FRAMEWORK FOR ADOPTION OF BLOCKCHAIN TECHNOLOGY IN GREEN BOND MARKET IN INDIA: TAM ANALYSIS

A thesis submitted to
UPES

For the award of
Doctor of Philosophy
in
General Management

BY
Neeti Misra

September, 2024

SUPERVISOR
Prof. (Dr.) Sumeet Gupta

School of Business
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CERTIFICATE

I certify that **NEETI MISRA** has prepared her thesis entitled "**FRAMEWORK FOR ADOPTION OF BLOCKCHAIN TECHNOLOGY IN GREEN BOND MARKET IN INDIA: TAM ANALYSIS**", for the award of Ph.D degree of the UPES, under my guidance. She has carried out work at the Department of School of Business, UPES, Dehradun.

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Date: 24/9/24

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CERTIFICATE

This is to certify that the thesis entitled "**FRAMEWORK FOR ADOPTION OF BLOCKCHAIN TECHNOLOGY IN GREEN BOND MARKET IN INDIA: TAM ANALYSIS**" is being submitted by **NEETI MISRA** in fulfilment for the Award of DOCTOR OF PHILOSOPHY in General Management to the UPES (University of Petroleum and Energy Studies). Thesis has been corrected as per the evaluation reports dated 20/09/2024 and all the necessary changes / modifications have been inserted/incorporated in the thesis.

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Date: 24/9/24

September 2024

DECLARATION

I declare that the thesis **"FRAMEWORK FOR ADOPTION OF BLOCKCHAIN TECHNOLOGY IN GREEN BOND MARKET IN INDIA: TAM ANALYSIS"**, has been prepared by me under the guidance of **Prof. (Dr.) Sumeet Gupta**, Professor, School of Business. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

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ABSTRACT

The adoption of blockchain technology in financial markets has garnered significant attention due to its potential to revolutionize traditional processes. Within the realm of sustainable finance, green bonds serve as a critical instrument for funding environmentally friendly projects. Adoption of blockchain technology in green bond market can help the market grow exponentially. However, the adoption of blockchain technology within the green bond market in India remains relatively unexplored. This thesis presents a comprehensive framework for assessing the adoption of blockchain technology in the Indian green bond market, employing a Technology Acceptance Model (TAM) analysis.

The study integrates both quantitative and qualitative analysis tools to evaluate the factors influencing the adoption of blockchain technology in the context of green bonds. The theoretical foundation of the Technology Acceptance Model (TAM) provides a structured framework for understanding user acceptance and adoption behaviours towards innovative technologies. Through the lens of TAM, this research examines the perceived usefulness and ease of use of blockchain technology among stakeholders in the Indian green bond market.

Quantitative analysis involves conducting surveys among key stakeholder groups, namely, investors, issuers, regulators, and financial intermediaries. The survey data were analysed using Structural equation modelling (SEM) to identify patterns and correlations between variables, and also to test hypotheses concerning a conceptual model providing insights into the determinant constructs (Scalability, privacy and cost efficiency) of blockchain technology adoption.

In tandem with quantitative analysis, qualitative methodologies such as document analysis and interviews were employed to delve deeper into stakeholders' perceptions, attitudes, and experiences regarding blockchain technology adoption in the green bond market. Qualitative data enriches the analysis by offering nuanced insights into contextual factors (cryptographic securities, consensus, distributed ledger technology (DLT), Immutability etc., shaping adoption decisions.

The synthesis of quantitative and qualitative findings culminates in the formulation of a robust framework for the adoption of blockchain technology in the Indian green bond market. This framework delineates key determinants, barriers, and enablers influencing adoption decisions, providing actionable recommendations for stakeholders to navigate the transition towards blockchain-enabled green finance.

