelligence in Iraq represents a historic opportunity to achieve sustainable development and improve citizens' quality of life, with an emphasis on the necessity of political will and clear strategies to overcome challenges and achieve long-term sustainable development goals.

DOI: [10.33899/radab.2024.150935.2184](https://doi.org/10.33899/radab.2024.150935.2184), ©Authors, 2023, College of Arts, University of Mosul.

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التحول الرقمي والذكاء الاصطناعي كأدوات لتحقيق التنمية المستدامة في العراق / دراسة تحليلية

المستخلص:

يشهد العالم في العصر الحديث تحولات كبيرة نتيجة التطورات التكنولوجية المتسارعة، لا سيما في مجالات التحول الرقمي والذكاء الصناعي، والتي أصبحت أدوات استراتيجية لتحقيق التنمية المستدامة . يناقش البحث إمكانيات توظيف هذه التقنيات الحديثة في المجتمع العراقي، ودورها في تعزيز النمو الاقتصادي والاجتماعي وتحسين جودة الحياة.

يتناول البحث ثلاثة محاور رئيسية: المحور الأول يركز على التحول الرقمي، معرّف إياه على أنه عملية تحويل الأنظمة التقليدية إلى أنظمة رقمية تعتمد على التكنولوجيا الحديثة لتحسين الأداء وزيادة الكفاءة. أما المحور الثاني، فيتناول الذكاء الصناعي، معرّف إياه كتقنية قادرة على تحليل البيانات الضخمة، واتخاذ القرارات الذكية، وحل المشكلات المعقدة بكفاءة عالية. أما المحور الثالث، فيركز على الواقع العراقي، حيث يعاني العراق من تحديات عدة في إدماج التحول الرقمي والذكاء الصناعي، أهمها ضعف البنية التحتية الرقمية، نقص الخبرات البشرية المؤهلة، المقاومة الثقافية للتغيير، والقيود القانونية والتنظيمية.

توصل البحث إلى مجموعة من الاستنتاجات المهمة، منها أن التحول الرقمي والذكاء الصناعي يشكلان أدوات استراتيجية لتعزيز التنمية المستدامة، وأن نجاح تطبيقهما مرتبط بتطوير البنية التحتية، بناء القدرات البشرية، نشر الثقافة الرقمية، وتعزيز الشراكات المحلية والدولية. كما قدم البحث توصيات عملية لتسريع عملية التحول الرقمي، مثل تطوير البنية التحتية الرقمية، إنشاء برامج تدريبية متخصصة، وتعزيز السياسات والتشريعات الداعمة، بالإضافة إلى مقترحات مستقبلية تشمل إجراء دراسات ميدانية، تطبيق مشاريع تجريبية، وتطوير منصة وطنية للبيانات المفتوحة. سيما أن تبني التحول الرقمي والذكاء الصناعي في العراق يشكل فرصة تاريخية لتحقيق التنمية المستدامة وتحسين جودة حياة المواطنين، مع التأكيد على ضرورة وجود إرادة سياسية واستراتيجيات واضحة، لتجاوز التحديات وتحقيق أهداف التنمية المستدامة على المدى الطويل.

الكلمات المفتاحية: التحول الرقمي، الذكاء الصناعي، التنمية المستدامة، العراق، البنية التحتية الرقمية.

Introduction

In the modern era, digital transformation and artificial intelligence have become one of the most prominent drivers that are reshaping the social and economic reality of countries and societies. Rapid development in the fields of technology and innovation has become a vital element in the competitiveness of countries and in the achievement of the Sustainable Development Goals, which represent a global framework that seeks to ensure human well-being and the sustainability of environmental and social resources⁽¹⁾. International experience has confirmed that the use of modern technology and artificial intelligence is not only to increase productivity, but also to improve the quality of public services, strengthen strategic planning and support social justice by providing equal opportunities for all members of society⁽²⁾.

Iraq is rich in natural and human resources, but at the same time faces significant challenges in terms of sustainable development, including weak infrastructure, unemployment, limited use of modern technology, and the social and economic impacts of recurrent conflicts and crises. These challenges make research into the possibilities of digital transformation and artificial intelligence not only a technical option, but also a strategic necessity to find sustainable solutions that contribute to enhancing the ability of Iraqi society to face challenges and achieve its aspirations Developmental Ministry.

