






RESEARCH ARTICLE

The link between sustainable business models and Blockchain: A multiple case study approach

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Abstract

The paper investigates the relationship between Blockchain technology and new sustainable business models (SBMs). The literature notes a lack of empirical classifications and successful case studies. Using a multiple case studies methodology, our research article aims to answer the research question (RQ): How can Blockchain enable new SBMs and support the United Nations Sustainable Development Goals (SDGs)? We present 20 business stories extracted from a combined analysis of the databases coinmarketcap.com and icobench.com, demonstrating how Blockchain can be used for environmental management. Notably, our analysis finds out four broad research clusters related to (i) smart energy management, (ii) climate change, (iii) waste management, and (iv) sustainable production. Mainly, an actual application of Blockchain toward SBMs is related to supply chain cost reduction. Finally, the research includes investments and their social scalability with Blockchain. Then, the final research cluster discovers social and proof sustainability. This study adds to the empirical literature evidence of SBMs offering a connection with the SDGs.

KEYWORDS

Blockchain, climate change, environmental, sustainable business models, sustainable development, sustainable production

1 | INTRODUCTION

Numerous external events are forcing companies to use new business strategies and promote sustainable business models (SBMs) (Bagnoli et al., 2019). These include an increasing customer sensibility to the problems of climate change and increasing inequality among different population groups (Fløttum et al., 2014). For these reasons, doing business is progressively evolving by combining the pure collection of profit with the achievement of environmental and social benefits for

all stakeholders (Nosratabadi et al., 2019; Secinaro, Calandra, et al., 2020). Pursuing SBMs means, therefore, incorporating triple bottom line approaches considering the interests of multiple stakeholders (Bocken et al., 2014).

Different national and supranational institutions clamor for such efforts. In particular, the United Nations, through the Sustainable Development Goals (SDGs), recommend changes to how companies generate cash flows from primary business activities by adopting sustainable innovations (Rosato et al., 2021). According to the World Business Council for Sustainable Development (WBCSD, 2022), such change can create new sustainable and inclusive markets, creating

Abbreviations: BM, Business models; CEO, Chief Executive Officer; SBM, Sustainable business models; SDG, Sustainable development goals.

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opportunities for \$12 trillion, especially in the sectors of energy, sustainable cities, and food and agriculture.

This strand of literature has evolved to include new technology-based operational paradigms in recent years. For instance, according to Ruzza et al. (2020), Blockchain can be considered a disruptive and enabling factor for creating new SBMs. This is because it promotes a change in corporate action by sharing opportunities to enhance all nodes in the network (Secinaro, Calandra, & Biancone, 2021). Several researchers investigated the topic by employing different perspectives. For instance, Dal Mas, Dicuonzo, et al. (2020) confirmed how smart contracts in the insurance sector could enable the development of SBMs. Tiscini et al. (2020) and Mercuri et al. (2021), through exploratory studies, deepened the introduction of Blockchain in commercial contracts in the agrifood sector. Massaro et al. (2020), through the analysis of a case study, demonstrated how Blockchain could foster long-term sustainability by promoting a widespread distribution of benefits to multiple stakeholders. Al-Saqaf and Edwardsson (2019) offered an exploratory piece of research to enhance the sustainability of journalism business models (BMs). Therefore, due to its decentralization and distribution features, Blockchain can enable new BM archetypes by maximizing operational efficiency and encouraging new business strategies for sustainability (Bai et al., 2020).

Despite research experiences, doubts about interpretation arise from several sides. According to Lambert (2015), developing and understanding new BMs need classifications without explicit criteria and studies of economic theories and business strategies. Furthermore, according to Boons and Lüdeke-Freund (2013), the development of new SBMs is a complex and multidimensional practice that needs a holistic understanding of recent case studies. In addition, Evans et al. (2017) and Parmentola et al. (2022) agree that the lack of case studies and empirical application of Blockchain and SBMs makes it more difficult to understand a potentially prominent phenomenon.

Based on these premises, the paper investigates how Blockchain and its features can enable new SBMs. The article can be considered original as it fits within a strand of literature that is still not widely studied. Therefore, to what extent Blockchain may and will play a key role in the development of SBMs is, to our knowledge, still largely to be explored. The article aims to add new knowledge to this field through the lens of 20 case studies contributing to theory and practice and conveying new future research challenges. Finally, our findings through the evidence of SBM-related applications may bridge the academic and practitioner worlds, making it worthwhile to examine what has been discovered by both managers, CEOs, and academics capable of taking charge of technology transfer to companies.

The article proceeds as follows. The next session summarizes the literature review on SBMs and Blockchain. The methodology design is then described, underlining the research context, data collection, and analysis. The findings come next. The discussion and conclusion sections end the research paper.

2 | LITERATURE REVIEW

2.1 | SBMs

A BM describes how a company creates, captures, and distributes value for its customers and, in general, its stakeholders (Dal Mas et al., 2018; Gatto et al., 2021; Osterwalder & Pigneur, 2010). While, in the beginning, the emphasis was more on understanding how to create and foster competitive advantage and economic value for the company and its shareholders, a new paradigm emerged, with the need, for organizations to embrace a broader concept of worth, including sustainability into the picture (Biloslavo et al., 2018; Edvinsson et al., 2021; Massaro et al., 2018).

