

From Pilot to Planet: Scaling United Nations' Blockchain Projects for a Sustainable Future

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Within the framework of the 2030 Agenda and to achieve the Sustainable Development Goals (SDGs), science, technology and innovation play an even more central role. Building on this foundation, the primary objective of this paper is to explore the potential applications of blockchain in supporting the achievement of these sustainability goals. Starting from a review of the relevant literature on this topic, the main fields in which blockchain can contribute to sustainable development will be identified. The main blockchain applications will then be analyzed and categorized according to these SDGs. This research will then critically present the main blockchain-based projects that emerged in the first stage of the study and were implemented by the United Nations. The main objectives and benefits of each project will be analyzed. This is where the originality of this paper lies. To the best of the author's knowledge, this is one of the first attempts to present a comprehensive overview of the United Nations' projects related to SDGs 1, 2, 5, 7, 9, 13, and 16. This paper, which bridges the gap between innovation management and the sustainability field, will contribute to the increasingly current debate on sustainability issues and be beneficial to scholars, practitioners, and policymakers alike.

Keywords: blockchain, SDGs, sustainability, sustainable development, innovation management, case studies, blockchain-based projects

Introduction

Across civil society, business, politics, and public opinion, there is a growing recognition of the pressing need to adopt a new, integrated approach and take concrete steps towards a socio-economic paradigm shift to tackle the many complex environmental and institutional challenges.

The Sustainable Development Goals (SDGs), building on the results of the Millennium Development Goals, are connected to issues of vital importance for development. The SDGs consider, in a well-balanced way, the three pillars of sustainable development (economic, social, and environmental). They aim to eliminate poverty, reduce inequalities, combat climate change, and foster societies that uphold human rights.

One of the key features of the current era is the trends and challenges related to the development and management of innovation, as well as the emergence of new technologies and the deployment of existing ones. Science, Technology, and Innovation (STI) are recognized as primary drivers of increased productivity (Sobti

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& Sarin, 2024) and as essential long-term factors for achieving economic growth, prosperity, and environmental sustainability (Giovannini et al., 2015). Within the framework of the 2030 Agenda and in pursuit of the SDGs, STI can play a more central role. In this context, blockchain technology (BT) could be given a critical role, as it is considered an innovative technology and an important area of research in information systems (Morisse, 2015).

The United Nations (UN) plays a crucial role in exploring and adopting emerging technologies, including BT, to tackle global challenges and promote sustainable development (Medaglia & Damsgaard, 2020). Through agencies such as the World Food Programme (WFP), the United Nations International Children's Emergency Fund (UNICEF), the United Nations High Commissioner for Refugees (UNHCR), and the United Nations Development Programme (UNDP), the UN has initiated numerous pilot projects leveraging BT to increase transparency, improve process efficiency, and build trust in aid delivery systems. In this research, the aim is to analyze the UN's role in adopting BT, focusing on the pilot projects launched and their potential for scaling up to support the SDGs.

This paper adds to the ongoing conversation in innovation management and humanitarian aid by examining how emerging technologies, such as BT, can be incorporated into the work of international organizations to tackle complex issues and develop more effective, transparent, and scalable solutions.

This paper is organized into multiple sections. This study begins with a review of the current literature, from which the research questions are derived. It goes on to examine the key areas where BT can support the achievement of the SDGs. At the core of the study is an analysis of key case studies, focusing on BT pilot projects promoted by the UN. Next, the results are discussed, highlighting the paper's main findings, key contributions, and implications for academia, management, and policy-making. The paper concludes with a summary of its objectives and the key findings from this research.