Digital transformation is also a comprehensive framework for re-engineering various sectors, be they economic, educational, health or environmental, through the use of big data, automation, and artificial intelligence to improve decision-making processes, and provide more efficient and transparent services. In Iraq, AI can play a pivotal role in the development of critical sectors such

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(1) IBM. (n.d.). What is digital transformation .

<https://www.ibm.com/think/topics/digital-transformation>

(2) IBM. (n.d.). What is artificial intelligence (AI). <https://www.ibm.com/think/topics/artificial-intelligence>

as energy, agriculture, health, and education, by improving resource management, predicting future needs, and providing innovative solutions to chronic challenges⁽¹⁾.

Accordingly, this research seeks to examine the role of digital transformation and artificial intelligence as effective mechanisms for achieving sustainable development in Iraq, by exploring the available possibilities, identifying the obstacles facing the application of these technologies, and proposing practical strategies that can contribute to improving the standard of living, promoting social justice, and preserving environmental resources for future generations. This research lays the scientific foundations for understanding the relationship between modern technology and sustainable development, with a focus on the specificity and unique potential of Iraqi society, in the context of a comprehensive vision towards a more sustainable and prosperous future.

The problem of this research is the challenges faced by Iraqi society in its quest to achieve sustainable development, in the light of the complex social and economic reality that suffers from the effects of conflicts, weak infrastructure, unemployment, and inadequate use of available resources. Despite global technological development and the growing interest in digital transformation and the use of artificial intelligence as strategic tools to promote development, Iraq has not yet succeeded in effectively integrating these technologies into its development plans.

The research addresses the following questions: To what extent can digital transformation and artificial intelligence contribute to improving the reality of sustainable development in Iraq, and what are the available possibilities and challenges that hinder the application of these technologies, and how can Iraqi society benefit from international experiences in this field without compromising its social and cultural specificities? Therefore, the urgent need to find innovative solutions that enhance the ability of the state and society to face economic and social problems, and achieve sustainable development that includes all segments of society, with a focus on the optimal use of modern technology to achieve comprehensive and balanced development.

The **importance of this research** lies in highlighting the growing role of digital transformation and artificial intelligence as strategic tools capable of promoting sustainable development in modern societies, especially in the context of Iraqi society that faces multiple development challenges at the economic, social, and environmental levels. A scientific understanding of this relationship can provide a clear framework for decision-makers and strategic planners to adopt effective policies that keep pace with global technological development and respond to the needs of the local community.

The research also gains importance by providing a practical perception of the possibilities of using modern technologies to improve the quality of public services, enhance productivity, support education, and improve resource management, thus contributing to reducing poverty and unemployment, and achieving social justice. In addition, the research highlights the importance of exploring the obstacles facing the integration of these technologies in Iraq, including institutional, social, and technical aspects, and developing viable proposals to maximize the benefit of digital transformation and artificial intelligence in achieving the Sustainable Development Goals. Thus, this research contributes to enriching scientific and applied knowledge in the field of sustainable development and modern technology, and provides a scientific base for those wishing to develop comprehensive strategies that enhance Iraq's ability to face future challenges and achieve comprehensive and balanced development.

This research relies on the Deductive Analytical Approach as the main methodological framework, due to its ability to analyze complex phenomena and draw general conclusions from

⁽¹⁾ International Institute for Sustainable Development. (n.d.). Sustainable development. Retrieved from <https://www.iisd.org/mission-and-goals/sustainable-development>

micro-facts. It examines the relationship between digital transformation and artificial intelligence and its impact on achieving sustainable development in Iraq, by deconstructing the different components of each of these phenomena and understanding how they interact with the social, economic and developmental reality in Iraqi society.