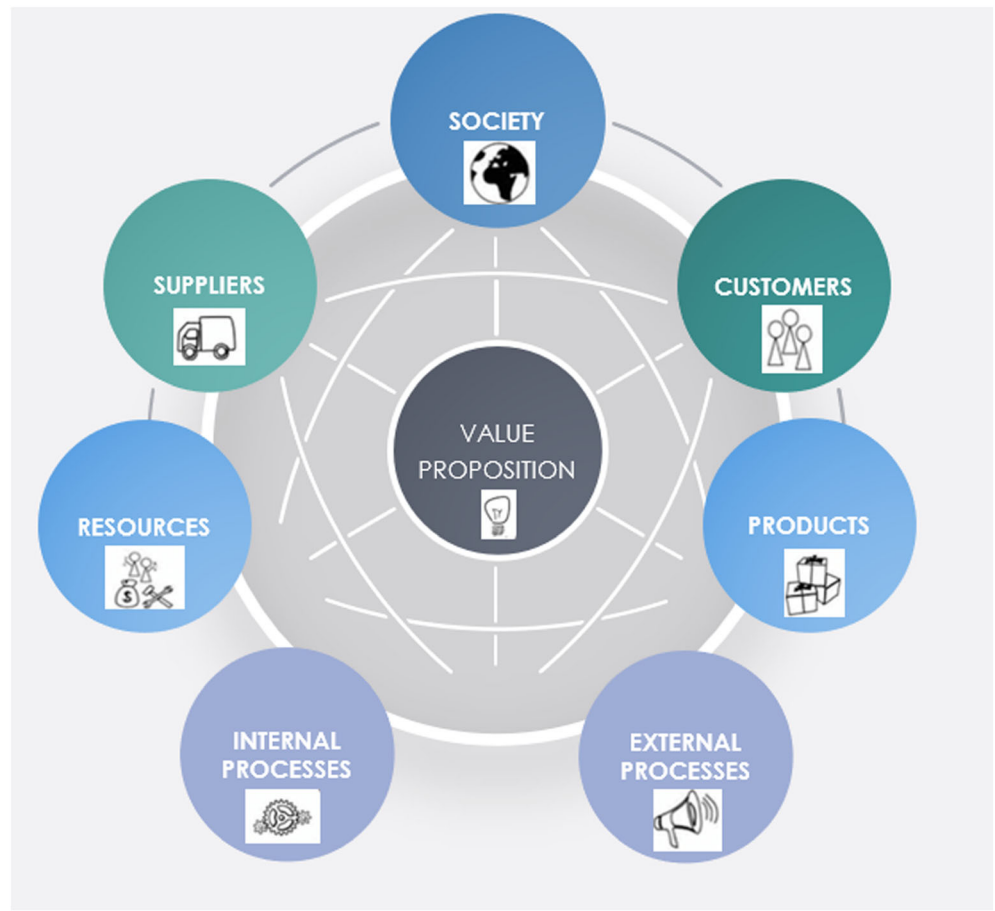
In this evolving scenario, SBMs were born to combine economic profit with the benefits of all stakeholders (Nosratabadi et al., 2019). Therefore, BMs can assume a relevant role as enablers of sustainability (Porter & Kramer, 2011). Compared to the theory of traditional BMs and transaction costs that calls organizations to define the value proposition by considering companies, processes, customers, products, resources, and suppliers (Bagnoli et al., 2018; Bagnoli & Maura, 2021; Marinescu, 2012), SBMs additionally require an ecological or social value as mandatory pillars of the value proposition or the value creation process (Cosenz et al., 2020; Drago & Gatto, 2022; Nosratabadi et al., 2019; Secinaro, Brescia, et al., 2020).

According to Evans et al. (2017), SBMs represent an emerging research topic with theoretical foundations in BM innovation, stakeholders, and networking. In particular, in addition to the above, SBMs require the design of value networks with new purposes, strategies, and governance. Moreover, SBMs necessitate more significant consideration of all stakeholders' interests, responsibilities, and externalities. Therefore, in practice, this may mean, for example, that suppliers also feel a responsibility toward their local networks, customers are incentivized to buy remanufactured or reusable products (Nosratabadi et al., 2019), and companies promote socially impactful interventions on the ground (Biancone et al., 2019) or design sustainable financial models (Secinaro, Calandra, et al., 2020).

Despite the growing interest, the literature is critically questioned, manifesting two critical strands. On the one hand, scholars are promoting new functional architectures for sustainable business strategies (Bagnoli et al., 2019; Bagnoli & Maura, 2021; Biloslavo et al., 2018). On the other hand, other academics design new theoretical connections looking at open innovation and collaborative entrepreneurship (Baima et al., 2020; Evans et al., 2017).

In the first case, starting from the environmental and social awareness and concerns that plague our world, the authors question the links among BMs variables by promoting evolved schemes in a sustainable key, in which the contribution of the company to the society is a central building block to assess and follow up (Biloslavo et al., 2018), as reported in the following Figure 1. The results to date are promising. For example, for SBMs, value creation is accompanied by improving people's well-being by promoting collaboration, moderation, harmony, and humanity (Roos, 2014).

FIGURE 1 SBMs framework.
Source: Adapted from Biloslavo
et al., 2018



In the second case, researchers assess SBMs as holistic vehicles that promote positive innovations in different domains (Bocken et al., 2019). This may include organizational and social changes (Bocken et al., 2019), configuration changes in terms of product or process innovation (Todeschini et al., 2017), as well as the introduction of technology into the business with sustainability goals (Mercuri et al., 2021).

