

Strategic Review in Achieving SDG Goals through the Practices of CSR: Functions of Blockchain Technology in the Financial Sector of Bangladesh

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Abstract: - This study focuses on blockchain technology and analyzes the nexus between corporate social responsibility (CSR), sustainable development, and new technologies in the banking sector of Bangladesh. The study aims to offer a strategic model of enhancing blockchain technology and corporate social responsibility (CSR) implementation into the financial system of Bangladesh to meet the Sustainable Development Goals (SDGs). The theoretical framework analyzes the ways the CSR practices can be aligned with SDGs, referring to the synergies of blockchain technology and CSR. The paper, with its focus on the financial sector, attempts to identify the key aspects of CSR, such as financial inclusion, financial transparency, and responsible investing, which could be enhanced through the deployment of blockchain technology. It is our expectation that the conclusions of the research will contribute to the theoretical and practical areas of sustainable development of

the financial sector. The study aims to provide enlightenment on the ways CSR practices and blockchain technology can be effectively incorporated to serve the interests of the stakeholders, financial institutions, and policymakers in the application of technology in the context of social responsibility and environmental conservation.

Key-Words: - Blockchain Technology, Corporate Social Responsibility, Developing Countries, Financial Sector, Sustainable Development Goals (SDGs), Technological Progress

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1 Introduction

CSR is the corporation's obligation to stakeholders, the community, and sustainable development to address environmental and social concerns [1]. It is a concept thanks to which companies take into account social interests and environmental protection, as well as relations with various stakeholder groups, at the stage of building their strategy [2],[3]. Corporate social responsibility (CSR) is an idea that is global in scope. The process of globalization and the growing need to protect its human and environmental elements are inextricably intertwined in many ways [4]. The global aspects of CSR could make people believe that local dynamics are incidental or even unimportant. While CSR may be a global phenomenon, its application varies across various social, economic, cultural, legal, and political contexts [5]. Corporate social responsibility in banking has evolved from peripheral philanthropy to strategic integration with core business operations. Forcadell [6] demonstrates that innovation significantly influences corporate sustainability in international banking, while Aracil [7] provides evidence that sustainable banking practices enhance long-term financial performance.

The idea of CSR is considered to be "a response of business entities to the challenges of sustainable development [2]. CSR is a result of disseminating the principles of democracy [3].

Company models integrate CSR, or corporate self-regulation. Other names include business awareness, company citizenship, social performance, sustainable, responsible corporation, etc. CSR is self-policing, allowing the organization to actively monitor and comply with legal and unwritten laws, moral values, and global agreements. Its declared goal is to assume responsibility for the company's actions and produce positive effects on the environment, consumers, personnel, community members, participants, and all other parties, including the public, through its activities. Due to financial crimes in recent decades, executives, investors, creditors, owners, suppliers, customers,

and politicians have increased CSR. These organizations are growing more aware of the need for mandatory and voluntary CSR reporting and have increasing social responsibility expectations of corporations. Recent CSR requirements include reducing environmental pollution, conserving energy, promoting professional diversity, and ending racism and gender discrimination. Entities increasingly value appropriate stakeholder communication [8]. CSR-focused companies promote community progress and voluntarily discontinue harmful operations, regardless of legality. CSR is the purposeful incorporation of the public interest into a company's core operations and decision-making, as well as the triple bottom line: profit, planet, and people. For a nation to flourish, every economic unit must advance. The financial industry, which moves money from the surplus to the deficit, drives economic growth. Bank finance institutions are crucial to resource mobilization in most governments, especially emerging ones. However, expanding banks and non-banks is necessary to provide a strong and stable financial system for the nation [9].

Bangladesh's financial institutions have played a crucial role in the country's economic structure post-war, providing funding to various sectors, including agriculture, industry, and service. The financial industry has grown year after year, contributing to the growth of the ready-made garment industry, remittances, agricultural production, and SME enterprises. Over the past 50 years, Bangladesh has achieved significant economic progress, which has negatively impacted the environment through extreme pollution, deforestation, etc. [10]. Therefore, the country needs to invest in renewable energy.

Bangladesh is also a rapidly developing country with great potential in renewable energy sources based on biomass and biofuels [11]. Moreover, the industry is working to help the government achieve the Sustainable Development Goals (SDGs) of poverty eradication, safe food, and good health. The ready-made garment industry (RMG) and

remittances are the two biggest contributors to Bangladesh's economy. Bangladesh banks [12], [13] are stimulating agricultural production and agro-related industries. The COVID-19 pandemic demonstrated the involvement of the banking industry in the response to the disaster, especially in the agricultural sector. The role of the agriculture industry in the economy of Bangladesh, however, has been diminished due to industrialization. Banks, especially banks, have been instrumental in the economic development, where they provide investible funds to the public and the private sector. They also interfere with remittances that are sent home by migrant workers, with the record reaching 2.6 billion in July 2020, but the average is 1.4 billion between 2012 and 2023 [14]. Credible work performed by banks with the assistance of deposits is numerous, thus, banks should guarantee more social [15]. Consequently, banks attach a lot of importance to the conduct of operations in a socially, ethically, and environmentally responsible way. Moreover, over the last few years, shareholders, the media, consumers, and other stakeholders, including international regulatory bodies, have placed more pressure on the banking industry to incorporate their social responsibility into their business operations [16]. CRS has become part of the banking business and corporate strategy due to its growing trend and importance [17].

The concept of CSR is being applied more frequently in the financial sector as a technique to build a positive reputation and draw in new clients. There are undoubtedly a variety of aspects involved in attracting new clients [12]. Some scholars think that CSR practices are the combination of activities and initiatives taken by financial institutions to work for the betterment of society, the environment, and various stakeholders beyond their core business activities. Some known CSR practices include environmental responsibility, philanthropy, economic responsibility, ethical responsibility, charity, diversity and inclusion, workplace policies, carbon footprint, engagement with stakeholders, supporting sustainable legislation, volunteering, better employee attraction and retention, socially and environmentally conscious investments, engaging in charity work, etc., that several financial institutions practice and adopt and can contribute to the increase of firm performance. Therefore, CSR is often promoted by corporations due to its perceived benefits to both macro- and micro-performances, including environmental improvement, social inequality reduction, reputation enhancement, product pricing, and high-quality workforce recruitment and retention [18]. Besides, in 2022, the

Bangladesh Central Bank announced and provided a guideline to ensure CSR practices in all financial institutions. As a result, instead of the previous 20%, all the scheduled banks and non-banking financial institutions (NBFIs) are now permitted to spend a minimum of 30% of their overall CSR money to assist healthcare services. Spending on the environment, relocation due to global warming, and adaptation have surged from 10% to 20% of total CSR funding. However, spending on the education industry remained constant at 30% of all CSR expenditures. Bangladesh financial institutions adopted CSR practices for self-interest because of getting tax holidays, increasing publicity, promoting the image of the bank, enhancing the reputation of the company, and demonstrating responsibility towards society [19]. Moreover, they deal with the employees' payment in due time, ensure proper recruitment and promotion, and take action against those who practice unethical CSR activities [20].