The research uses a collection of information and data related to digital transformation, artificial intelligence, and sustainable development from reliable theoretical sources, including academic studies, official reports, and scientific articles. This information is then analyzed and results are derived that illustrate the available possibilities and challenges facing the employment of these modern technologies in the context of sustainable development. By linking theory and practice, practical conclusions that can help formulate actionable recommendations for decision-makers and strategic planners. The use of the deductive analytical method also allows the possibility of comparing international experiences in the field of digital transformation and artificial intelligence with the reality of Iraq. As regards the objectives of this research, the research aims to:

1. Identify the basic concepts of digital transformation and artificial intelligence and link them to the concept of sustainable development.
2. Study the theoretical framework of sustainable development and the importance of modern technology in achieving its goals.
3. Highlight successful experiences in employing artificial intelligence and digital transformation to achieve sustainable development.
4. Analyze the relationship between digital transformation, artificial intelligence, and the reality of Iraqi society from a theoretical perspective.
5. Propose practical strategies to employ digital transformation and artificial intelligence in supporting sustainable development and improving the reality of Iraqi society.

First Topic: Digital Transformation and Its Importance in Achieving Sustainable Development

Digital transformation is the process of integrating digital technology into all areas of business, leading to fundamental changes in how organizations operate and how they deliver value to customers. This includes modernizing processes, business models, and organizational culture to meet the changing demands of the market. We will address this topic through the following axes:

A. Key dimensions of digital transformation⁽¹⁾:

1. **Digital Infrastructure:** Includes the networks, servers, and software needed to support digital operations.
2. **Innovation and development :** The use of technology to develop new products and services that meet market needs.
3. **Organizational Culture :** Changing the corporate culture to embrace digital thinking and enhance collaboration and flexibility.

B. Dimensions of digital transformation in achieving sustainable development⁽²⁾:

1. **Social Dimension:** Digital transformation contributes to enhancing access to essential services such as education and healthcare, reducing social gaps and achieving social justice.

(1)World Bank. (n.d.). Digital Transformation Overview.

<https://www.worldbank.org/en/topic/digital/overview>

(2) UN Environment Programme. (n.d.). Digitalization for Sustainability.

<https://www.unep.org/topics/digital-transformations/digitalization-sustainability>

- 2. Economic dimension:** Digital transformation helps improve business efficiency, reduce costs, and increase productivity. It also opens up new horizons for innovation and enhances the competitiveness of economic sectors.
- 3. Environmental Dimension:** Digital transformation contributes to improving the management of natural resources, reducing energy consumption, and reducing environmental pollution through the adoption of smart and sustainable technologies.

C. Applications of Digital Transformation in Developing Societies⁽¹⁾:

In developing countries, digital transformation plays a pivotal role in advancing sustainable development by:

1. **Enhancing Digital Education:** Offering online learning platforms that ensure broader and more equitable access to knowledge.
2. **Expanding Digital Healthcare:** Delivering remote medical consultations and improving access to health services.
3. **Supporting E-Commerce:** Allowing individuals to buy and sell goods and services via the internet, thereby stimulating economic growth.

D. Digital Transformation in Iraq

For Iraq, digital transformation faces significant challenges, including⁽²⁾:

1. **Limited infrastructure:** Lack of modern internet networks and servers.
2. **Cultural Challenges:** Some individuals and institutions are resistant to digital change.
3. **Lack of digital skills:** Lack of cadres trained in the use of modern technology.

E. Opportunities for the implementation of digital transformation in Iraq⁽³⁾:

Digital transformation in Iraq represents a field where the technological architecture intersects with social, political, and economic structures. The dynamics of this transformation cannot be understood in isolation from the historical-institutional context that shaped the state's capacities, or from the class and spatial structure that determines people's access to and benefit from digital services. Digital transformation should therefore be approached here as a socio-institutional process and not simply the installation of technological tools.

First, the spread of digitization and its social spread:

Internet use rates have risen significantly in recent years: by the end of 2024, solid report data showed that the percentage of Internet users in Iraq has reached high levels (estimates indicate about 78-83% of the population according to official and analytical statistical sources). This actual spread does not mean homogeneous access, as the benefit of connectivity varies according to geographical location, educational level, and economic status. High statistics hide behind "usage gaps" with social dimensions. Citizens in big cities are better able to turn connectivity into educational and economic opportunities than rural and internally displaced people.