2.2 | Blockchain and SBMs

Blockchain has been considered by many as one of those technologies demonstrating tremendous application potential for business management (Bai et al., 2020; Ruzza et al., 2020; Salah et al., 2019; Scekcic et al., 2019). The researchers' interest stems from its characteristics of immutability, authenticity, decentralization, and accuracy (Secinaro, Dal Mas, Brescia, & Calandra, 2021). Such technical factors are reflected by the opportunity to increase the trust and transparency of business data among all stakeholders (Secinaro, Calandra, & Biancone, 2021). For instance, according to Mercuri et al. (2021), Blockchain turns out to be an enabler of corporate sustainability due to the traceability, security, and nonmanipulability of information. Moreover, by limiting intermediaries, the technology can reduce

transaction costs. Similar results have been achieved by Dal Mas, Dicuonzo, et al. (2020) and Massaro et al. (2020). Remarkably, the authors demonstrate the reduction of transaction costs by increasing the social proof of corporate business, even in service industries, leading to more people getting access to products and services. Therefore, within companies, Blockchain seems to have a role in terms of financial sustainability.

Still, the economic sphere also finds direct relations with the environmental one. Piterou and Coles (2020) show that although there is little empirical evidence, Blockchain can fuel new green business strategies to limit energy consumption and reduce the ecological footprint. Moreover, due to its distributed ledger feature, it can make climate-neutral interventions transparent to stakeholders. This, as stated by Hazboun et al. (2020) and Valenciano-Salazar et al. (2021), is in line with international guidelines and the United Nations Sustainable Development Goals (SDGs) (2015) and allows consumers to participate and become aware of the climate problem and the actions that companies put in place to limit it. Additionally, according to the recent study by Parmentola et al. (2022), Blockchain could facilitate the achievement of the SDGs from an environmental perspective by promoting a change in economic models, notably, on SDGs #7 (Affordable and Clean Energy), #11 (Smart Cities and Sharing Economy), #12 (Sustainable development in the supply chain) and #13

(Climate Action). However, as mentioned, the potential of this technology, although transversal, needs empirical testing and virtuous cases of application to allow future scalability (Aldieri et al., 2021).

Finally, the distributed and decentralized ledger characteristics increase social participation, sustainability, and innovation (Changwony et al., 2015; ORourke, 2003). As suggested by the results of Aysan et al. (2021), we need to “Do not over-hype and do not over-promise” the technology. At the same time, Blockchain, also in the COVID-19 period, has shown that it can accelerate the uptake of the SDGs, for example, #3 (Good Health and Well-being), and #10 (Reduced Inequalities). Furthermore, as stated by Al-Saqaf and Seidler (2017) and Scekcic et al. (2019), Blockchain may stimulate socially virtuous BMs despite knowledge gaps. This is possible because, through improved trust between stakeholders and sponsors, the technology may track investments made, the impacts created, and grab new funds (Mukkamala et al., 2018; Nguyen et al., 2021). Therefore, as found out by Kusi-Sarpong et al. (2022), through the adoption of Blockchain, it is possible to, directly and indirectly, improve the knowledge flow of intellectual capital (IC) characterized by human, relational, and structural capital. It is also possible due to the knowledge decentralization that this technology allows (Suci et al., 2020). Blockchain technologies appear promising even in socially sensitive sectors like healthcare. For example, drugs cannot be counterfeited thanks to the distributed and secure ledger, allowing patients to get the correct dosage they need without fraud (Dal Mas, Massaro, et al., 2020; Massaro, 2021; Spanò et al., 2021). Blockchain impacts healthcare services, enabling trust, traceability, and transparency, encouraging a distributed electronic health record ecosystem that allows the integration of clinical, organizational, and managerial outcomes (Cerchione et al., 2022). Therefore, blockchain-based applications also seem to have a role in social sustainability.

Building on the theoretical implications of blockchain and SBMs, the paper's research question is as follows:

RQ: How can blockchain enable new SBMs and support SDGs?

3 | METHODOLOGY

The following sections define the research methodology to address the paper's aim. In the first subsection, the authors describe the motivation for implementing a multiple case study method, the research context, and the data acquisition process. The data analysis and the tools for the investigation are described in the second subsection.

3.1 | Motivations, research context and data acquisition

The paper adopts a multiple case study research approach to test how Blockchain can foster SBMs. The authors chose a qualitative research method for several reasons. Gummesson (2006) suggested that

qualitative research in the management sciences can address complexity, context, and personality. Besides, investigators can capture research nuances and factors otherwise overlooked by quantitative methods. Additionally, as suggested by the same authors, multiple case studies allow researchers to capture many intangible factors that create value for the literature. Therefore, as Massaro, Dumay, and Bagnoli (2019) pointed out and Biancone et al. (2021) applied, these methods make it possible to appreciate managerial processes' complexity and illustrate their social influence.

More specifically, case study analysis allows researchers to answer research questions about “how” or “why” certain events occur (Yin, 2017). According to Yin, the case study presupposes an empirical investigation by researchers into a contemporary phenomenon not yet explored. Finally, as defined by Massaro, Moro, et al. (2019), the research team adopted a transparent approach to sampling selection and results' generalization.

The research context and data acquisition start from the databases of coinmarketcap.com and icobench.com. These websites provide Blockchain companies' listing, allowing researchers to extract vital information on innovative Blockchain solutions and token prices (Dal Mas, Massaro, et al., 2020; Felix & von Eije, 2019). Previous researchers used both databases as a source of information (Felix & von Eije, 2019). Considering the paper's research aim, the analysis discovered 432 companies on their Initial Coin Offering (ICO) in investments, entertainment, banking, exchange and launchpad, media, health, real estate, casino and gambling, and marketing categories. After this first step, the authors proceeded with the companies' selection considering only the top 25% of internal evaluations provided by the same database. Then, the authors moved to the analysis of each extracted company's related website and white paper.