Literature Review and Research Questions

Originally built for cryptocurrencies like Bitcoin, BT has expanded into various sectors due to its unique features, including immutability, auditability, and trustless functionality. Key characteristics of BT systems include decentralization, cryptographic security, consensus mechanisms, and transparency. Transactions are verified by a peer-to-peer network, stored in blocks, and linked in chronological order, ensuring data integrity and auditability (Niranjanamurthy, Nithya, & Jagannatha, 2018; Guo & Yu, 2022; Monrat, Schelán, & Andersson, 2019; Dong, Abbas, Li, & Kamruzzaman, 2023; Zhang, Xue, & Liu, 2019). Major cryptographic methods used include public key cryptography, hash functions, and zero-knowledge proofs (Guo & Yu, 2022; Zhang et al., 2019).

BT has become a transformative tool in various strategic areas, providing solutions that improve efficiency, transparency, and security (Perrini & Pisani, 2023). In the financial and banking sectors, it simplifies processes like payments, transaction clearing, credit information management, and asset management, thereby reducing the reliance on intermediaries and boosting operational performance (Krichen, Ammi, Mihoub, & Almutiq, 2022; Dong et al., 2023; Beck, Avital, Rossi, & Thatcher, 2017; Guo & Liang, 2016). Similar benefits are also seen in supply chain management, where BT enhances product traceability, authenticity verification, logistical optimization, and quality certification, collectively increasing transparency and lowering fraud risks (Casino, Dasaklis, & Patsakis, 2019; Durach, Blesik, Düring, & Bick, 2020). In healthcare and biomedical sciences, BT supports the safe storage of electronic health records, manages access to patient data, assists in clinical trial

management, and monitors the pharmaceutical supply chain (Casino et al., 2019; Angraal, Krumholz, & Schulz, 2017; Drosatos & Kaldoudi, 2019). Governments and public institutions have adopted BT for a variety of purposes, including digital identity management, e-voting, land registry systems, and the creation of transparent public records (Krichen et al., 2022; Sunny et al., 2022; Dong et al., 2023). The education sector is also exploring its potential, particularly in verifying academic credentials, maintaining secure academic records, and preventing degree fraud (Sunny et al., 2022; Chen, Xu, Lu, & Chen, 2018).

Considering these applications, it can be stated that most of the projects and initiatives that aim to extend the scope of BT applications are mainly aimed at benefiting businesses, governments, and consumers.

BT appears to be an important tool for achieving the SDGs, both theoretically and practically (Kewell, Adams, & Parry, 2017). Starting from this premise, the primary goal of this research is to explore the potential future applications of this disruptive technology in achieving the SDGs.

In particular, in this research paper, two research questions (RQs) have been identified:

RQ1. Which SDGs can be supported through BT applications?

RQ2. What are the main BT-based projects led by the UN?

For RQ1, an in-depth analysis of the existing literature on BT applications for the SDGs was conducted to identify the main concepts and prevailing trends. Building on these findings, the most significant case studies that emerged from the RQ1 analysis were examined to address RQ2, allowing for an exploration of how these concepts are applied in real-world contexts. By exploring these RQs, this paper aims to clarify the potential of BT in advancing global development and to provide an overview of UN-led projects in this field.

Blockchain Applications for Achieving the SDGs

BT is increasingly explored as a tool to advance SDGs (Kewell et al., 2017), including SDG 1—No Poverty, SDG 2—Zero Hunger, SDG 5—Gender Equality, SDG 7—Affordable and Clean Energy, SDG 9—Industry, Innovation, and Infrastructure, SDG 13—Climate Action, and SDG 16—Peace, Justice, and Strong Institutions.

For SDG1, BT can enhance the efficiency and transparency of aid distribution, social protection programs, and financial inclusion efforts, ensuring that resources reach the most vulnerable populations without leakage or corruption (Aysan, Bergigui, & Disli, 2021a; 2021b; Trequattrini, Palmaccio, Turco, & Manzari, 2024). By creating secure digital identities and transparent records, BT can help provide unbanked individuals with better access to financial services, which is essential for reducing poverty (Aysan et al., 2021a; 2021b; Mavilia & Pisani, 2020).