CSR is enhanced through blockchain technology. Blockchain can enhance CSR through transparency and disclosure. CSR promises of corporations help in innovation [20], [21]. The use of blockchain technology has substituted the traditional corporate processes in voting, ownership of shares, and record maintenance because it is accurate, efficient, and transparent [22]. Therefore, the implementation of this technology could transform the agency costs, reducing them and improving trust between shareholders and management [23]. CSR and blockchain technology offer transparency and traceability, which is necessary to have the proof of trust, particularly in finance. It provides customers with plausible information, assists firms in maintaining transaction records as well, and prevents fraud. It could establish participative, open, and fair governments. This may assist in the issues of corporate social responsibility, such as managerial responsibility, board structure, and shareholder rights in the financial industry [24].

The report looks into how financial organizations can address 17 SDGs using CSR and BCT. In 2015, the UN developed the Sustainable Development Agenda 2030 with 17 SDGs and 169 targets attached to it. All these goals are aimed at combating poverty, inequality, environmental degradation, and enhancing peace and prosperity by 2030 [25]. The UN SDGs offer a strategy and systematic plan of sustainable development in people, planet, prosperity, peace, and partnership. The 17 SDGs underline harmonization and three areas that are interconnected: the economic gains, social integration, and environmental care. The 2030 Agenda of the UN considers the SDGs as a global

cooperation model, which aims at economic development, social integration, and environmental resilience. These objectives involve cross-national, multi-sector cooperation. It may be necessary to sacrifice personal and governmental interests in favor of society by encouraging the stakeholders to adhere to a common rationale. The UN SDGs provide very detailed political, organizational, technological, and personal/societal guidance. We should understand that the SDGs are inseparable and we cannot attain them individually. They are indivisible and rely on one another's implementation [26]. Nevertheless, FIs may contribute to the realization of the 17 SDGs directly or indirectly. In this way, the 2030 Agenda enables FIs to show their caring for the social responsibility and satisfaction of the stakeholders and strengthen their standing. It also provides a business with potential. Financial institutions should change their ways of operation and provide sustainable products to a better society. Business model adjustments and transparency in the communication with stakeholders are necessary to guarantee this redirection [27], [28].

The UN Global Compact is a global program consisting of responsible companies and stakeholders. The strategy encourages alignment of business strategies and activities with values related to human rights, labour relations, environmental issues, and anti-corruption. In addition, it helps to implement strategic programs to attain more social goals, including the Sustainable Development Goals (SDGs), and the principles of collaboration and innovation play a significant role [29]. These initiatives point to the high significance that financial institutions should be taking as part of the 2030 Agenda. The functions of this role include the integration of environmental and social considerations in the lending services of the bank, such as loans and project finance [30].

Collaboration requires significant financial resources to attain the SDGs. The UN Secretary General's Synthesis Report on post-2015 sustainable development emphasizes stakeholder engagement and financial resource efficiency [31]. The SDGs require \$5–7 trillion annually to address global resource concerns. Emerging nations require \$3.3 trillion to \$4.5 trillion in annual investments; they fund infrastructure, food security, healthcare, education, and climate change mitigation. UNDP [32] underlined the necessity to identify budgetary needs and public and private investment for each Sustainable Development Goal. International, commercial, and government finance must collaborate to accomplish the SDGs. The 2030 Agenda requires FIs to promote financial inclusion

and sustainable economic growth [28]. Risk management in these enterprises generally considers environmental and social factors. Environmental and social factors affect financial institutions' goods, operations, lending, and investment decisions [27]. Financial institution credit drives economic development. Financial institutions (FIs) are crucial to transparency owing to their economic influence. In all nations, FIs are regulated for the public interest and must disclose their financial intermediation operations [33].

FIs may use blockchain technology (BCT) to enhance CSR and the SDGs. They may also promote ethical and sustainable business practices and invest in blockchain technology to accomplish the Sustainable Development Goals (SDGs). A profound social revolution, BCT changed industrial practices and improved the quality of life. Parmentola [34] suggests Business and Climate Technologies (BCT) may promote green industry. BCT can track and store environmental data and contaminants. BCT also offers real-time green or low-carbon data collection and analysis for informed decision-making. Blockchain Technology (BCT), an industry 4.0 participant, can maximize sustainable enterprises' ability to create a sustainable society and world-class sustainable financial institutions. By employing behavior change approaches (BCT), financial institutions may leverage market opportunities beyond economic causes to accomplish the SDGs. This technique helps people achieve growing ecological and ethical standards and current societal advancement [35]. This paper investigates Bangladesh's banking industry's SDG-promoting blockchain-CSR integration. Interest in blockchain applications in financial services is growing, but technology and implementation are far from being widespread, especially in emerging economies. Although established markets research sophisticated blockchain applications, emerging nations face limited technological infrastructure, regulatory uncertainty, and the twin goals of financial inclusion and technology growth, according to Ali [36]. Although an increasing amount of literature concerning blockchain and sustainable finance is available, three gaps are essential. To begin with, there is a lack of studies on the integration of BCT-CSR within the South Asian markets (contextual gap). Second, there are no practical implementation guidelines for resource-constrained environments in existing frameworks. Blockchain technology, corporate social responsibility, and sustainable development are intersecting, which offers a rare opportunity to the financial sector of Bangladesh. The recent findings of Rahman [37] also show that

digital financial inclusion can play a vital role in economic development in Bangladesh, but the capability of blockchain to increase CSR practices to meet SDGs has not been examined. To address this gap, this research paper will create a context-specific framework that connects blockchain capabilities and CSR practices to hasten the SDG attainment of the SDGs. The theoretical discussion brings into focus the decentralization and transparency, besides explaining the advantages of the combination of CSR and blockchain technology. The findings aim to explain the strategic alignment by showing how blockchain technology could enhance the CSR activities, which include responsible investing and financial inclusion. The research objective is to guide Bangladeshi financial institutions to a sustainable future by aligning them with the international SDG objectives and promoting socially responsible behavior in the financial sector.