(1) EY Vietnam. (n.d.). Digital Transformation – The Key to Sustainable Development.

https://www.ey.com/en_vn/insights/digital-strategy/digital-transformation-the-key-to-sustainable-development

(2) UNCTAD. (n.d.). Accelerating the Digital Economy in Developing Countries <https://unctad.org/news/accelerating-digital-economy-developing-countries>

(3) UNDP. (n.d.). The Turning Point: Iraq's Leap into the Digital Economy.

<https://www.undp.org/arab-states/press-releases/turning-point-iraqs-leap-digital-economy>

Second: Digital transformation as a mirror of poor state integration and governance e-government:

indicators and digital availability of government services reveal a partial level of transformation; This lack of integration between ministries' databases and procedures systems reflects a lack of institutional capacity building and bureaucratic obstacles that prevent digital architectures from becoming real on the ground. Ground. Consequently, widespread adoption of digital government remains an incomplete form that requires administrative and legislative restructuring.

Third: Digital economy:

Emerging growth under the roof of structural market constraints , Iraq is registering growth in aspects of the digital economy: the rise of cellular communications, the growth of e-commerce and the emergence of tech startups. However, this sector faces structural constraints: near-total dependence on the oil economy, a weak business environment, and a lack of a clear legislative framework for consumer protection and electronic transactions. These obstacles prevent the integration of the digital economy with the national productive experience, and limit its ability to create sustainable jobs commensurate with a segment Big Guys.

Fourth, spatial and social disparities in access to vital services Transformation:

in sectors such as education and health has shown situational adaptability (e.g., the expansion of distance learning during the pandemic), but actual utilization is still limited by a lack of devices, weak local content, and a limited legal structure to protect health and educational data. From a sociological perspective, these facts give us an understanding of how technologies become "mirrors of inequality" — technology does not abolish social structures, but rather reproduces them if they are not accompanied by policies Corrective.

Fifth: Human Capital: Motivated Youth and Skills Gap:

Iraq has a broad youth base that constitutes a critical energy for digital transformation, but the gap between the skills of graduates and the demands of the digital labor market is clear. This disparity points to an urgent need for educational and skills reforms (technical training, vocational programs, partnerships with the private sector) to ensure that young people become an "active force" in the knowledge economy rather than just tech consumers.

Sixth: The socio-cultural dimension of digital adoption Digital adoption cannot be separated from the elements of trust, corporate culture, and social relationships. Levels of trust in digital institutions, concerns about privacy, and traditional behaviors in transactions all affect the extent to which society accepts digital services. Therefore, building trust becomes a prerequisite for the success of any digital reform that is intended to be inclusive and sustainable.

The expansion of the digital space calls for a clear legislative framework for data protection and privacy, along with national cybersecurity plans. The absence of such a framework increases the risk of cyberattacks and misuse, which exposes the trust of the public and institutions alike to collapse.

Digital transformation in Iraq is not a purely technical issue, but rather a social and political project that must be read through the concepts of digital justice, equal opportunities, and state-building. Recent statistics (Internet usage rates, number of cellular subscribers, development of digital government indicators) indicate that significant progress has been made in digital penetration, but it is fragile progress that faces structural constraints – economic, institutional, legislative, and spatial. The success of digital transformation as a means of achieving sustainable development depends on the ability of public policies to bridge gaps Digital justice, empowering human capital, and ensuring an effective legal and security framework to arbitrate.

Second Topic: Artificial Intelligence and Its Role in Supporting Sustainable Development

Artificial Intelligence (AI) is one of the most prominent modern technologies that is transforming various sectors, including health, education, and energy. By enabling systems to learn, analyze, and make decisions, AI contributes to enhancing efficiency and achieving sustainable development. Recent studies show that artificial intelligence can contribute significantly to achieving the Sustainable Development Goals by improving performance, reducing costs, and enhancing access to basic services, and we will address this topic through the following axes:

A. Artificial Intelligence in the Health Sector

The health sector is one of the sectors that has benefited the most from artificial intelligence applications, which use artificial intelligence technologies to diagnose diseases, develop treatments, and improve hospital management. For instance, Kasturba Medical College in Mangalore has launched a Department of Artificial Intelligence in Healthcare, the first of its kind in India, with the aim of integrating AI into medical education and clinical practice. The department focuses on developing artificial intelligence applications in diagnosis, treatment, medical imaging, and public health. In addition, ⁽¹⁾. AI technologies are used to analyze big medical data, contributing to early detection of diseases and the delivery of personalized treatments, thereby improving the quality of healthcare and reducing costs.