For SDG 2, BT can improve transparency and traceability in the food supply chain, helping to reduce fraud and inefficiencies, thereby supporting food security and safety (Aysan et al., 2021a; Mulligan, Morsfield, & Cheikosman, 2023; Jiang et al., 2022; Pisani, 2025). It can also facilitate farmers in developing countries to access microfinance systems, enabling them to buy the necessary materials for agricultural production (Kumarathunga, Calheiros, & Ginige, 2022).

In the context of SDG 5, although direct applications are infrequent, BT's capacity to offer secure digital identities and transparent records can empower women by enhancing their access to financial services and property rights (Aysan et al., 2021b; Singh & Kumar, 2024; Jiang et al., 2022). BT-based solutions can promote financial inclusion, allowing women to access banking and credit services even in contexts where they do not have access to traditional institutions (Mavilia & Pisani, 2020).

For SDG 7, BT is commonly used in the energy sector to facilitate peer-to-peer energy trading, monitor renewable energy production, and support the development of decentralized energy communities, all of which contribute to cleaner and more affordable energy systems (Vaccargiu, Pinna, Tonelli, & Cocco, 2023; Parmentola, Petrillo, Tutore, & De Felice, 2021; Mulligan et al., 2023). It could also improve the management of energy networks, facilitating the development of energy micro-grids in remote regions (Waseem, Bilal, Danish, & Hameed, 2024).

Regarding SDG 9, BT supports innovation in infrastructure by enabling secure, efficient, and transparent processes across sectors like banking, logistics, and construction, as well as improving supply chain management and data security (Singh & Kumar, 2024; Mulligan et al., 2023; Jiang et al., 2022).

For SDG 13, BT can assist in monitoring carbon credits, promoting sustainable supply chains, and encouraging environmentally friendly actions (Parmentola et al., 2021; Mulligan et al., 2023; Aysan et al., 2021a; Kalaiselvan, Venkatesh, Kumar, & Karthik, 2024). However, its energy consumption remains a concern.

Regarding SDG 16, BT's transparency and immutability can reinforce institutions by decreasing corruption, enhancing accountability, and enabling secure digital identities (Aysan et al., 2021b; Bounceur, Berkani, Moumen, & Benharzallah, 2025; Singh & Kumar, 2024). It can also be used for securely recording property rights and other legal transactions (Kshetri, 2022).

Despite these opportunities, research shows that BT adoption is still in the early stages, facing challenges such as privacy concerns, regulatory uncertainties, and a lack of standardization and long-term empirical evidence (Bounceur et al., 2025; Jiang et al., 2022; Mulligan et al., 2023). Policymakers and practitioners should carefully assess when BT is the best option, as it may not always be better than simpler alternatives (Aysan et al., 2021a; 2021b; Mulligan et al., 2023). Choosing a BT solution requires a comprehensive evaluation of multiple factors. First, a cost-benefit analysis should be conducted to evaluate the advantages of this application compared to other technologies. Second, considering the decentralized nature of this technology, careful analysis and a thorough identification and evaluation of the types of governance and stakeholders involved are necessary. Third, given the rapid evolution of BT, it will be crucial to identify the best ways to ensure compliance with data management regulations related to BT, in line with current laws. Additionally, it is important to examine how it connects with existing tools, which can be done by conducting further tests to determine the likelihood and practical feasibility of integrating with current tools.

Case Studies

Several BT-based projects are focused on addressing SDGs (Kewell et al., 2017). Numerous initiatives have been developed and implemented by multilateral organizations such as the UN, exemplifying a concerted effort to leverage innovative technologies in the pursuit of sustainable development. These BT-based projects target a range of objectives, including the protection of digital identities, the improvement and transparency of property title registries, promoting gender equality, ensuring equitable access to financial services and markets, supporting peace and democratic initiatives, and improving the efficiency of humanitarian efforts. This section showcases a selection of case studies demonstrating how BT is practically implemented to advance these goals. Through these examples, this section aims to answer RQ2, highlighting both the potential benefits and the challenges faced in real-world implementations, thus providing valuable insights into the role of BT as a tool for sustainable development.