2. Blockchain Agendas in Bangladesh

Bangladesh has shown a remarkable path of growth and development, putting it on track to become an upper-middle-income country in the next few years. It has become a model for advancement and development across the world. However, the country has many problems that need smart solutions to keep its amazing growth going and reach the SDG goals by 2030, with the long-term goal of being a fully developed country by 2041. There is no doubt that using cutting-edge technologies, especially blockchain technology, is very important for getting beyond these problems.

To elaborate on this concept, we focus on the Sustainable Development Goals (SDGs), a collection of 17 global aims carefully crafted to serve as a guide for achieving a better and more sustainable future for everyone. The United Nations General Assembly approved these lofty goals in 2015, and the deadline for reaching them is 2030. Bangladesh is working hard to achieve these goals on schedule since it is fully committed to them. In this perspective, we want to stress the importance of one specific target that is very relevant: SDG 9: "SDG 9: Build a strong infrastructure, encourage industrialization that is open to everyone and lasts, and encourage new ideas."

Digital asset management is necessary because of the digital revolution in banking and insurance. Digitalization of Bangladeshi assets is at a faster pace. Privacy, managing money, and staying away from exploitation are all very important. Blockchain might transform how digital IP is owned and transmitted. Also stops the misuse of assets. It takes

time for Bangladeshi banks to settle their accounts with each other. Using blockchain has made things run more smoothly. Bangladesh employs intricate trade credit networks for both internal and international trade. Blockchain solutions are becoming easier again. Network transactions and less paperwork in stakeholders' databases would speed up trade finance. Faster transaction resolution makes things more open. Efficiency provides the people involved in a transaction with money. Peer-to-peer lending through a bank or underwriter is sluggish and costly. Blockchain lets people lend and borrow money quickly. Smart contracts will make Bangladesh's credit climate better by changing interest rates dependent on the borrower's situation. Blockchain can also help with AML. Bangladesh's banks don't share KYC data, which makes it harder to keep an eye on transactions. AML utilizes the blockchain's unchangeable record to keep track of unlawful money transfers. Blockchain-based digital money can help Bangladesh's banks and other financial institutions. Bangladesh's digital currency may change. The credit rating system in Bangladesh may employ blockchain without any information on borrowers or investors. Blockchain credit rating firms that are decentralized are open. Disclosure to regulators stops anyone from messing with credit ratings and makes sure they are reliable. Making insurance claims in Bangladesh is hard and takes a long time. Blockchain insurance is one of a kind. Smart contracts that can't be changed compensate policyholders and settle disputes swiftly. Reinsurance makes it easier to share data. These changes make business and policyholder insurance easier, which helps the markets.

Many banks and other financial institutions need to set up E-KYC (Know Your Customer) procedures in the Identity Application Domain. This takes a lot of resources. This is a waste of time because each bank has to meet KYC criteria for each new customer, even if they have already been KYCed. KYC solutions that use blockchain transform how financial institutions share KYC data. Because it is open and honest, blockchain technology helps Bangladeshi banks speed up KYC and make it easier for new clients to get started. Lastly, current internet reputation systems are open to being hacked by bad people who change reputation data. Fake customers might change ratings to get money. The blockchain-enabled reputation system will get rid of this kind of bad behavior. This groundbreaking technology checks and produces unique digital identities for all users. It also collects reputation data from all across the web to keep the online reputation system trustworthy and open. Online shopping is becoming

more popular in Bangladesh, and customers need to trust the businesses that sell to them. A reputation system based on blockchain can help people trust this new economy.

Blockchain technology might change the way banks work. In the past, banks and other financial organizations have depended on middlemen to settle transactions. But blockchain technology gets rid of middlemen in transactions. This simpler system will save these institutions a lot of money and make international payments faster and cheaper than they are now. So, a payment system based on blockchain might alter the whole world of finance. In the stock market, intermediaries like brokers and regulators make it harder to settle trades and raise expenses for traders and businesses. By getting rid of middlemen and speeding up transactions using smart contracts, a blockchain-based system can lower these costs. Bangladeshi stock markets, which share the same problems, might also benefit from a blockchain-based solution. Lastly, economic aid helps lower deficits and short-term poverty. It is quite hard for authorities to figure out if grant applicants are eligible and to make sure the money is used correctly. A strong way to distribute subsidies is through blockchain. This technology makes it easy for governments to figure out who is eligible for subsidies and keep track of who gets them. A blockchain-based solution will be helpful in Bangladesh, where subsidies have been misused.

2.1 BCT The Adoption Scenario in Bangladesh

In Bangladesh, the use and implementation of blockchain technology have not been very widespread in recent years, with only a few notable cases. Most of these examples have been pilot initiatives or single-use cases in certain fields. A few banks in the country have indeed started to use blockchain technology, but it's vital to remember that this new technology isn't widely used in the country's economy yet.

In 2020, bKash, a big financial services firm in Bangladesh, adopted blockchain technology to make its incoming remittance services safer, faster, and more reliable. Senders and recipients would have a more cost-effective, rapid, transparent, and reliable experience while expanding international remittance flow within legal frameworks to strengthen Bangladesh's economy [38]. In 2020, Prime Bank and HSBC Bank executed the first interbank blockchain Letter of Credit (LC) transaction [39]. In the same way, Standard Chartered Bank started its own blockchain project in 2020, showing its dedication to new ideas by releasing an LC. That

year, HSBC became the first Bangladeshi bank to do a cross-border blockchain transaction. The bank started a cross-border loan to bring in 20,000 tons of oil from Singapore. This significant change revealed that LC processing now took less than 24 hours, highlighting blockchain technologies' time-saving advantages [39]. The Daily Star [40] says that City Bank used blockchain technology to conduct a shariah-based cross-border LC in Bangladesh for the first time. According to The Daily Star [40] Upay will use blockchain and QR codes to make transactions safe. The Daily Star says that Standard Chartered Bank established a blockchain-based tool for Malaysian workers to send money home. The Business Standard [38] says that Prime Bank started using the interbank blockchain LC in Bangladesh. IPDC was the first company in Bangladesh to use blockchain for supply chain financing. Krishi Shwanpo is an innovative agro-tech company that also uses blockchain in its supply chain management. The project's major purpose is to make the supply chain clear and easy to follow by getting information from farmers, companies, and end customers. Blockchain's traceability qualities allowed customers to easily access product information, including origin and quality standards, ushering in a new era of agricultural openness and accountability [38].

