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EDITORIAL COMMENT

The digital revolution: impacts of digital transformation and AI on health, education, and the economy in Brazil

Adiemir Hortega Medeiros[1] **Priscila Rezende da Costa**[2] **Benny Kramer Costa**[3]
Luís Fábio Cavalcanti da Silva[4]

[1] Universidade Nove de Julho (UNINOVE) / São Paulo, SP - Brazil

[2] Escola Superior de Propaganda e Marketing (ESPM) / São Paulo, SP – Brazil

[3] Universidade Nove de Julho (UNINOVE) / São Paulo, SP - Brazil

[4] Universidade Nove de Julho (UNINOVE) / São Paulo, SP - Brazil

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[1] Master's degree in Logistics from PUC-Rio. PhD candidate in Strategy, focusing on Digital Transformation and Value Co-creation. Senior executive at a Big4 with 20+ years in Supply Chain, driving strategic, sustainable, and digital transformations across key industries. **Corresponding author**: adiemir.hortega@uni9.edu.br

[2] Doctor in Business Administration from FEA USP

[3] Doctor and Postdoctoral in Business Administration from USP, Master's in Business Administration (UFRN), and Economist (UFRN). Full Professor at UNINOVE and Livre-Docente at USP. He has organized 6 books on strategy and tourism and is the General Editor of Podium - Sport, Tourism and Leisure Review. He leads CNPq projects on stakeholders, value co-creation, and competitiveness in tourism and sports. benny@uni9.pro.br

[4] Master's in Business Administration from UNINOVE (2022) and graduated in the same field (2006). Director of CESTech, an IT company focused on software and digital platforms. Researches Stakeholder Engagement and Value Co-Creation in Digital Transformation. Coordinates an international project on personality and social entrepreneurship. luis.fabio@uni9.edu.br

Abstract

Objective of the study: This article analyzes how Digital Transformation (DT) and Artificial Intelligence (AI) are impacting the health, education, and economy sectors in Brazil through process optimization and improved efficiency in essential services.
Originality/Relevance: The analysis provides concrete data and examples of how DT and AI are driving innovation and digital inclusion in Brazil.
Social/Management contributions: Challenges in governance and the need for greater investment in digital infrastructure and regulation are discussed.

Keywords: digital transformation, artificial intelligence, health, education. economy.

A revolução digital: impactos da transformação digital e da IA na saúde, educação e economia do Brasil

Resumo

Objetivo do estudo: Este artigo analisa como a Transformação Digital (TD) e a Inteligência Artificial (IA) estão impactando os setores de saúde, educação e economia no Brasil através da otimização de processos e a melhoria na eficiência de serviços essenciais.
Originalidade/Relevância: A análise apresenta dados e exemplos concretos de como a TD e a IA estão promovendo inovações e inclusão digital no Brasil.
Contribuições sociais/para a gestão: São discutidos os desafios de governança e a necessidade de maior investimento em infraestrutura digital e regulamentação.

Palavras-chave: transformação digital, inteligência artificial, saúde, educação, economia.

La revolución digital: impactos de la transformación digital y la ia en la salud, la educación y la economía de Brasil

Resumen

Objetivo del estudio: Este artículo analiza cómo la Transformación Digital (TD) y la Inteligencia Artificial (IA) están impactando los sectores de salud, educación y economía en Brasil a través de la optimización de procesos y la mejora en la eficiencia de los servicios esenciales.
Originalidad/Relevancia: El análisis presenta datos y ejemplos concretos de cómo la TD y la IA están promoviendo innovaciones e inclusión digital en Brasil.
Contribuciones sociales/para la gestión: Se discuten los desafíos de gobernanza y la necesidad de mayores inversiones en infraestructura digital y regulación.

Palabras clave: transformación digital, inteligencia artificial, salud, educación, economía.