Blockchain for SDG 1

UNHCR uses BT to enhance efficiency and transparency in distributing humanitarian aid and support to refugees (Abraha, 2025). BT is primarily used for managing and distributing funds and resources to refugees, providing them with access to vital services and reducing the risk of fraud. It also helps create secure digital identities for refugees who often lack official documents or ID. These digital identities allow refugees to access assistance services, like food, money, and shelter, without needing physical cards or paper documents. Additionally, by using BT, UNHCR can transfer funds directly to beneficiaries quickly, securely, and in a traceable way, reducing operational costs and improving the efficiency of aid delivery. Transactions can be tracked in real time, ensuring that funds are arriving correctly. In certain instances, BT-based payment platforms have also been implemented, enabling refugees to purchase goods from local merchants using a BT-based credit system.

Blockchain for SDG 2

The “Blockchain for Zero Hunger” initiative by WFP is the largest BT implementation worldwide for humanitarian aid (Del-Aguila-Arcentales et al., 2022). This project, involving more than 100,000 refugees, was developed to deliver financial assistance to refugees in countries with fragile banking and telecommunications systems due to events such as wars or natural disasters.

The pilot project was first tested in 2017 in Pakistan and later implemented in Jordan (Barbosa, 2020). As part of the “Building Blocks” pilot project, WFP tested the BT as a tool capable of making money transfers more efficient, transparent, and secure, enabling people to meet their basic needs, based on their priorities, thanks to opportunities provided by emerging technologies.

All users of the system have their own role, and based on this role, they can perform specific actions. For an end user, for example, the process is very easy: make purchases in stores and then pay via an iris reader. This iris reader enables the identification of each customer, confirms the available balance, and facilitates payment processing. Thanks to this application, beneficiaries receive digital funds via a card or an app, which can be used to purchase food in stores. BT allows each transaction to be tracked, making the entire distribution process completely transparent and secure. BT reduces the operational costs associated with managing aid, speeding up transfers and ensuring that funds are spent exclusively for the intended purposes, without intermediaries or bureaucracy. This project promotes greater efficiency, easier access to food for vulnerable populations, reduced waste, and improved control through real-time monitoring, which lowers the risk of corruption or disorganization.

Blockchain for SDG 5

UN Women is the United Nations organization that supports women and girls in pursuing gender equality and the empowerment of women worldwide (UN Women, 2019). This Organization also supports UN member states in establishing a set of global standards to define laws, policies, programs and services needed in the implementation phase of these standards. UN Women seeks the equal participation of women in all aspects of life. It is possible to identify five priorities: increase their leadership and their participation; eradicate violence against them; engage them in all aspects of peace and security; strengthen their economic empowerment; place gender equality at the heart of national development planning and budgeting (UN Women, 2019).

UN Women tested a BT-based mobile wallet solution in Kenya, exploring the potential use of this new technological tool to achieve the economic empowerment of women affected by the crisis, with a focus on

financial inclusion. UN Women also collaborated with the WFP to test the “Building Blocks” project. Through this initiative, Syrian refugee women participating in the United Nations’ Cash-for-Work programs in Jordan will be able to receive and spend their earnings digitally in a faster and safer manner. A Syrian woman will be able, through the iris scan, to request a refund at the supermarkets selected by WFP as this scan will connect to her account on BT. In this way, the amount of cash dispensed will be directly sent to “Building Blocks”. UN Women and WFP mutually validate transactions across a shared BT-based network, ensuring greater security and accountability, reducing risks and costs while promoting greater aid harmonization. In addition, UN Women aims to increase the financial literacy of its beneficiaries. For instance, in the refugee camps of Za’atari and Azraq, UN Women is therefore increasing training opportunities for women and girls, with particular attention to digital literacy.