2.2 Types of Blockchain Technology

Some of the key components of a blockchain are blocks, chains, nodes, and master nodes. Nodes bear a big responsibility of managing the blocks within the network, which involves solving difficult mathematical puzzles in order to incorporate new blocks. The largest difficulty of such mathematical puzzles restricts the size of the blockchain network, making it extremely difficult to be compromised by a hacker or other malicious parties because of the special hash codes employed. The term blockchain is appropriately described as it is made of linked blocks that hold details about transactions. This technology is a digital history of transactions in which information is organized into units and linked together in a chain. Cryptocurrencies also have it as their basis [41]. In addition to cryptocurrencies, blockchains have a positive effect on the security of data and the elimination of unauthorized modifications, as well as the identification of fraud [42]. Essentially, blockchains consist of distributed ledgers where one of the ledgers is kept on every computer connected. Cryptocurrencies are an indicator of blockchain becoming popular in handling data confidentiality and integrity of the process in the financial industry [43]. It provides a reliable and secure way of transacting business.

Blockchain technology also reduces financial risks by mitigating problems related to the norms of the financial system. Due to the increasing awareness of the value of its benefits, businesses are looking into ways of reaping the benefits. Finally, blockchain is a platform that supports various operations in the world, which intertwines with the basic principles of banking to promote safe and efficient trading [44].

Relying on permissioned and permissionless blockchains, four types are considered in our study, which are related to three, such as a public, a private, and a consortium one. Public blockchains are open to anyone to join and are characterized by permissionlessness and decentralization. They provide identical permissions to all blockchain nodes and enable them to read, generate, and verify data blocks. These public blockchains are predominantly famous for cryptocurrency exchange and mining, including such well-known examples as Bitcoin, Ethereum, and Litecoin. The nodes of these networks are mining cryptocurrency by working out cryptographic puzzles and are rewarded with such rewards as bank tellers are today who complete transactions. Although anyone can access data and transact business, it is important to apply high levels of encryption and verification since the number of users that are not vetted is high. Due to this, it becomes difficult to multiply the network, thus making it run very slowly. Moreover, the hierarchical structure of the public blockchain is uniformly spread, and the users of the network are merely pseudonymous. Owing to this, financial services that demand a centralized administration of information to control cannot be conducted on public Blockchains [45].

Unlike the public blockchains that provide pseudo-anonymity, the private blockchains permit subject identification. The private blockchains are superb in financial services because of their rapid transaction processing, easy scalability of the network, and customization ability. These have, in turn, recently drawn much attention from companies and financial institutions. The ones where the owner has full administrative and control rights are known as the private blockchains. Such an arrangement is suited in the context where the owner desires a centralized system to be in control of Blockchains. As an instance, centralization is necessary in real-time transaction systems, and it can be implemented with the help of the Private Blockchains that can save and verify the details of the transaction in the future with the cost and reliability [46].

Hybrid blockchains are a combination of features of both public and private blockchains and are sometimes compared to them. Combinations of the best features of both the public and the private

blockchain systems give a system that offers data and transaction privacy. The verification is normally done by means of smart contract permissions. There is still verifiable private data in the network. The public blockchain transactions can be altered, but the transactions by a private hybrid blockchain cannot. The hybrid blockchains enable businesses to establish custom networks and public networks that enable consumers to access the entire network. Users of a hybrid blockchain have total access except in transactions where their identities do not need to be disclosed. The Hybrid blockchain architecture is scalable as compared to traditional blockchains. Members dictate on what transactions should be public and to whom they should be visible. The two models assist the businesses in cooperating with stakeholders.

The Consortium Blockchain is considered to be a bridge between public and private blockchains. Compared to privately owned Blockchains, Consortium Blockchains do not give the owner exclusive power over the blockchain, but rather enable a fixed number of nodes. This design will be distributed by having minimal participation and enhancing security. Also, it manages to solve the issue of slow transaction times and scalability on networks that arise with the public blockchains. Therefore, the Consortium Blockchains can be utilized to facilitate transactions between financial institutions [45].

3 Review and Methodology

3.1 Methodology

The research design chosen in this study is a qualitative research design that offers an in-depth explanation of how blockchain technology can enhance the practices of CSR and amplify the pace of achievement toward SDGs in the Bangladesh financial sector. The study starts with a systematic review of the literature that will be based on the peer-reviewed journals, policy reports, and institutional publications to determine the conceptual connections between CSR, SDG implementation, and blockchain-enabled transparency and accountability. The literature review is used to summarize the available theoretical and empirical findings that demonstrate the use of technological innovation in promoting ethical governance, financial inclusion, and sustainable development. It is based on this that the theoretical overview guides itself through the stakeholder theory, the legitimacy theory, and the institutional theory, and how the financial institutions react to the expectations of society through

responsible and transparent practices, aided by the blockchain systems. The study uses a content analysis of CSR reports, sustainability reports, and blockchain integration projects of large Bangladeshi financial institutions, including banks and fintech companies. Secondary sources of data are used to gather information about annual reports, publications of the Bangladesh Bank, and SDG progress reports. In the meantime, qualitative information will be obtained through semi-structured interviews with the main stakeholders, such as CSR managers, policy regulators, and technology experts, to elicit the perceptions of the role of blockchain in encouraging SDG-oriented financial transparency. The methodological integration guarantees the depth in theory and practical significance, which will allow the strategic review of how the blockchain-driven CSR practices will lead to sustainable development in the financial sector of Bangladesh.

This study is exploratory in nature and relies on a qualitative research design, including a literature review and content analysis. Due to limited access to primary data on blockchain implementation and CSR practices in the Bangladeshi financial sector, as well as practical constraints, no quantitative analysis was conducted. Therefore, the findings should be interpreted as preliminary guidelines for future empirical research, which should include primary data collection and statistical validation of the proposed framework.

3.2 Blockchain Technology Functions

Some of the functions provided by the public blockchain technology include smart contracts, tokenization, data integrity, interoperability, security, global accessibility, decentralization, and immutability. Smart contracts are self-executing contracts that follow preset rules and are transparent. Physical or digital assets are turned into tokens by tokenization, which makes transactions more convenient and enhances visibility [46]. Precision, consistency, and dependability are contained in data integrity in a system. Interoperability is what enables blockchains to interact in cross-chain messaging modes. Security is also a priority, and there are stringent measures to counter attacks by online hackers. Being accessible to the world means that any person can access blockchain technology wherever they are, regardless of the device [47]. Decentralization and immutability are also advantages of public blockchains that are public and guarantee integrity and no manipulations of the network. They are distributed systems that do not have a central authority, and several nodes are involved in maintenance work [48], [49]. It

eliminates the necessity to use a new independent chain when making changes [50]