B. Artificial Intelligence in the Education Sector

In education, artificial intelligence is improving the learning experience and expanding access to education. AI systems are used in the development of intelligent learning platforms that deliver personalized content to students based on their needs and educational levels. For example, artificial neural networks are being used in higher education to enable agricultural students to conserve water resources, thereby contributing to the promotion of sustainable education. In addition, AI technologies are used to analyze student performance and make recommendations to improve their academic outcomes, thereby improving the quality of education and expanding access to it⁽²⁾.

C. Artificial Intelligence in the Energy Sector

Artificial intelligence contributes significantly to improving energy efficiency and enhancing its sustainability. Artificial intelligence technologies are used to improve smart power grid management, predict energy consumption, and improve the efficiency of power plants. For example, Siemens and NextGen Grid have developed a smart grid management system using artificial intelligence, which analyzes real-time data on energy use, weather patterns, and renewable energy generation to improve energy distribution and reduce waste. This system has reduced energy losses by 20% and improved efficiency by 15%, contributing to the sustainability of the energy sector. In addition, AI technologies are being used to improve energy efficiency in buildings, by modifying HVAC ⁽³⁾. systems based on real-time data, thereby reducing energy consumption and carbon emissions.

D. International Experiences in the Application of Artificial Intelligence to Achieve Sustainable Development

1. India Experience

⁽¹⁾ Times Union. (2025). Editorial: The AI power question. Times Union. <https://www.timesunion.com/opinion/article/editorial-ai-power-question-20888188.php>

⁽²⁾ Times of India. (2025). KMC Manipal launches dept of AI in healthcare. Times of India. <https://timesofindia.indiatimes.com/city/mangaluru/kmc-manipal-launches-dept-of-ai-in-healthcare/articleshow/123589643.cms>

⁽³⁾ Nature. (2025). Artificial intelligence in sustainable development research. Nature Sustainability. <https://www.nature.com/articles/s41893-025-01598-6>

Kastorba Medical College has launched a Department of Artificial Intelligence in Healthcare, the first of its kind in the country. This section aims to integrate AI into medical education and clinical practice, and to develop applications of AI in diagnosis, treatment, medical imaging, and public health⁽¹⁾.

2. The U.S. Experience

Siemens and NextGen Grid have developed a smart grid management system using artificial intelligence, which analyzes real-time data on energy use, weather patterns, and renewable energy generation to improve energy distribution and reduce waste. This system has reduced energy losses by 20% and improved efficiency by 15%, contributing to the sustainability of the energy sector⁽²⁾.

3. The EU Experience

Artificial intelligence is used in environmental data analysis to monitor biodiversity, predict climate change, and improve natural resource management strategies. These applications contribute to the achievement of the Sustainable Development Goals related to the environment, by improving the management of natural resources and reducing negative environmental impacts⁽³⁾.

4. Challenges and Opportunities

Despite the great potential of artificial intelligence in supporting sustainable development, there are challenges facing its applications, such as⁽⁴⁾:

- **Lack of digital infrastructure:** Many developing countries need to improve their digital infrastructure to support AI applications.
- **Privacy and security:** AI applications raise concerns about privacy and data protection.
- **Digital Divide :** There is a significant gap in access to AI technologies between developed and developing countries.

However, there are significant opportunities to leverage AI to support sustainable development, through⁽⁵⁾:

- **International Cooperation :** Enhancing cooperation between countries to exchange knowledge and experiences in the field of artificial intelligence.
- **Training and Capacity Building :** Investment in training human cadres on artificial intelligence technologies.
- **Legislation and Policies :** Developing legislation and policies that support the safe and sustainable use of AI.