This project demonstrates how such technology can be utilized to create livelihood opportunities. Furthermore, it is possible to identify a holistic approach to women’s resilience and empowerment, including through the importance of protection and prevention of gender violence, corrective education, and civic engagement, as well as access to child welfare assistance.

Blockchain for SDG 7

A UN project that uses BT to address SDG 7 is the “Power Ledger” in collaboration with the UNDP and other international organizations. Power Ledger is a BT platform that enables peer-to-peer exchange of renewable energy between consumers. Although Power Ledger is an independent technology company, the project has received support and collaboration from the UN, particularly through the UNDP, to develop sustainable energy solutions in different regions of the world (Marke et al., 2022).

The Power Ledger platform enables decentralized energy markets as energy consumers and producers can exchange renewable energy through a decentralized BT-based network. This eliminates traditional intermediaries, reducing costs and improving the efficiency of the energy system. Additionally, this tool ensures complete transparency in transactions, enabling all parties involved to track and verify the origin and use of energy in real time, while aiding in the management of energy resources. Power Ledger enables the development of energy micro-grids, which allow remote and vulnerable communities to access affordable renewable energy. BT also offers tools for managing renewable energy credits, which can be traded or sold on the market. This further promotes the adoption of renewable energy, encouraging a shift from fossil to sustainable energy sources and supporting the transition to a more sustainable global energy system.

Blockchain for SDG 9

The “Blockchain for Supply Chain Transparency” project—in partnership with the United Nations Economic Commission for Europe (UNECE)—is an initiative that uses BT to improve transparency, traceability, and efficiency in global supply chains. This initiative helps reduce inefficiencies, fight corruption, and ensure that resources are used sustainably (Kharitonova, 2022).

BT is used to monitor each stage of the production and distribution process, from raw materials to the end customers. This system enables supply chain participants to access real-time information, ensuring that products meet quality and sustainability standards. The information stored on the BT is immutable, meaning that transactions and data cannot be altered, enhancing the security of the supply chain. Smart contracts enable the automation and validation of transactions along the supply chain. This shortens waiting times, cuts bureaucracy, and increases operational efficiency. Additionally, BT enables the tracing of product provenance

and production practices, ensuring that environmental and social standards are met, while also promoting more sustainable sourcing and manufacturing methods. This process allows each stage of production and distribution to be monitored and traced, fostering greater trust among producers, consumers, and other parties involved. In fact, BT enables more efficient supply chain management by reducing errors, data discrepancies, and costs related to bureaucracy and intermediaries.

Blockchain for SDG 13

An example of a UN BT project targeting SDG 13 is the Climate Chain Coalition (CCC). This global network of organizations and institutions uses BT to address climate change challenges. Specifically, this project aims to enhance the transparency, efficiency, and traceability of climate change-related actions using innovative BT-based solutions (Climate Chain Coalition, 2022).

The CCC comprises organizations like the UNFCCC (United Nations Framework Convention on Climate Change) and other international agencies, aiming to develop practical solutions to fight climate change through emerging technologies such as BT.

This project employs BT to monitor and verify transactions related to climate finance, CO₂ emission reductions, and other climate measures. This promotes greater transparency in climate management. Moreover, decentralized registries can be established to allow for real-time monitoring and certification of greenhouse gas emission reductions, improving data accuracy. BT can also help manage carbon credits more effectively by making them easier to track and reducing the risk of fraud or double-counting.

This project demonstrates how high-tech solutions can be effectively implemented to enhance reporting practices and achieve greater transparency. This is made possible by a public and unchangeable registry that can be used to verify and report on climate actions. Furthermore, an additional benefit is increased efficiency through the automation of resource management and certification of climate actions, while reducing the burden costs. Ultimately, it is crucial to recognize that this solution can enhance access to climate resources for small communities and developing countries, which often have limited resources for monitoring climate change, thereby promoting greater accessibility and inclusiveness.

Blockchain for SDG 16

The UNDP Blockchain Land Registry Project is an initiative that leverages BT to tackle issues related to land registration and management in India. This project involved close collaboration with the Indian government and other local agencies, including the Ministries of Agriculture and Land Resources.