Introduction

Digital Transformation (DT) and Artificial Intelligence (AI) are reshaping essential sectors in Brazil and worldwide, promoting advancements ranging from task automation to decision-

making optimization. According to the AI Index Report 2024 (Maslej et al., 2024, AI Index Report), the number of large AI models, such as GPT-4, doubled globally in 2023, with significant investments for training, including $78 million allocated exclusively for GPT-4. Concurrently, investments in generative AI reached $25.2 billion, demonstrating the magnitude and speed with which this technology is being adopted. In Brazil, this technological adoption trend is accelerating, reflecting the growing importance of AI in various sectors.

In Latin America, where the Gross Domestic Product (GDP) totals approximately $6 trillion, Brazil holds a prominent position as one of the region's largest digital economies (Vasconcellos et al., 2023, Latin America Digital Transformation Report). This positions the country as a key driver of DT, not only enhancing efficiency and innovation but also fostering technological inclusion crucial for economic and social development. The expansion of DT and AI in Brazil and Latin America represents a strategic movement to achieve tangible benefits in critical areas such as health, education, and the economy, laying a solid foundation for a more digital and inclusive future.

Digital Transformation and AI: Essential Concepts for Technological Innovation

Digital Transformation (DT) refers to the adoption of digital technologies to profoundly change business models, operational processes, and the ways companies interact with their customers. This transformation is driven by the necessity to adapt to the new global landscape, where technological innovation is crucial for ensuring organizational competitiveness and efficiency (Vial, 2019). A clear example of its importance was during the COVID-19 pandemic when companies that embraced digital transformation were able to mitigate negative business impacts by implementing new strategies and digital technologies to operate more effectively, such as real-time collaboration platforms for managing team routines and remote meetings with clients and other stakeholders (Verhoef et al., 2021).

Artificial Intelligence (AI) underpins much of this transformation, defined as the capacity of computational systems to perform tasks that usually require human intelligence, such as learning and decision-making (Brynjolfsson & McAfee, 2014; Cramarenco et al., 2023; Bilgram & Laarmann, 2023). Within AI, Generative AI stands out by creating content, such as images and texts, based on training data, revolutionizing areas like visual content creation and natural language processing. These generative models, such as the Generative Image-to-text Transformer (GIT), are

already outperforming humans in specific tasks, setting a new standard for technological innovation, including computational programming without generating codes, relying solely on text commands/prompts in natural human language (Bilgram & Laarmann, 2023; Ahuja et al., 2023).

Digital Transformation and AI in Healthcare

Artificial Intelligence (AI) is transforming the healthcare sector in Brazil by optimizing both patient care and the management of medical resources. Initiatives like Conecte SUS promote the centralization and integration of health data in real-time, facilitating access to medical services, improving diagnostics and treatments, and enhancing administrative efficiency (Ministério da Saúde, 2020). An example of this impact is the Meu SUS Digital app, which has surpassed 50 million downloads, highlighting the importance of digital transformation in public health (Ministério da Saúde, 2024).

In the context of digital health, the use of AI in developing diagnostic technologies continues to grow substantially. AI tools have increased the accuracy of medical examinations and reduced analysis time, enabling earlier diagnoses that can reduce hospital costs related to prolonged treatments by up to 30% (Cahyo & Astuti, 2023). These advancements have the potential to revolutionize the healthcare system, providing more effective and accessible care. The startup Laura, accelerated by the Eretz.bio incubator of Albert Einstein Hospital, exemplifies innovation in this field, using AI to monitor clinical data in real-time and predict complications before they become critical, as detailed in the Innovation Brazil 2024 Report (Valor Econômico & PwC Brasil, 2024).

Additionally, telemedicine, driven by AI, has been essential for advancing digital health, particularly in rural areas. The AI Index Report 2024 (Maslej et al., 2024, AI Index Report) highlights how AI facilitates remote consultations and chronic patient monitoring, expanding access to specialized care across various regions of Brazil and globally. This advancement enables more Brazilians to receive quality medical care without needing to travel long distances.