The second company screening step started with the analysis of companies that had to include sustainability as a vital element of their business strategy and value proposition, adopting the research framework of Biloslavo et al. (2018) and Bocken et al. (2019). Therefore, the second investigation process looked for companies active in Technological groups with material maximization and energy efficiency, value creation from waste, substitution with renewables and natural processes; Social groups with delivering functionality rather than ownership, stewardship role adoption, sufficiency encourage; and Organizational groups with repurposing actions for society/environment and developing scale-up solutions. After this phase, 20 companies were selected for further investigation. The authors double-checked the 20 identified companies' activity directly on their websites, considering the coin's value and that they were still running their business. Figure 2 shows the research design of the paper and the companies' selection process.

3.2 | Data analysis, coding and tools

After the pool's selection, the authors collected data from multiple sources. As suggested by Yin (2017) and Massaro, Dumay, and Bagnoli (2019), case study analysis allows researchers to gather

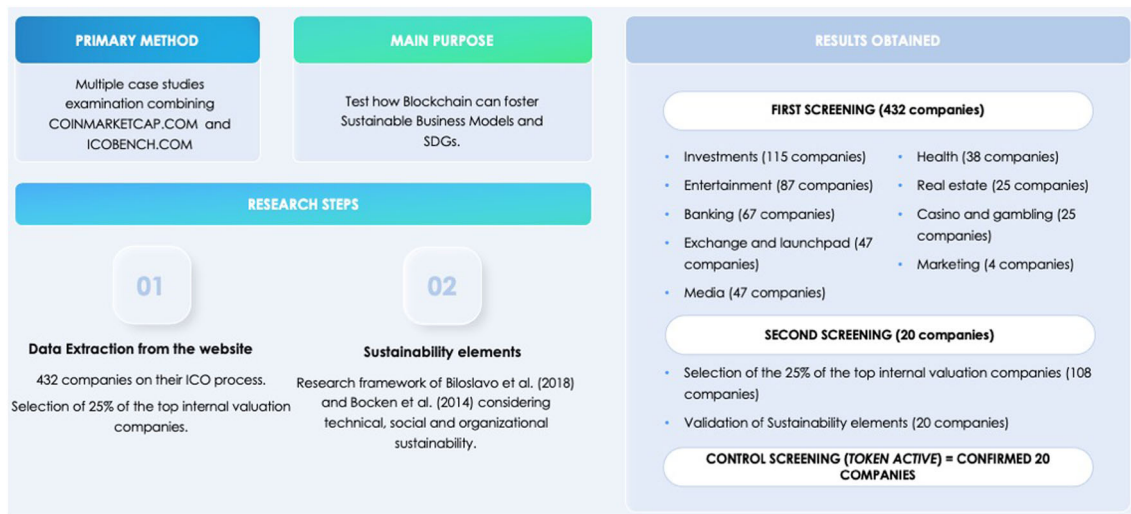


FIGURE 2 Research design. Source: Authors elaboration

TABLE 1 Data used for the analysis

Variable	Description
Company’s whitepaper	Sum of knowledge, including the aim and vision of the company.
Other publicly available sources	Websites, comments from investors and practitioners.

Source: Authors' elaboration.

TABLE 2 Data codification: An example

First-order concepts	Second-order concepts	Aggregated dimension: Compromising multiple values
By combining machine learning innovations, blockchain, IoT, and energy storage, Verv hopes to develop peer-to-peer energy trading. The VTP has been designed to facilitate trading at the grid edge. Verv intends to develop a freemium business model, which would allow all users to access the platform for free, with the possibility of purchasing additional features, services, or capabilities.	Transparent and accessible energy trading system	Smart energy management
Serenity platform will be connected to the National Electricity Operators, synchronizing all distributed energy resources (DER) through blockchain and HEPEK device control.	Device control for distributed energy resources	

Source: Authors' elaboration.

information from several flows. Therefore, internal data, whitepapers, and public comments from investors were considered for the investigation. Table 1 shows the primary sources of analysis.

All the data retrieved from the analysis were classified considering the theoretical framework of Biloslavo et al. (2018) and Bocken et al. (2014) in terms of SBMs variables. Therefore, as Yin (2017) recommended, comparing practical and theoretical models, internal and external validity was considered.

To develop the investigation, the authors used ATLAS.ti, a qualitative data analysis tool able to classify and create nodes and clusters among the interested thematic (Hwang, 2008; Massaro

et al., 2021; Secinaro, Brescia, et al., 2020; Secinaro, Dal Mas, Massaro, & Calandra, 2021). Next, a content analysis methodology was employed, combined with an in-vivo coding approach (Krippendorff, 2013). Thus, starting from the initial codification of concepts extracted from the literature, data collection was then carried out by second-order grouping macro-themes that identified the overall value of the Blockchain and of the variables of the SBMs (Table 2). Finally, in vivo coding was conducted, also considering the importance of the SDGs (Pizzi et al., 2020, 2021), matching each extracted company to the related SDG(s) in terms of environmental and social sustainability (United Nations, 2022).

4 | FINDINGS

Table 3 highlights the analysis results, depicting multiple research investigation perspectives on Blockchain's application for SBMs. Findings are reported as follows. The first column summarizes the main sustainability topic as found in the company's detailed analysis. The second column records the company's name, followed by the description of the venture. The last column recalls the SDG(s) involved in the business.

As suggested in the literature review section, one of the main applications of Blockchain technology is environmental management. The analysis led to four research clusters related to (i) smart energy management, (ii) climate change, (iii) waste management, and (iv) sustainable production. The second essential Blockchain application for SBMs is related to supply chain cost reduction. The third strand of research includes investments and their social scalability. Then, the final research cluster discovers social and proof sustainability. The multiple cases under investigation are all connected with the SDGs.