This initiative contributes to the digitalization and transparency of real estate transactions, aiming to reduce corruption, improve legal certainty, and simplify access to justice for people, especially in a country like India, where land management has historically been problematic and vulnerable to fraud and legal disputes. This project also has significant implications for achieving SDG 16, particularly in terms of access to justice, combating corruption, and promoting transparency in public institutions.

The core concept is to digitize land records and transfer them to a BT-based platform. Every property transaction (such as purchase, sale, or transfer) is permanently and immutably recorded on the BT, forming a decentralized ledger accessible to all involved parties. The BT ledger is accessible to all stakeholders in the process. Digital access also reduces the risk of corruption in land registration and transfer processes, as the records are immutable and cannot be altered by intermediaries or officials. The project integrates with traditional registration systems, digitizing existing paper documents and recording them on the BT.

The implementation of BT makes it easier for citizens to defend their legal rights, improving fairness and legal certainty in a country where land disputes are a common cause of social injustice.

Discussion and Implications

Overall, BT is a versatile technology that, if properly adopted, could accelerate progress towards many of the SDGs by improving efficiency, transparency, and collaboration globally.

However, solutions based on BT can still be considered in an early stage of development. It is not clear what the future directions may be. Starting from the main application, crypto-currencies, about 19.39M—Market Cap: \$3.95T (CoinMarketCap, 2025), BT solutions in the non-strictly financial field are analyzed.

UNHCR's Blockchain for Refugees project uses BT to improve efficiency and transparency in the delivery of humanitarian aid and support to refugees. This project directly contributes to reducing poverty among refugees by enhancing access to essential resources and improving transparency and efficiency in the delivery of aid. It also reduces the risk of corruption and enhances access to banking services, including for those without access to traditional financial institutions. In this way, UNHCR is using BT to promote economic inclusion and improve the safety of refugees in situations of extreme vulnerability, making a significant contribution to the fight against poverty (SDG 1).

This research also highlights that the "Building Blocks—Blockchain for Zero Hunger" project demonstrates the effectiveness of this technology in the humanitarian sector, aligning with SDG 2. This project uses BT to enhance the efficiency of food aid distribution, enabling the secure and transparent tracking and management of cash transfers for food purchases by beneficiaries. This minimizes the chance of fraud and waste, ensuring that food aid genuinely reaches people in need. In this way, this project is helping to achieve SDG 2, by improving food security and reducing poverty in some of the world's most vulnerable regions, such as those affected by conflict or resource scarcity.

The further case study analyzed allowed us to understand how UN Women is exploring solutions based on BT to address the challenges that the female gender faces in humanitarian contexts and to enhance their access to socio-economic opportunities. UN Women has identified, in particular, the transfer of money as a field in which to exploit BT to support women in the humanitarian field, contributing to the achievement of SDG 5.

The Power Ledger project greatly advances SDG 7 by providing access to clean, renewable, and affordable energy for people in remote or vulnerable areas. BT helps overcome the economic and logistical barriers that often prevent communities from accessing sustainable energy resources, making energy more affordable and promoting the adoption of clean and decentralized energy solutions. In this way, Power Ledger is making the energy system more inclusive, transparent, and sustainable, perfectly aligning with the goals of SDG 7.

In the Blockchain for Supply Chain Transparency project, UNECE examined the use of BT as a tool to reduce inefficiencies, fight corruption, and ensure that resources are used sustainably. The project directly supports SDG 9 by promoting the adoption of BT to make industrial and logistics infrastructure more efficient, transparent, and sustainable. By fostering innovation in infrastructure and supply chains, BT helps improve the competitiveness and sustainability of the industry, accelerating digital transformation and making production processes more environmentally and socially responsible. In this way, this initiative helps build resilient infrastructure, fostering innovation and improving efficiency in the global industry.