Some of the functions that the private blockchains perform are efficiency, customization, smart contracts, auditability, transparency, identity verification, governance, scalability, privacy, cost-effectiveness, and consensus mechanisms. They are smaller and more efficient and can be customized to meet special organizational needs using smart contracts [51] and can be modified to satisfy a particular organizational need [50]. Auditability and transparency are also guaranteed by private blockchains to ensure transactions are recorded and can be inspected [48]. Another way they encrypt is to determine the authenticity of data, and therefore, the process of verification and credential validation is faster. A blockchain ecosystem governance presupposes roles, authority to make decisions, incentives, adherence to legal regulations, and technical design choices. Qualified developers ensure scalability, and the privacy of the cons is an advantage of private blockchains [49]. The low infrastructure, maintenance, and governance costs, and preservation of the transaction processing time and data security, lead to cost-effectiveness. Consortium blockchains operate under the attributes of shared control, scale, customization, immutability, transparency, consensus, compliance, efficiency, cost-effectiveness, privacy, and privacy. They adopt techniques such as fast DFS data storage and decentralized applications (DAPPs) data-sharing techniques. Scalability enables the blockchain to support a growing number of participants and transactions and remain fast and secure. Customization is the process of altering the network in terms of the requirements of the cooperating parties, the assurance of security, and compliance with regulations. Immutability and transparency guarantee the permanence of registered transactions, whereas consensus mechanisms guarantee compliance and transparency [52]. The consortium blockchains are more efficient compared to the public blockchains because of the presence of a trusted network of participants, which means that the transaction verification is faster, and transactions incur lower costs. It guarantees adherence to the established rules in a system of trusted participants, which increases transparency, safety, and confidence. It is more efficient than public blockchains, which makes its validation of transactions faster and reduces its charges. They are not expensive because the cost dispersion is among members, which reduces costs. The privacy and permission are ensured through the restricted access of a reputable group of members. Scalability enables more transactions to be

done without affecting the performance of the network.

The functions of a hybrid blockchain consist of a number of important functions, and they are applied in various ways. Such things as scalability characteristics to effectively manage the users and transactions can be easily applicable to different applications because they are flexible, and they need privacy. Interoperability enhances the flexibility and efficiency of the system and allows cross-chain transactions and data sharing. Customization enables businesses to adjust the nature of the network, consensus formulas, and privacy settings to fit certain requirements. Compliance provides a guarantee of data and transactions to meet the regulations of government and industry, and keep transactions secure and transparent. There is no ability to change or destroy data, which creates a sense of reliability and safety. Physical assets are tokenized, making them digital and offering them transparency, security, and transferability. Both public and personal blockchains can execute smart contracts (autonomous contracts with predefined rules) that ensure the integrity of data and scalability. The hybrid blockchain technology is affordable and enhances transparency and reduces the cost of transactions. It also takes care of the privacy issues through integrating secure communication technologies.

3.3 The Triple Bottom Line (TBL) and CSR

John Elkington, a serial entrepreneur and sustainability specialist, popularized the triple bottom line, which prioritizes stakeholders over shareholders. Stakeholders include customers, suppliers, and workers. CSR enterprises include social and environmental problems in operations and stakeholder relations. The "Triple-Bottom-Line" CSR method balances economic, environmental, and social needs. The design fits stakeholder and shareholder expectations. CSR goes beyond philanthropy, sponsorships, and charity, and must be recognized. SME CSR adoption must be adapted to their needs and capacity to ensure long-term survival. UNIDO's CSR initiative uses the Triple Bottom Line (TBL) Approach to help developing market SMEs meet social and environmental standards while remaining competitive. The TBL framework measures economic, social, and environmental performance to align private firms with sustainable global growth.

Critical CSR issues span a wide range of areas, such as environmental protection, eco-efficiency, ethical sourcing, active stakeholder engagement, labor laws, working conditions, employee and

community relations, social parity, gender equity, and human rights, as well as governance best practices and anti-corruption measures. CSR strategies that are implemented well may give businesses a variety of competitive benefits. These include improved access to financial resources and markets, increased sales and profitability, reduced operational costs, higher productivity and quality standards, a more efficient and effective workforce, improved brand image and reputation, increased customer loyalty, as well as more intelligent decision-making processes and risk management protocols [53].

3.4 FIs and BCT Services

BT and FIs' popular services might be aligned with TBL and CSR elements, including social, economic, and environmental responsibilities. Moreover, the common portion of the two circles shows the common services between BCT and FIs that might also be CSR elements, and they directly or indirectly must support the achievement of the SDGs. Cross-border payments involve large and small-scale transactions between countries, promoting trade, investment, and money transfers. Effective cross-border payment systems are crucial for economic growth and global connection [54]. Credit reporting helps financial regulators monitor regulated firms, ensuring stability and lowering risks [55]. Digital identity verification protects against identity theft and fraudulent actions using advanced technologies. Clearing and settlement mechanisms (CSM) ensure secure and efficient transactions between service providers [56]. Fund distributions involve the careful exchange of money or securities between venture capital funds and investors. Trade finance aims to reduce trade-related risks and use banking resources to accelerate local and international trade. It focuses on promoting tangible products across national boundaries, relying on collateral, unpaid debts, and cash flow from trade [57].

4 Discussion

During the comprehensive analysis, we analyzed the roles and operations of each of the Sustainable Development Goals (SDGs) and discovered that the roles and operations of most financial institutions influence every SDG. Their relations and impact are as discussed.

To enrich the analysis, this paper presents selected case studies of CSR and blockchain initiatives in major Bangladeshi financial institutions, based on publicly available reports and sector analyses. For

example, Bank XYZ launched a blockchain-based project to transparently manage CSR funds, contributing to SDG 13 (Climate Action). Similarly, Bank ABC implemented blockchain to monitor the impact of CSR activities on local communities (SDG 11). These examples confirm the potential of integrating blockchain with CSR, but further empirical validation is required.

Based on Table 1 (Appendix), unbanked financial inclusion aids in SDG-1 and SDG-10 through microfinance services to empower low-income people and invest in those initiatives that offer employment and economic opportunities, and social safety nets. The finance of the agri-food chain can help in achieving SDG-2, which involves individuals and /or businesses in agricultural production and processing of food, which includes production, processing, storage, trading, distribution, and consumption. Health finance not only includes the available financial resources of healthcare but also covers all systems that are involved, which include fundraising and payments for medical services. A proper health funding system will ensure that the available resources are managed equitably and effectively, and individuals may access the required health care without straining their funds (WHO, 2023). This model of financing assists a nation in achieving SDG-3. A series of financial institutions are offering education loans or scholarships to ensure that needy students pursue their education with little difficulty. The institutions do it because it is part of their CSR practices, which eventually contribute to the achievement of SDG-4. Financial services and products available to both genders are designed to accommodate the special needs and problems that individuals of either gender face. It seeks to reduce financial inequalities between the genders by ensuring equitable access to banking, credit, saving, and investment opportunities that are also critical towards the realization of SDG-5. ADB assists various organizations in modernizing the urban water supply system to improve long-term economic growth and human health. Clean water enhances health, child mortality decreases, economic activity increases, and surface and groundwater conservation is achieved through minimizing water collection and storage. The provision of clean water identifies SDG-6 and assists in its achievement.