4.1 | Environmental management

Within the first research cluster, three case studies were selected. The issue of smart energy management is closely linked to the theoretical concept of environmental sustainability. The observed companies propose new business strategies to lower energy costs and reduce their carbon footprint (Piterou & Coles, 2020). For instance, through Blockchain, Serenity Source brings control and transparency to end users by offering advanced energy management solutions. The BM's core is tied to customers' platform and data management with customized dashboards that include energy costs, consumption per room, and carbon footprint. Access also connects energy supply and demand by redeeming sharing tokens for renewable projects. On this last theme, Blockchain enables the reduction of intermediaries (Dal Mas, Dicuonzo, et al., 2020). Among these is the case study Verv VLUX which, using a peer-to-peer exchange platform, allows households and consumers to exchange electricity directly and, if necessary, sell it on the market. The BM's strategy aims to exchange energy at a low cost, balancing the supply and demand of energy while decreasing expenses. Finally, the investment tool proposed by Green X raises funds and reduces investors' liquidity problems in alternative energy projects. The business strategy makes it possible to increase participation in green energy projects by reducing the number of intermediaries. Considering the SDGs, a direct link can be observed with #7 (*Ensure access to affordable, reliable, sustainable and modern energy systems for all*), 8 (*promote sustainable economic growth [...] about Green X*), #12 (*ensure sustainable patterns of production and consumption*), and #13 (*promote actions, at all levels, to fight climate change*).

The second cluster discovered concerns climate change. The observed companies offer consumers platforms that support government sustainability agendas (Hazboun et al., 2020). For example,

Poseidon connects actual purchases with the carbon footprint through Blockchain, providing consumers with credits to purchase even greener products. Integration with Blockchain allows specific donations to be co-created on environmental projects with a measurable impact between sellers and consumers. Exciting research results are also derived from the 1PLANET Marketplace case. The case shows a co-participation project (Scherhauer, 2021), which allows individuals and companies to know their ecological footprint on the planet and implement compensation mechanisms to reduce carbon emissions. The company, therefore, through co-participation tools, enables verifiable and practical actions to be taken by adopting a multistakeholder business strategy for a favorable climate offer. In terms of SDGs, a relationship can be observed with SDGs #12, #13, and #15 (*protecting, restoring, and promoting sustainable use of the Earth's ecosystem*).

The third cluster within environmental management includes the waste management concept. Using Blockchain, FCC encourages recycling waste conversion into reusable material. The BM provides a central element of transparency (Romano et al., 2021) and stakeholders' co-participation in recycling materials. The virtual currency obtained from virtuous recycling operations is transferred to a virtual wallet that can be used to purchase exchange items. In terms of the SDGs, the case study responds to #11 (*making cities and human settlements inclusive, safe, durable, and sustainable*), #12, #13, and #15.

Last but not least, the fourth cluster deals with sustainable production. For example, while observing Nagricoin, the team of researchers saw an agricultural cryptocurrency (Salah et al., 2019) that has an organic composite formulation of microelements and antioxidants for plant growth as its base asset. The asset, linked to a real underlying, allows the quality and quantity of crops sustainably (Biancone et al., 2022; Secinaro, Dal Mas, Massaro, & Calandra, 2021). In terms of SDGs, the case study responds to #2 (*end hunger, achieve food security, improve nutrition and promote sustainable agriculture*), #10 and #12.

4.2 | Supply chain costs' reduction

Two case studies adopt Blockchain for logistics management (Jović et al., 2020). For instance, Quasa and Cargo Coin make cargo and carrier management economically sustainable. More specifically, smart contracts enable the elimination of trust issues in port operations by limiting information asymmetries and legal costs. Companies eliminate intermediaries in managing maritime documentation, protecting owners in shipping activities, and decreasing expenses through their BM. In terms of SDGs, the case study responds to #9 (*Resilient infrastructure, sustainable industrialization and innovation*).

4.3 | Investments

Six case studies adopt Blockchain for investments. In this case, it can be observed that there could also be initiatives in this field to increase

TABLE 3 Blockchain and its relations with business model sustainability

Topics	Cases	Description	SDGs
Smart energy management	Serenity Source	Serenity source is a next-gen renewable energy retailer on blockchain looking to reduce energy bills, put control back on users hands and reduce carbon emission through a multifaceted blockchain ecosystem. With a focus on the renewable energy sector, combined with the blockchains power, the company aims to revolutionize energy generation, monetise carbon credits, develop Net-Zero estates and expand globally by affiliate licensing.	#7 and #8
	Verv VLUX	By combining machine learning innovations, blockchain, IoT, and energy storage, Verv hopes to develop peer-to-peer energy trading. The VTP has been designed to facilitate trading at the grid edge. Verv intends to develop a freemium business model, which would allow all users to access the platform for free, with the possibility of purchasing additional features, services, or capabilities. We estimate costs will be c.1% of the total transaction value in the long-term.	#7, #8 and #13
	Green X	GreenX is a blockchain ecosystem that enables individual and institutional investors to discover and invest in lucrative, low-risk renewable energy projects worldwide. It allows investments in green and renewable energies. Their business model includes due diligence processes, links with crypto platforms, investments and tax breaks/funding incentives.	#7, #8 and #12
Climate change	Poseidon	Poseidon has developed a blockchain platform that allows the customers to turn the negative environmental impact of every purchase they make into positive climate action. This is possible through a revolutionary integration that connects you directly to forest conservation projects, allowing clients to make micro-donations with a measurable impact.	#13 and #15
	1PLANET Marketplace	The 1PLANET marketplace and Dapp allows people and companies to buy and utilize tokenized carbon credits using the blockchain platform. Carbon credits are globally traded eco-commodities that imbue the 1PLANET crypto-tokens with positive real-world impact. The 1PLANET marketplace allows for direct, secure, transparent, and verifiable tokenized carbon credits from environmental projects. 1PLANET tokens can be used directly and through partner companies to offset carbon emissions from products and services.	#13 and #15
Waste management	Full Circle Coin	Using the blockchain platform, Full Circle Coin (FCC) aims to reduce waste generation rates, give education and awareness, and provide value from waste. They enable complete traceability of materials from the collection point to final output and data collection, which improve commercial efficiency. When a material is collected, households are given FCC in return. FCCs are transferred to a wallet which can be used on an online e-commerce website called a “good recycling mall” to buy items, e.g. groceries, clothes or an exchange house.	#6, #11, #12, #13 and #15