Digital Transformation and AI in Education

In Brazil's education sector, Artificial Intelligence (AI) is revolutionizing learning by enabling a more personalized experience tailored to the individual needs of students. AI-powered

platforms allow teachers to monitor performance in real-time and adjust pedagogical strategies according to the specific progress and challenges faced by students, enhancing both effectiveness and inclusion in education. The report *Generative AI and The Future of Work & Education* (Innovation Intelligence, 2024) notes that 71% of companies plan to adopt Generative AI solutions within the next two years, according to KPMG data, underscoring the growing interest in technologies that drive efficiency in sectors like education. This personalization extends beyond optimizing educational processes; it also facilitates learning for students with difficulties or disabilities, enabling them to progress at their own pace while addressing specific emotional and cognitive needs for maximum engagement and better outcomes (Standen et al., 2020).

Brazil has also been investing in a robust ecosystem of educational innovation through the "National Connected Schools Strategy," which aims to connect all public schools in the country to high-speed internet by 2026. With an investment of R$ 8.8 billion, this initiative promotes digital inclusion, especially in the North and Northeast regions, where many schools still lack adequate infrastructure. This program not only seeks to integrate technology into pedagogical practices but also represents a significant step toward a more equitable and accessible education for all Brazilians (Governo do Brasil, 2024).

Digital Transformation and AI in the Economy

The economic sector has been significantly impacted by Digital Transformation (DT) and Artificial Intelligence (AI), driving innovation and productivity across various industries. In Brazil, the digitalization of the banking sector has advanced rapidly, with 77% of banking transactions conducted through digital channels such as mobile banking, internet banking, and messaging apps, according to the *Febraban Banking Technology Survey 2024* (Deloitte & FEBRABAN, 2024). Globally, investments in AI, particularly Generative AI, have surged, reaching $25.2 billion in 2023, almost eight times the previous year's value (Maslej et al., 2024, *AI Index 2024 Annual Report*). These advancements have been pivotal in increasing productivity and driving innovation across economic sectors.

The *Innovation Brazil 2024 Report* reveals that companies in Brazil invested R$ 85 billion in research and development (R&D) in 2023, marking an increase of R$ 15 billion compared to the previous year. This growth reflects the increasing use of AI in various work processes,

especially among leading companies. Additionally, 43.4% of patents published in 2023 originated from the oil and gas sector (Valor Econômico & PwC Brasil, 2024).

Digital Governance: Challenges and Opportunities

Digital governance represents one of the most significant challenges for the effective implementation of Digital Transformation (DT) and Artificial Intelligence (AI) in Brazil. The *General Data Protection Law* (LGPD) was a milestone in data privacy protection and regulation of personal data usage, establishing itself as an essential pillar of the country's digital economy. However, significant challenges remain concerning digital infrastructure and specific AI regulations, as highlighted in the *Brazilian Artificial Intelligence Strategy* (EBIA) of 2021. The document proposes guidelines for the responsible development and use of AI, addressing the need to create a safer and more ethical environment for applying these technologies (Ministério da Ciência, Tecnologia e Inovações, 2021).

The *Benchmarking of AI Indicators* report by the *Center for Strategic Management and Studies* (CGEE, 2024) emphasizes the urgent need for greater investment in R&D in Brazil. The country lags behind more developed nations in AI and technological innovation investments. To compete globally, Brazil must strengthen its R&D base, particularly in critical sectors such as healthcare and security (CGEE, 2024).

Despite progress, Brazil continues to face substantial challenges in implementing effective digital governance. Investments in both regulation and digital infrastructure are essential to enable the responsible and secure use of AI (Ministério da Ciência, Tecnologia e Inovações, 2021; CGEE, 2024).

Conclusion

Digital Transformation and AI are opening new opportunities for Brazil’s development, but the success of this revolution depends on balancing innovation, capacity building, and governance. With significant advancements in healthcare, education, and the economy, Brazil is well-positioned to lead the Digital Era in Latin America. However, it is crucial for the country to continue investing in digital infrastructure, workforce training, and governance strengthening to ensure that the benefits of DT, driven by AI technology, particularly generative AI, are widely distributed and support inclusive and ethical economic growth.

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