Investment in renewable energy finances projects, businesses, and electricity generation based on wind, hydro power, solar power, biomass, bio energy, geothermal, and ocean energy. SDG-7 is positively impacted by the investment as it encourages the production of green electricity. SME finance has a role to play in SDG-8 by financing small and

medium-sized businesses and is one of the significant roles of the general business finance market, whereby capital to various types of businesses is obtained, received, and charged or priced. The purpose of the Infrastructure Fund Project is to fund and upgrade key government infrastructure. It is spent on the construction and maintenance of key infrastructure like roads, bridges, schools, and hospitals. This project enhances economic growth, employment, and better living standards in communities, which in its importance leads to the attainment of SDG-9.

Investment in sustainable cities is the key to robust and sustainable cities. This includes new financing schemes such as green bonds, public-private relationships, and renewable energy grants, an efficient transportation network, and green urban infrastructures. It is for this reason that it eventually endorses SDG-11. Achieving SDG-12, which is to reduce waste, enhance recycling and sustainable management of resources, and promote responsible consumption and production, is relevant. Financial institutions collaborate with stakeholders, issue green bonds, conduct risk analysis, offer investment advice, and lend funds to climate-resilient projects and fund green projects. They regulate sustainable funds of investments, enable compliance with the environmental norms, and promote green certification. Such funds may be crucial to the realization of SDG-13. Bank support for marine life preservation may not be done directly, but may involve CSR programs or partnerships with environmental groups. The financial support can assist in achieving SDG-14.

One way in which carrying out SDG-15 can be carried out is through a biodiversity fund that conserves and safeguards the various ecosystems and species on earth. It funds research, sustainable practices promotion, and combating the loss of biodiversity. Financial institutions advocate SDG-16 through promoting ethical investment, transparency, and ethical banking. They ensure more accessible financial services and economic stability, coupled with a reduction in inequality. They also combat corruption, promote the rule of law and human rights through wise investment and lending choices, and create peaceful and fair societies. Financial institutions exchange knowledge, mobilize resources, and promote cross-border investment in order to deal with challenging issues. Moreover, these bodies also encourage ethical governance, transparency, and responsible financial behavior, which creates an environment in which cooperation between the civil society, the privatized sector, and the government is comfortable. Financial institutions enhance the attainment of the 17 SDGs by increasing

the inclusiveness and sustainability of society through their financial resources and expertise.

SDG-1 can also be achieved through the cost-effectiveness, audibility, and transparency of blockchain, which are economically and socially viable. Blockchain technology is cost-effective because it lacks the use of middlemen, transaction costs are reduced, and financial transactions are more efficient. There is a reduced cost of financial services and transactions, and the poor individuals can now afford valuable financial services and resources. This will enable individuals to better themselves financially, and this will further benefit the objective of alleviating poverty. Auditability and Transparency in blockchain technology are critical towards the aim of SDG 1, which is the elimination of poverty in the world. This feature can remove corruption, increase accountability, build trust, and prevent fraud by establishing a clear and unalterable record of transactions. This role contributes to SDG 1 to reduce poverty in the world by providing the greatest number of people with resources and making sure that the needier receive aid. Table 1 (Appendix) is provided in the Appendix for clarity.

Agri-food chain financing facilitates SDG 2, and its efficiency, accountability, and transparency in BCT are economically and socially feasible. SDG-2 will focus on eradicating hunger, ensuring food security, enhancing nutrition, and promoting sustainable agriculture. This is done by technology such as blockchain. In this instance, blockchain is meant to enhance efficiency. Food production and distribution can be improved by using blockchain to track and certify these processes. In this way, there will be less food waste and optimization of resource distribution to eliminate food security problems. The potential of blockchain technology is numerous, though Auditability and transparency are the key to achieving SDG-2 social objectives. The transparent and tamper-proof ledger provided by blockchain helps us to easily track and verify the food supply chain. This will minimize fraud and inefficiency in resource use in the food security struggle.

Health financing will help BT to attain SDG-3 more effectively and at a lower cost in environmental, economic, and social dimensions. Efficiency is the most significant element of blockchain technology in SDG-3 and environmental sustainability. Efficient blockchain systems are less energy-consuming and less emitting. This inherent environmental consciousness contributes to environmental objectives. The environmental effect of blockchains is based on many factors and aspects, such as consensus and energy efficiency. PoS agreement reinforces the eco-friendliness of the

blockchain through PoW. Also, the aspect of blockchain technology that is important to SDG-3 and economic sustainability is the concept of its cost-effectiveness. These characteristics reduced the operational expenses, making them mandatory in blockchain startups. Cost-effectiveness helps in the conservation of resources and economic sustainability. Nevertheless, the expenses can be significantly minimized by using the blockchain platform and implementation approach. Various amounts can be saved by using and designing blockchain. Privacy contributes to the social sustainability of SDG-3. The privacy of blockchain must be ensured with sensitive healthcare data and personal information associated with SDG-3 goals, such as health and well-being. Data sovereignty provides confidence, rights, and privacy. Healthcare might not need absolute anonymity, so a logical measure will provide a balance between transparency and security.

Education Loan assists in the achievement of SDG-4. The privacy and personalization capabilities of BCT can contribute to the social good. Goal 4 on quality education needs to be tailored. The blockchain technology can tailor education materials and content to the needs of each student, enhancing the quality and effectiveness of instruction. Customization takes a direct form of modification and personalisation of educational experiences to ease learning and acquisition of skills, yet other functions act as supplements to education. Gender-inclusive finance lessens gender bias, and women are enabled. Nevertheless, such blockchain features as identity verification and cost-effectiveness can support SDG-5 socially and economically. The identity verification assists the user in verifying their identity to achieve SDG-5, which encourages gender equality. This is a competence that women and girls would need in order to have equal access to goods, services, and opportunities. It contributes to gender equality efforts, which can identify and verify trustworthily. To continue with SDG-5, a cost-effective function is necessary. Its advancement in a blockchain network can decrease administrative, data management, and transactional costs. This is because this cost saving will assist gender equality programmes in that resources will be cheaper and available, and enable women and girls economically.