Accordingly, AI shows great potential in supporting sustainable development by improving performance, reducing costs, and enhancing access to basic services in the health, education, and energy sectors by overcoming current challenges and taking advantage of available opportunities, significant progress can be made towards achieving the Sustainable Development Goals (SDGs) using AI technologies.

⁽¹⁾ Coax soft. (2024). Using AI for sustainability: Case studies and examples. Coax soft. <https://coaxsoft.com/blog/using-ai-for-sustainability-case-studies-and-examples>

⁽²⁾ Medium. (2023). 10 Case studies on using AI to improve sustainability efforts. Medium. <https://medium.com/%40eddie.hc.tsui/10-case-studies-on-using-ai-to-improve-sustainability-efforts-92b0d3ee4ac5>

⁽³⁾ UN Sustainable Development Group. (2024). Harnessing Artificial Intelligence for Sustainable Development Goals. UNSDG. <https://unsdg.un.org/latest/announcements/harnessing-artificial-intelligence-sustainable-development-goals-sdgs>

⁽⁴⁾ ResearchGate. (2025). Artificial Intelligence and the Sustainable Development Goals: AI Applications for Each SDG. ResearchGate. https://www.researchgate.net/publication/392882719_Artificial_Intelligence_and_the_Sustainable_Development_Goals_AI_Applications_for_Each_SDG

⁽⁵⁾ International Telecommunication Union. (2025). ITU AI for Good. ITU. https://en.wikipedia.org/wiki/ITU_AI_for_Good

Third Topic: The Iraqi Context and the Potential of Employing Digital Transformation and Artificial Intelligence to Achieve Sustainable Development

Digital transformation and artificial intelligence are key factors that contribute to achieving sustainable development in various countries. In Iraq, these new technologies are a great opportunity to improve government performance, enhance transparency, and develop vital sectors such as health, education, and energy. However, Iraq faces significant challenges in integrating these technologies, ranging from weak infrastructure, lack of expertise, and cultural resistance to change. This topic aims to analyze the Iraqi reality in the field of digital transformation and artificial intelligence, and to provide strategies and plans for employing these technologies in achieving sustainable development, and we will address this topic through the following axes:

A. Challenges Facing Iraq in Integrating Digital Transformation and Artificial Intelligence

- 1. Weak digital infrastructure:** According to the World Bank report, Iraq suffers from weak internet networks, continuous power outages, and a shortage of modern data centers. These factors limit the ability of government and private institutions to adopt modern digital technologies⁽¹⁾.
- 2. Lack of expertise and qualified cadres:** Iraq is facing a significant shortage of trained human cadres in the fields of digital transformation and artificial intelligence. Most ministries and government institutions lack staff with advanced technical skills, making it difficult to apply these technologies effectively⁽²⁾.
- 3. Resistance to Change and Bureaucracy:** Cultural resistance to change is one of the most prominent barriers to integrating digital transformation. Many public sector officials are resistant to the adoption of new technologies, due to fear of loss of control or change in traditional ways of working⁽³⁾.

B. Analysis of the Current Reality of Employing Digital Transformation and Artificial Intelligence in Iraq

- 1. Government Initiatives and Strategic Directions:** Despite the challenges, the Iraqi government has begun to take steps towards digital transformation. Initiatives have been launched to develop digital payments, such as regulating digital payments, and encouraging the use of electronic payment systems such as e-payment cards and digital wallets. These initiatives contribute to enhancing transparency and reducing dependence on cash, thereby enhancing the efficiency of the national economy⁽⁴⁾.
- 2. Applications of Artificial Intelligence in Critical Sectors:** Iraq has begun to explore the applications of Artificial Intelligence in some critical sectors. For example, artificial intelligence has been used to improve energy efficiency, develop precision agriculture techniques, and improve health services through medical data analysis. These applications show the great potential of artificial intelligence in promoting sustainable development⁽⁵⁾.