(Continues)

TABLE 3 (Continued)

Topics	Cases	Description	SDGs
Sustainable production	Nagricoin	NagriCoin provides agricultural tokens to compensate for currency fluctuation and add value to the agricultural and plant cultivation sector. The essential token asset is the Nagri-HL - the newest organic composite formulation of microelements and antioxidants stimulating plant growth. Being in development for more than 7 years, this advanced product demonstrates an increase of yields and quality for almost any crop it is applied to and will find wide application in agriculture worldwide.	#2, #10, and #12
Supply chain sustainability	Quasa	The aim is to protect cargo owners and carriers through the blockchain and improve smart-contract technology to eliminate problems related to trust, information barriers and legal costs. Logistics involves the movement of significant volumes of information. It deals with colossal paperwork, making this complicated industry even more opaque—formation barriers and high prices. Therefore, Quasa, with its blockchain technology, can reduce costs and protect cargo owners in their shipping activities.	#9
	Cargo Coin	The aim is to provide a global marketplace environmental utilities for facilitating trade, transport, exchange of documents and payment options at low cost in real-time. The platform links physical trade and transportation with blockchain technologies: the objective is to create a broad user base by introducing simple-to-use, efficient and cost-effective, free online interaction services followed by smart contracts.	#9
Sustainable investments	Coin Analyst	It provides real-time information to investors on suitable cryptocurrencies. The vision is to provide a platform that strengthens social engagement for traders. The role of advanced information tools could increase investments profitability and concentrate on investing decisions, increasing the number of people who could provide funding in broad projects. It is a unique tool that helps crypto investors make more accurate predictions while trading.	#9 and #10
	Pulsar	A venture foundation for investing in 29+ best start-ups from Eastern Europe, Silicon Valley and Ireland. Pulsar VCs crowd sale mission is to allow eligible purchasers to invest in the best early-stage start-ups leveraging Pulsar VCs deal flow, a proven model for investing with VC grade due diligence, a robust support process by the Pulsar VC team with the help of a global network of partners and investors.	#9 and #10
	Swinca	Swinca aims to let anyone access any real estate investment opportunity worldwide. They can transparently choose what percentages of a flat, a house, an office or land they want to invest in. That way, they can benefit from a personalized real estate portfolio that is flexible to manage. Transactions are easy and instant and dont cost. Since Swincas asset records are stored in the Blockchain, buying, renting and receiving dividends become easy, fast and decentralized through the blockchain.	#9 and #10

TABLE 3 (Continued)

Topics	Cases	Description	SDGs
	Alt.Estate	Alt.Estate is a financial technology company offering the protocol for real estate tokenization and the platform for buying and trading tokenized property assets in fractions. The blockchain platform is the marketplace for prior sales and secondary trading of tokenized assets. It allows users to trade real estate in fractions with higher liquidity and lower costs.	#9 and #10
Social engagement and innovation	Fan 360	The blockchain-based Fan360 token will enable us to run an automated smart reward system based on fans contributions. Fan360 will allow fans to earn tokens for their contributions and redeem them for a wide range of activities (i.e. tickets, merchandize, unique experiences, etc.). The project creates engagement for fans allowing them to participate in processes and earn rewards from sports.	#10
	Migranet	Migranet is a blockchain migration platform. It presented a one-stop solution to migrants and accredited migration practitioners by automating the processing of migration applications. It also assists refugees with their skills assessment to be integrated into their host country post-selection.	#4, #8 and #10
	Knowledge	Knowledge is universally beneficial and creating incentives for developing and propagating knowledge benefits various economic, social, and educational environments. It tells stories and identify individual brilliance in a way that has never been possible before. Through integration with the Knowledge platform, educators, employers, advocates, and others can value and exchange knowledge through voluntary or gamified interactions. Users that interact with the knowledge platform are rewarded for contributing. The Blockchain platform manages tokens disbursed proportionally as a reward for sharing or generating knowledge among users.	#4, #8 and #10
	Cryptoleaf	We want to help businesses and entrepreneurs turn their ideas and visions into successful organizations using cryptocurrency and smart-contract technology. We want to help fund and guide enterprises to their success. By creating our cryptocurrency, we provide everyone on the planet the opportunity to support and fund environmental companies, initiatives and projects.	#4 and #10
	Talentico	Talentico project mission lies in creating an ecosystem where talented token holders will be making investments to gain maximum profit. It will develop and introduce software products based on blockchain technology to provide economic effectiveness and transparency in communication for all the parties involved.	#4, #8 and #10
	rLoop	rLoop will offer everyone the opportunity to develop innovative projects to reach human and economic growth. It will provide a blockchain platform that aims to strengthen the collaboration among stakeholders for excellence innovation results. The business model was adopted to increase the social proof of innovation.	#4 and #10