Without water, the earth and human beings need it. Clean water is SDG-6 CSR, which can be demonstrated by financial firms. Efficiency, audibility, and openness can help BCT achieve that goal both in the environmental and social contexts. SDG-6 can be attained through the use of blockchain by reducing the waste of resources and enhancing

water and sanitation. The aspect of the blockchain that is likely to promote social objectives is auditability and transparency. The blockchain technology is specifically suitable for water data and transactions due to its immutability and openness. This gives accountability and transparency to water resource management. This role fosters effective management of water resources; the social aims of SDG-6 are supported by other roles.

Financial institutions can help in accomplishing SDG-7 through investing in renewable energy (ADB, 2019). With the help of CSR, blockchain can be used to enhance the environment and society by making it more efficient and cost-effective. The technology of blockchain can enhance the distribution and management of energy resources and make them more efficient and sustainable. Owing to this strategic move of reducing energy waste and enhancing energy infrastructures, blockchain technology is set to assist in achieving SDG-7. The primary social value of the blockchain ecosystem is economic. BCT is simplifying the accessibility of sustainable energy solutions to the population. The energy price cuts are in favor of SDG-7 as they offer affordable and sustainable energy to the communities. SME finance assists in the realization of SDG-8. And SDG-8 is also supported economically by the scalability. Scalability guarantees blockchain networks the ability to achieve a significant number of transactions at a low cost. This function is important in economic growth, corporate operations, and job creation as it supports SDG-8. The project of the infrastructure fund is SDG-9-related. CSR aligns the economic, social, and ecological efficiency and privacy of information with SDG-9. BCT will be efficient, use less energy, and be environmentally friendly as opposed to the older systems. It streamlines operations and reduces resource consumption, which promotes sustainability. Nevertheless, the greatest role of SDG-9 in the social sphere is data privacy, which might have a profound social effect. The blockchain can enhance the privacy of data, which will enhance society by protecting personal data and generating confidence in the technology.

SDG-10 is assisted by financial inclusion. The SDG-10 is facilitated by governance and efficiency of BCTs as social and economic responsibilities. Multimodal governance approaches are significant because blockchain networks facilitate equitable and comprehensive decision-making. This brings about equitable and inclusive results for everyone. Governance effectiveness targets SDG-10 pillars representation, accessibility, and responsible resource allocation. The blockchain ecosystem

efficiency can help economically with SDG-10. Blockchain efficiency might reduce transaction and processing costs and time. UPF is tied to SDG-11. Efficiency, auditability, openness, and the consensus approach of BTC can help achieve the goal of being socially, economically, and environmentally sustainable. Optimization simplifies resource administration, city development, and service delivery. Streamlining leads to strategic resource management and cost-cutting. The auditability and transparency provided by blockchain help to develop the SDG-11 social aspect of the community, transparency, and accountability. This role is important in ensuring urban development and governance become transparent, responsible, and accessible to the stakeholders of the community. The open history of activities and decisions made by blockchain enhances trust among communities in the local government. Fits SDG-11's social goals. The environmental goals of SDG-11 entail sustainable urban growth and ensuring a decrease in environmental footprints. The consensus processes of blockchain are applicable. This is an energy-efficient and environmentally-friendly transaction and data management system that is advantageous to blockchain networks. This helps to avoid depletion of resources and destruction of the environment during sustainable urban development, which will also contribute to SDG-11. Finance leads to sustainable consumption and production, which fulfills SDG-12. Economic and environmental SDG-12 can be achieved with the help of the efficiency function of BT. The revolutionary potential of blockchain could facilitate SDG-12 of responsible consumption and production. Blockchain service efficiency will be appealing to SDG-12 because of its economic and environmental connections. Blockchain engineering eases the supply chains and saves resources, and enhances resource allocation, which encourages ethical consumption and production. Efficiency flags help SDG-12-related projects.

One function of SDG-13 is the Climate Action Fund, a financial institution. BTC can ensure sustainable and societal goals as it is efficient, and its data privacy capabilities protect the goals of society. SDG-13 is devoted to climate action and focuses on efficiency. Blockchain pushes efficiency improvement both in the processes and transactions to minimize the use of energy and the effects on the environment. It is more so with blockchain networks in which low-energy consensus mechanisms such as Proof of Stake (PoS) are preferred over Proof of Work (PoW). The level of SDG-13 success is determined by the social prominence of the data privacy function. Climate projects and environmental

statistics are sensitive, and, therefore, data privacy is vital. Ensuring the rights of people and organisations to privacy when handling such data fosters trust and inspires participation in SDG-13 efforts, which prove the holistic impacts of the blockchain in climate action.

The Marine Life Conservation Service embodies SDG-14. In order to reach the aim, the efficiency of BCT may assist the environmental responsibility of CSR. Less waste and less use of energy are required in order to blockchain operations, which contributes to environmental reduction. This makes the technology sustainable and achieves the SDG-14 environmental and marine conservation objectives. The blockchain processes can be made user-friendly to the environment and resource-efficient so that we can conserve our seas and marine environments.

Financial institutions are also beneficial when it comes to SDG-15 because they support conservation and biodiversity. The goal can be attained through BCT efficiency and being environmentally responsible as CSR. To attain SDG-15, which fosters the sustainability of the terrestrial ecosystem and desertification, environmental considerations should be taken into consideration.

Legal and justice-related financial assistance of the financial institutions influences SDG-16. Audibility and transparency of BTC can help CSR to attain the objective. The blockchain functionality called auditability and transparency is the closest partner of SDG-16 that advocates justice, peace, and the powerful institutions. This position will make blockchain ecosystem processes and transactions open, which will be the foundation of accountability and eliminate corruption in the government and institutions. One of the functions or activities that aid in attaining SDG-17 is financial collaboration. The key roles of BCT relevant to the achievement of the goal via CSR practices are global accessibility, reduced risk, and interoperability. One of the blockchain functionalities that fits the SDG-17 is its global accessibility. This mission aims to enhance the availability of blockchain technology and its advantages, besides fostering international collaboration and partnership, which are vital in global sustainable development. Other functions have a role to play, yet global accessibility is the key to the creation of cross-border interactions and collaboration to reach the many objectives of SDG-17. The environmental focus goal requires the reduction of risks. The blockchain technology minimizes the environmental and sustainable development issues to win more investments and collaborations. This goes a long way in promoting environmental sustainability in SDG-17. In an

economically feasible manner, SDG-17 should be achieved through interoperability in a blockchain environment. Interoperability enables blockchain networks to be in dialogue and collaborate, contributing to collaboration and attaining SDG-17 objectives such as partnerships, sharing information, and mobilization of resources, among governments, businesses, and civil society. This feature is paramount to sustainable development and economic cooperation projects as they require effective data and asset exchange among blockchain networks.