⁽¹⁾ World Bank. (2023). Iraq Economic Monitor, Spring/Summer 2023 - Reemerging Pressures. <https://openknowledge.worldbank.org/entities/publication/5c828010-f6da-499a-b48d-b3dc756ee6cf>

⁽²⁾ UNDP Iraq. (2024). The Turning Point: Iraq's Leap into the Digital Economy.

<https://www.undp.org/iraq/blog/turning-point-iraqs-leap-digital-economy>

⁽³⁾ Jummar Media. (2025). Artificial intelligence in Iraq: Between digital ambitions and fragile realities. <https://jummar.media/en/9299>

⁽⁴⁾ ESCWA. (2021). Digital transformation and artificial intelligence in Iraq. <https://www.unescwa.org/news/digital-transformation-and-artificial-intelligence-iraq>

⁽⁵⁾ ResearchGate. (2025). Artificial Intelligence and Digital Transformation in Iraq - Strategic Integration Framework. <https://www.researchgate.net/publication/>

C. Strategies and Plans for Employing Digital Transformation and Artificial Intelligence in Achieving Sustainable Development

1. **Digital infrastructure development:** Iraq should invest in the development of digital infrastructure, by improving internet networks, building modern data centers, and providing sustainable energy sources to ensure the continuity of digital services. This contributes to the creation of an environment conducive to the adoption of new technologies⁽¹⁾.
2. **Human Capacity Building:** Training and developing human resources in the areas of digital transformation and artificial intelligence is crucial. Specialized training programmes should be established in cooperation with universities and educational institutions, scholarships should be provided abroad, and workshops and internal training courses⁽²⁾ should be organized.
3. **Strengthen partnerships with the private sector and international organizations:** The Iraqi government should strengthen cooperation with the private sector and international organizations to exchange new experiences and technologies. This can be achieved through the signing of partnership agreements, the organization of joint conferences and symposiums, and the exchange of study visits⁽³⁾.
4. **Update legislation and policies:** National legislation and policies must be updated to keep pace with digital transformation. This includes the development of laws to protect personal data, regulate the use of artificial intelligence, and develop policies that encourage innovation and digital entrepreneurship⁽⁴⁾.
5. **Spreading digital culture:** Awareness and digital culture should be spread among community members, through media awareness campaigns, educational programs in schools and universities, and the provision of e-learning platforms. This contributes to enhancing society's acceptance of modern technologies⁽⁵⁾.

Conclusions

Digital transformation emerges as an essential strategic tool in building a society capable of facing the accelerating challenges of the modern era. It contributes to the restructuring of government and service systems, and creates a data-driven institutional environment in decision-making, enhancing operational efficiency and reducing waste and corruption. By reviewing the literature and previous studies, it has been found that countries that have systematically adopted digital transformation strategies have achieved significant improvements in economic and social performance, which makes its adoption in Iraq an urgent necessity to achieve development Long-term sustainable.

In the health sector, AI can improve the quality of healthcare by analyzing medical data, early diagnosis of diseases, and personalized treatment plans. Artificial intelligence also contributes to improving education by providing personalized educational content that matches students' needs and achievement level, helping to improve the learning experience and reduce the knowledge gap. In the energy sector, AI provides innovative solutions to improve Energy efficiency, smart grid

⁽¹⁾ Journal of Economics and Administrative Sciences. (2025). The Role of the Digital Economy in Enhancing Economic Development in Iraq.

<https://jeasiq.uobaghdad.edu.iq/index.php/JEASIQ/article/view/3638>

⁽²⁾ Iraq Business News. (2024). Does Iraq have a digital economy.

<https://www.iraq-businessnews.com/2024/12/13/does-iraq-have-a-digital-economy/>

⁽³⁾ iINNOV8. (2023). Adopting AI in Iraq. <https://innov8.krd/530>

⁽⁴⁾ BMZ Digital. Global. (2022). Digital Transformation Center Iraq.

<https://www.bmz-digital.global/en/initiatives/digital-transformation-center-iraq/>

⁽⁵⁾ Humanitarian & Natural Sciences Journal. (2025). Artificial Intelligence and Digital Transformation in Iraq. <https://www.hnjournal.net/volume6/issue8/6-8-20.pdf>

management, and the development of renewable energy strategies, supporting the Sustainable Development Goals related to the environment and clean energy.