The implications of using BT in projects like the Climate Chain Coalition for reaching SDG 13 are manifold. They address various aspects of climate change management, profoundly impacting both operational and global governance, and help create a more equitable, transparent, and sustainable system in the fight against climate change, significantly contributing to the achievement of SDG 13. Not only does it offer a transparent and secure system for tracking emissions and offsetting efforts, but it also creates an environment where climate finance policies are easier to access and verify, international collaborations are strengthened, and businesses and consumers are more accountable.

The BT initiative for the Land Registry in India aims to be an innovative and scalable solution to address the country's long-standing land ownership issues, providing benefits in transparency, legal certainty, and administrative efficiency. This project not only helps improve land ownership management but also marks a crucial step towards achieving SDG 16. The transparency, security, and efficiency provided by BT help create a fair, equitable, and inclusive legal environment, thereby reducing corruption and fostering trust in public institutions. Moreover, the BT system promotes universal access to justice. It safeguards rights, which is particularly useful in a context like India's, where land ownership is often at the center of legal conflicts and social injustices.

As this paper reveals, BT solutions can serve as a support for achieving the SDGs. From a humanitarian perspective, the most important element is the potential to enhance the dignity of all beneficiaries. Therefore, it is essential to emphasize that individual entrepreneurial initiatives have demonstrated their fundamental importance and can have a positive impact, even within large organizations.

These projects not only benefit the beneficiaries. In fact, the scalability potential (i.e., the possibility of replicating these applications) allows more and more people to benefit from them and also to optimize the financial management of the monetary resources used. This turns out to be a crucial element because monetary resources are often limited and hard to acquire, since most of these resources come from donors. This aspect is relevant because scalability can contribute to achieving the SDGs by maximizing the intrinsic potential of BT. In general, therefore, the advantages of using BT to manage funds with social purposes are highlighted, thanks to greater efficiency and cost reduction.

Future research could extend the scope of investigation to include BT-based projects initiated by a broader range of intergovernmental organizations beyond the United Nations. Such research would provide a more comprehensive understanding of how diverse international actors employ BT in the pursuit of sustainable development. Additionally, exploring projects that target other SDGs not covered in the current paper would offer valuable insights into the versatility and adaptability of BT applications.

Nonetheless, this research could have significant implications at various levels, especially for managers, researchers, and policymakers. By examining how BT is being used to address these global challenges, several considerations emerge that could influence decisions, policies, and the future direction of sustainable technology and initiatives. Managers could draw lessons from this research to understand how BT can be used as an operational tool to improve efficiency and transparency, as well as the importance of cross-sector collaboration. A key aspect for researchers is the opportunity to explore new frontiers in the technological, social, and economic fields. Researchers could draw on this research to explore how economic and sustainable models using BT can be integrated into social and development projects. This could include studying business models that use BT to improve access to services. For policymakers, this research offers evidence of how

technology can be used to address social, economic, and environmental challenges, aiming to reform governance and implement more transparent and equitable policies.

Conclusions

This study aimed to address two main questions: how BT can be effectively used to help achieve the SDGs, and which BT-based projects the United Nations has already started.

Through a literature review and case study analysis, this paper illustrates how BT is an emerging technology of great interest to the sustainable development sector, especially for its potential to enhance transparency, efficiency, accessibility, and inclusion. Pilot projects launched by UN agencies demonstrate how these applications can translate into operational solutions, despite the typical challenges of early adoption phases. The case studies analyzed show that, although mainly pilot or early-stage projects, they encompass a variety of application areas and demonstrate a strong alignment between BT's features and the specific needs of different SDGs, highlighting clear potential for their expansion and larger-scale integration. However, scaling these projects requires careful attention to technical, organizational, and regulatory challenges, as well as enhancing collaboration between public and private stakeholders. This contribution thus aligns with a growing debate on the responsible use of innovation in humanitarian and development contexts, offering valuable insights for future research, strategic management, and the formulation of more effective policies.

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