(Continues)

TABLE 3 (Continued)

Topics	Cases	Description	SDGs
	Kambria	Kambria is a decentralized open innovation platform managed by Kambria International that will foster a collaborative ecosystem, to dramatically accelerate the development and adoption of the worlds most advanced robotic technologies. The token was created to enable access to the Kambria Platform, reward participation, and align incentives for all stakeholders in the ecosystem.	#4, #8 and #9

Source: Authors' elaboration.

social involvement (Changwony et al., 2015; ORourke, 2003). For example, Coin Analyst provides real-time information to improve traders' social engagement in cryptocurrency investments that address multiple and sustainable issues. Therefore, its business strategy is based on social engagement and the expansion of cryptocurrency investors. In the same vein is Pulsar's case study, which aims to invest in the 29 best early-stage start-ups, allowing investors to make sustainable investments that would otherwise not be possible due to riskiness and the amount required. Finally, two case studies relating to real estate investments. Swinca and Alt. Estate offer liquid tokenization protocols for the purchase and sale of real estate assets and rental management. The case studies' business strategy increases the number of investors and decreases management costs in rental contracts. In terms of SDGs, the case studies respond to # 9 and #10.

4.4 | Innovation

Seven case studies adopt Blockchain to increase social participation and innovation (Al-Saqaf & Seidler, 2017; Scekic et al., 2019). For example, Fan360, through a token on the Blockchain, increases the social engagement of sports by allowing the redemption of a range of assets such as tickets and merchandising responding to SDG 10. Different is the case of Migranet, a Blockchain platform that aims to connect accredited professionals and migrants to evaluate their skills to foster integration processes between countries. The business strategy seeks to scale assistance to migrants globally and create an exchange currency for international services. A different target is the case study Talentico, active in the education sector, promoting integration and fostering knowledge with virtual exchange currencies. The first case refers to a multistakeholder context, the second to investors. Both case studies address SDGs #4 (*provide quality, equitable, inclusive education and learning opportunities for all*), #8, and #10.

Furthermore, Cryptoleaf and rLoop use Blockchain to help businesses and entrepreneurs to launch their business ideas, providing a funding platform favoring SDGs #4 and #10. Finally, the Kambria case study is a decentralized open innovation platform that fosters a collaborative ecosystem, accelerating robotic technologies. Its BM

strategy includes social innovation and the spread of knowledge and sharing design. In terms of SDGs, it fits #4, #8, and #9.

5 | DISCUSSION

Starting from the RQ. *How can Blockchain enable new SBMs and support SDGs?*, the analysis of the 20 case studies allowed the research team to highlight some new implications in terms of theory and practice. First, the results show that there is a link between Blockchain and SBMs. This is particularly prevalent in environmental management through the creation of new companies that can reduce their ecological footprint or promote efficient energy management, in line with SDGs #7, #8, and #13. Our findings are in line with and offer empirical evidence that the study of Parmentola et al. (2022) required. Second, as suggested by Ruzza et al. (2020), Blockchain is able to spread the value across all nodes of the chain. Again, we are in line with the theory of SBMs, which envisages a diffusion of positive impacts on business activities (Cosenz et al., 2020). Third, the promotion of new sustainable business strategies concerning climate, energy, and the reduction of inequalities can only be in line with the goals of the United Nations and the SDGs strategy. Table 4 below and the following subsection aim to link the findings discussed above with some theoretical implications, allowing a better understanding of the topic and opening new research avenues.

5.1 | Environmental management, co-creation, and stakeholder engagement implications

The selected case studies demonstrate an active role of stakeholders such as citizens and consumers in energy and environmental management. According to Benítez-Martínez et al. (2021), Blockchain enables democratic participation and involvement. This is reflected in enhancing the network and nodes that the technology enables (Secinaro, Dal Mas, Brescia, & Calandra, 2021). This assumption has also been studied, for example, in the private sector in the field of energy management of electric vehicles. For example, Liu et al. (2018) show opportunities for energy iterations between participants in the same network (Scekic et al., 2019). Blockchain introduces new forms of

TABLE 4 SBM impacts, theories, examples, and sectors

SBM impacts	Theoretical implications of the new SBMs	Examples	Sectors
Environmental management through citizen participation	Co-production and stakeholder engagement	Poseidon, Green X and 1PLANET Marketplace Full Circle Coin	Energy and waste management Waste management
Cost reduction through efficient use of resources.	Transaction costs	Quasa and Cargo Coin	Supply chain
Investments and new possibilities for entrepreneurs.	Social entrepreneurship	Fan 360 and Migranet	Sustainable investments and social activities
Innovation and new knowledge flows	Intellectual capital	Knowledge and Swinca	Social activities, human capital and sustainable investments.

Source: Authors' elaboration.

interaction, collaboration, and idea creation between citizens, boosting SBMs. Our observation confirms this. For example, Poseidon, GreenX and 1Planet MarketPlace, addressing SDGs #7, #8, #12, #13, and #15, were created to integrate consumers and companies by raising awareness of climate change and improving ecological value distribution, moderation, harmony, and humanity (Cosenz et al., 2020; Nosratabadi et al., 2019). At the same time, the theme of co-creation is cogent. According to (Dias et al., 2020), climate change requires new integrated adaptive experiences from companies and stakeholders. The observation is also in line with the UN SDG strategy to increase the environmental awareness of actions taken (Valenciano-Salazar et al., 2021).