Turning to the Iraqi reality, the research showed that Iraq faces major challenges in integrating digital transformation and artificial intelligence. The most prominent of these challenges are the weakness of digital infrastructure, including internet networks, power outages, and the lack of modern data centers, which limits the ability of institutions to adopt modern technologies. Iraq also suffers from a shortage of qualified and trained human cadres in the fields of digital transformation and artificial intelligence, in addition to resistance to change in some public institutions as a result of bureaucracy and fear of losing control over Traditional processes.

Despite these challenges, there are positive indications that Iraq is ready to embark on a path of digital transformation and the use of artificial intelligence. The Iraqi government has begun to implement initiatives to improve digital payment, develop e-services in some sectors, and have piloted applications of artificial intelligence in limited areas such as energy management and precision agriculture. These experiments, while limited, point to the great potential that can be exploited if comprehensive and thoughtful strategies are developed.

Based on the results and data of the research, a set of conclusions can be reached that reflect the specificity of the Iraqi environment:

1. Digital transformation and artificial intelligence are strategic tools to promote economic and social growth in Iraq, and effectively contribute to achieving the Sustainable Development Goals and reducing development gaps between governorates and population groups.
2. Digital infrastructure is the cornerstone of any digital advancement, and this requires the development of national internet networks, the expansion of fibre optic networks, the improvement of data centers, and ensuring energy stability as the driver of all digital activities.
3. Building human capacities in Iraq is a pivotal condition for the success of digital transformation, by qualifying cadres specialized in the development and operation of artificial intelligence applications, and preparing a generation that possesses the digital skills of the future.
4. Artificial intelligence contributes to the development of vital sectors, especially health, education, and energy, by improving the efficiency of services, and providing innovative solutions to the challenges faced by Iraqi society such as lack of resources and service inequality.
5. Digital culture is a critical element in the success of digital transformation, as spreading technical awareness among individuals and community organizations helps to promote acceptance of modern technology and reduce resistance to change that may hinder the path of development.
6. International and local partnerships represent an important lever for the transfer of knowledge and technical expertise, and benefit from successful global experiences in line with the Iraqi reality, especially in the fields of innovation and digital entrepreneurship.
7. The legislative and regulatory framework plays a fundamental role in creating an environment conducive to digital transformation and artificial intelligence, by developing laws to protect data and digital privacy, encourage investment in technology, and ensure fair competition within the digital market.

Recommendations

Based on these findings, practical recommendations can be made that contribute to accelerating the process of digital transformation and employing artificial intelligence to achieve sustainable development:

1. Develop digital infrastructure by improving internet networks, establishing modern data centers, and ensuring energy continuity.
2. Establishing specialized training programs to qualify human cadres in the fields of digital transformation and artificial intelligence at the academic and professional levels.
3. Strengthening partnerships with the private sector and international institutions to exchange experiences and modern technologies and implement joint projects.
4. Develop national policies and legislation that protect personal data, regulate the use of artificial intelligence, and encourage digital innovation.
5. Spreading digital culture among community members through media and educational awareness programs, and providing digital educational platforms that contribute to accepting change.

The research also proposes several practical proposals to promote digital transformation and artificial intelligence investment in Iraq:

1. Conducting extensive field studies to assess the readiness of government and private institutions to adopt digital transformation and artificial intelligence.
2. Implementing pilot projects in the fields of health, education, and energy to test the effectiveness of artificial intelligence in improving services and achieving sustainable development.
3. Developing a national open data platform that facilitates access to data and information, promotes transparency, and supports evidence-based decision-making.

Therefore, it can be said that digital transformation and artificial intelligence represent a historic opportunity for Iraq to achieve sustainable development and improve the quality of life of citizens. Despite the great challenges, the presence of political will, well-thought-out strategies, and specialized human capacity building can pave the way for a sustainable digital future that contributes to promoting economic growth, improving services, and protecting the environment, in line with the global Sustainable Development Goals.

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