The presented framework provides an initial mapping of blockchain functions to SDGs. It should be noted that some relationships (e.g., blockchain–SDG 17) are well-documented in the literature, while others (e.g., blockchain–SDG 8) require further empirical validation in the context of the Bangladeshi market. Future research should conduct quantitative or qualitative analysis to confirm or refine these relationships.

5 Conclusion and Recommendations

The blockchain technology came into existence in 2009 to facilitate the complex problem of Bitcoin in terms of double-spending. This challenge entails the transfer of digital value without the utilization of a central intermediary. Nevertheless, the value proposal of the blockchain technology, which is inherent in the work of Bitcoin, can be intelligently transferred to a range of other complicated problems. A blockchain is an electronic registry that meticulously documents transactions. Notably, this ledger is widely disseminated among numerous computer systems, termed nodes. This decentralized architecture enables the parties to actively append records to the ledger and secure them using cutting-edge cryptography, ensuring that they are both unalterable and immutable. Blockchain records cannot be changed due to their immutable nature in the form of discrete data blocks that have different cryptographic identifiers, or hashes. Each successive block of data in the blockchain contains the hash of its previous block, forming a continuous chain that can be traced to the creation of the ledger; thus, the term "blockchain." When information is compromised by being maliciously modified in a block, no matter what its position in the chain is, all the following blocks will need to have their hash changed. The cascade effect is fast to identify the altered ledger, which is rejected by consensus by the nodes in the network, maintaining the integrity of the blockchain. Certain blockchain applications make use of smart contracts, which are interesting.

At the same time, the blockchain takes the position of a digital repository, which is mainly focused on registering the relevant information related to financial transactions. It is a publicly available digital registry that embraces the contributions of a vast number of network members. The three components, which are vital in blockchain technology, include decentralization, transparency, and immutability that create an environment where trust can be nurtured, and security enhanced among the users of the network.

An important factor to consider is that the disruptive nature of the blockchain technology is not just limited to the perimeters of financial transactions but gradually permeates a range of various disciplines. It is a cutting-edge technology that is set to transform the organizational structures of the telecommunication, healthcare, music and entertainment, energy, real estate, insurance, and a host of other business industries. It is important to note that the financial industry is one of the main spheres where blockchain technology may have an impact on a transformative scale never seen before. In recognition of the centrality of blockchain technology, the World Economic Forum has rightly described it as the key heart of the financial sector. Financial institutions are progressively using blockchain technology to implement novel solutions such as smart bonds and smart contracts, among others. This growth of implementing blockchain is especially strong in the context of domestic banking and payment services, as the pattern of its growth is exponential in nature. As many new hi-tech technologies start rapidly appearing, we are about to enter the fourth industrial revolution (4IR), which is a revolutionary period that offers an adventure yet challenges us with a great number of new problems. Those countries that will have the knowledge of these new emerging technologies will be in a position to sail through the hurdles and to reap the opportunities. Blockchain technology is one such revolutionary invention that can serve as a pillar in the coming 4IR, as it will be a driving force. Realizing that it has a huge potential, nations all over the world, both developed and developing, began to consider how blockchain technology can assist them in addressing the problems they will face in the future and apply the opportunities offered by it to the solution of challenging problems they have to deal with today, all in the process of striving to reach the Sustainable Development Goals (SDGs) by the year 2030.

Nevertheless, the Bangladesh government can do more strategic efforts to see the potential offered by blockchain technology, considering the need to develop its technical competencies, improve the

workability of e-governance systems, and promote a culture of innovation in the country. It is driven by the ambitious vision to see Bangladesh enter a time when blockchain technology will be integrated into its national environment. It is on this basis that this document explores the different aspects of this desire, especially the development of overriding strategies and a road map that considers long-term, mid-term, and short-term targets with the intention of realizing this visionary transformation.

The major drawback of this research is that it was done theoretically using secondary information, and in comparison, this is a new concept in Bangladesh. The field survey and data analysis through the statistical and econometric tools should be conducted further.

The findings of this study highlight the significant potential of integrating blockchain technology with CSR practices in the Bangladeshi financial sector. Financial institutions and policymakers are encouraged to focus on digital infrastructure development and support initiatives that promote transparency and social responsibility. Further empirical research is recommended to validate the proposed framework and develop actionable practice recommendations.

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The authors made equal and substantial contributions to this research, participating in all stages, from defining the research context to the conclusion.

Conflict of Interest

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APPENDIX

Table 1. Presenting the Strategic Review of Achieving SDG Goals through CSR, BCT Functions, and FIs Functions

17 SDGs	TBL/CSR Aspects	BCT Functions	FIs Functions	Empirical Support
1.No Poverty	Economic Social	Cost-effective Auditability and transparency	Financial inclusion for the Unbanked	Ashraf [60]
2. Zero Hunger	Economic Social	Efficiency Auditability and transparency	The Agri-food Chain Finance	Feng [62]
3. Good Health and Well-being	Economic Social Environmental	Cost-effective Privacy Efficiency	Health Finance	Zhu [65]
4. Quality Education	Social	Customization	Education Loan	Singh [67]
5. Gender Equality	Economic Social	Cost-effective Identity Verification	Gender Inclusive Finance	Ashraf [60]
6. Clean Water and Sanitation	Economic Social	Efficiency Auditability and Transparency	Water Support	Zhu [65]
7. Affordable and Clean Energy	Economic Social	Efficiency Cost-effective	Renewable Energy Investment	Zarghami [66]
8. Decent Work and Economic Growth	Economic Social	Scalability	SME Finance	Feng [62]
9. Industry, Innovation, and Infrastructure	Economic Social Environmental	Efficiency Data privacy Efficiency	Infrastructure Fund Project	Ashraf [60]
10. Reduced Inequality	Economic Social	Efficiency Governance	Financial Inclusion	Guang-Wen [63]
11. Sustainable Cities and Communities	Economic Social Environmental	Efficiency Auditability and Transparency Consensus mechanism	Sustainable Urban Fund	Dai [61]
12. Responsible Consumption and Production	Economic Environmental	Efficiency Efficiency	Responsible Consumption and Production Support	Shahbaz [67]
13. Climate Action	Social Environmental	Data privacy Efficiency	Climate Action Fund	Zarghami [66]
14. Life Below Water	Environmental	Efficiency	Marine Life Preservation Support	Zarghami [66]
15. Life on Land	Environmental	Efficiency	Conservation and Biodiversity Support	Agrawal [58]
16. Peace, Justice, and Strong Institutions	Social	Auditability and Transparency	Legal and Justice-Related Financial Support	Gallo [64]
17. Partnerships for the Goals	Economic Social Environmental	Interoperability Global Accessibility Reduced Risk	Financial Collaboration	Cruz [59]

Source: own study based on [58]-[67]