5.2 | Cost reduction and transaction costs implications

The results show how Blockchain can play a role in making business processes more efficient. As defined by Marinescu (2012), transaction cost theory and economic theory predict that every human action has a cost. This recalls the concept of choice, sacrifice, and missed opportunities. As mentioned above, one of the Blockchain roles seems to have concerns developing the network and collaboration concepts. Therefore, the distribution of value in the supply chain allows for increased economic and extra-economic value. However, this extra value, as suggested by Roos (2014), enables SBMs collaboration and promotion.

On this, the cases of Quasa and Cargo Coin demonstrate the use of smart contracts for the management of practices in the logistics sector addressing SDG 9. Thus, every human action can be modified to reduce the costs of business activities (Cabezas et al., 2004). On this point, the literature appears to be unified. According to Schmidt and Wagner (2019), validation of information allows for consensus and eliminating intermediaries and opportunistic behavior. Furthermore, according to Ahluwalia et al. (2020), removing information asymmetries explains a more effective allocation of resources within and outside companies. Therefore, in addition to identifying tangible benefits for the company in terms of reduced transaction costs, the

ecosystem would also benefit from a reduction in such values and an increase in trust between stakeholders.

5.3 | Investments and social entrepreneurship implications

Social innovation theory has evolved in recent years to different areas of knowledge. For example, according to Pel et al. (2020), social innovation has succeeded in hybridizing the institutions involved by extending the scope of action beyond social enterprises alone. Therefore, the concept develops with Olsson et al. (2017), who argue that bottom-up social innovation can recombine existing elements in new ways, activating new entrepreneurship (Bricolage theory). These theoretical assumptions are confirmed in our results by the Fan 360, Migranet and Knowledge cases (SDGs #4, #8, and #10) that, thanks to tokenization, propose a bottom-up and scalable innovation model for knowledge dissemination and migrant assistance. In addition, with the Pulsar case study, we demonstrate how sustainable investment can be drained to early-stage start-ups. This is in line with the literature, as recently discovered applications pave the way for the use of Blockchain in crowdfunding by demonstrating its social value as an alternative funding architecture (Nguyen et al., 2021). Therefore, we confirm the potential of Blockchain in creating new SBMs and promoting new democratic and social entrepreneurial initiatives (Al-Saqaf & Seidler, 2017; Mukkamala et al., 2018).

5.4 | Innovation and intellectual capital implications

Our results suggest an active role of Blockchain in both innovation and IC and knowledge sharing. In recent years, IC theory has evolved to include more and more variables within the human, relational, and structural pillars, using technology as a mode of transmission (Kusi-Sarpong et al., 2022). This is evident in the case studies observed. For example, the Knowledge platform (SDGs #4, #8, and #10) through distributed tokens incentivizes knowledge exchange by

rewarding structural ingenuity and fostering relational iterations among stakeholders. Or again, the Swinca case study (SDGs #9 and #10) underlines the possibility of creating decentralized knowledge ecosystems for investors seeking access to real estate investments. Therefore, as demonstrated by Suciú et al. (2020), Blockchain reshapes the ways of doing business and knowledge transfer systems by promoting the diffusion of skills and capabilities related to human capital.

6 | CONCLUSIONS, LIMITATIONS, AND FURTHER RESEARCH

In conclusion, the research aims to develop the debate on SBMs and Blockchain. As defined by Bai et al. (2020), the research area is continuously expanding due to the continuous discoveries that the technology enables. In particular, the enabling power of Blockchain is increasingly being integrated with the modification of BMs and the establishment of new business ventures. However, the youthfulness of the research field allows new opportunities for researchers to observe. Therefore, our research focused on observation and documentary analysis (white papers and other available documents), seeking to provide practical feedback to bridge the knowledge gap in this area. Through the observation of 20 case studies involving Blockchain, we discovered four research clusters related to (i) smart energy management, (ii) climate change, (iii) waste management, and (iv) sustainable production. Furthermore, new business initiatives show that Blockchain can reduce costs by promoting SBMs strictly linked with the United Nations agenda and SDGs. Finally, we reiterate how the technology can distribute value internally and externally to stakeholders.

As reported in the previous section, the research development allowed us to determine some theoretical and practical implications. From a theoretical perspective, we demonstrate an evolution of corporate business strategies. In particular, Blockchain fosters new research streams that are based on transaction cost theory, co-participation and co-creation theory, stakeholder engagement, and social innovation entrepreneurship. Interestingly, the case studies observed underline how Blockchain promotes theory development, as is the case with transaction cost theory, which is fully reflected here.

From a practical point of view, we have shown that the general discussion is primarily about entrepreneurial ideas and tokenization aimed at energy efficiency, waste management and climate change. Therefore, it is interesting to note that most case studies refer to goals addressed by the SDGs. Finally, the business case descriptions reported here can provide the lifeblood for managers, CEOs and future entrepreneurs to employ Blockchain in business processes, allowing them to increase their competitive advantage while, at the same time, pursuing sustainability aims.

Our study, like all research, has several limitations. First, while we tried to be rigorous in selecting multiple case studies, we cannot exclude that we have left out virtuous experiences. This could promote single case studies and specific observation lenses for the

in-depth analysis of relevant experiences. Second, future literature reviews could be conducted to examine the variables of the research stream analyzed here in greater depth. Third, future lines of research could investigate individual sectors in more detail. For instance, new studies could shed light on how SBMs change by integrating Blockchain into energy, waste, sustainable production, logistics, and sustainable investments. Finally, further studies should quantitatively assess whether Blockchain can enable economic, environmental, and corporate social value by monitoring specific indicators.

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CONFLICT OF INTERESTS

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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