By leveraging the TAM theory as a theoretical base and employing a blend of quantitative and qualitative analysis tools, this thesis contributes to advancing understanding of blockchain technology adoption in sustainable finance contexts. The insights generated are expected to aid taking informed decisions regarding policy formulation, industry practices, and academic discourse, ultimately facilitating the realization of a more sustainable and technologically advanced green bond market in India making it as an example for other economies to follow.

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CHAPTER 1

1.1 Introduction

In an era where the imperatives of environmental sustainability are more pronounced than ever, Green Investment has emerged as a pivotal force driving transformative change. This paradigm shift reflects a global recognition of the urgent need to reconcile economic growth with ecological responsibility. For the growth of green investment, the inclusion of fintech is needed which can prosper this sector. Green investment covers green banking, green loans, green bonds etc. Financial technologies i.e., Blockchain technology, Machine learning, IoT etc., have the major role in most of the areas of finance. The research area and the research themes that lead to the full study are presented in this chapter.

The advent of blockchain technology has caused a paradigm shift in the global financial environment in recent years, revolutionizing traditional markets and fostering transparency, security, and efficiency. This transformative force has not spared the domain of sustainable finance, particularly the green bond market, where environmental considerations are paramount. This thesis delves into the nuanced intersection of blockchain technology and adoption of Green Bonds, aiming to explore the potential synergies, challenges, and implications for sustainable finance. As societies increasingly prioritize environmental sustainability, understanding the role blockchain plays in shaping the future of the green bond market becomes imperative for both financial stakeholders and proponents of ecological resilience.

1.2 Background of the study

Finance and fund acquisition is a challenge and an opportunity in the corporate world and financial markets. To increase the amount of money coming into the company through securitization and other means, new financial models and instruments are constantly being produced. One such modern financial concept is green finance (Shabu and Vasantagopal, 2021). New trends, tools and financial models are always an essential part of this rapidly changing economy. The financial categories that make up green financing are many. All products and services are introduced to create opportunities for projects that have a positive environmental impact. This is a broad term that refers to all financial instruments issued

primarily to support clean energy, sustainability, and pollution control measures. Policies and instruments to support (Schulz et al., 2020). Green finance is funds acquired through financial instruments such as green bonds, green loans, green insurance, etc., where these funds are used only for sustainable development. The concept was introduced and promoted internationally by the Millennium Sustainable Development Goals (SDG) of the UN Development Program (UNDP, Goal 7). Green finance is known by various names; climate finance, eco-investing, green investing, environmental finance, clean technology investment, energy efficiency loans, etc. (Shabu and Vasantagopal, 2021).

The primary goal of green finance is to offer funding for initiatives that encourage clean energy or innovative technologies that lower pollution emissions and improve energy efficiency. These investment prospects get worldwide recognition and backing from development institutions, such as the Asian Development Bank in India.

1.3 Green finance in Indian scenario

Green finance is a global concept, but there still exist ambiguity regarding what exactly green is, and which all projects are to be classified under the head green finance. In India, green initiatives are being given priority and has been recognised by amending the Companies Act 2013 and incorporating green projects and sustainable development initiatives as a mandatory requirement through Corporate Social Responsibility (Poddar, et al., 2019). Reserve Bank of India has also taken their steps towards green initiatives by categorising green finance under priority sector lending, wherein around 40% of the total loans provided are only for green energy (Kumar et al., 2019). Security Exchange Board of India has also made their existence known in this field and have raised 7.15 billion US$ in 2.5 years in the name of Green Bonds (Kumar, Vaze, and Kidney, 2019). Green Banking also has an extensive role in India. Being a mandatory norm, all banking units have introduced their own unique green banking policies which provides to be a market boost up in terms of societal impact, corporate social responsibility initiative and as green marketing initiative. Some of the notable green banking initiatives are long term loans provided to large corporates for solar power-based projects, ICICI provides loans at a subsidised rate for electric vehicles or hybrid vehicles, most of the banks have enabled solar ATM and maximum paperless transactions (Ratnaparkhe, and Gajanan, 2015), all leading to a greener economy.

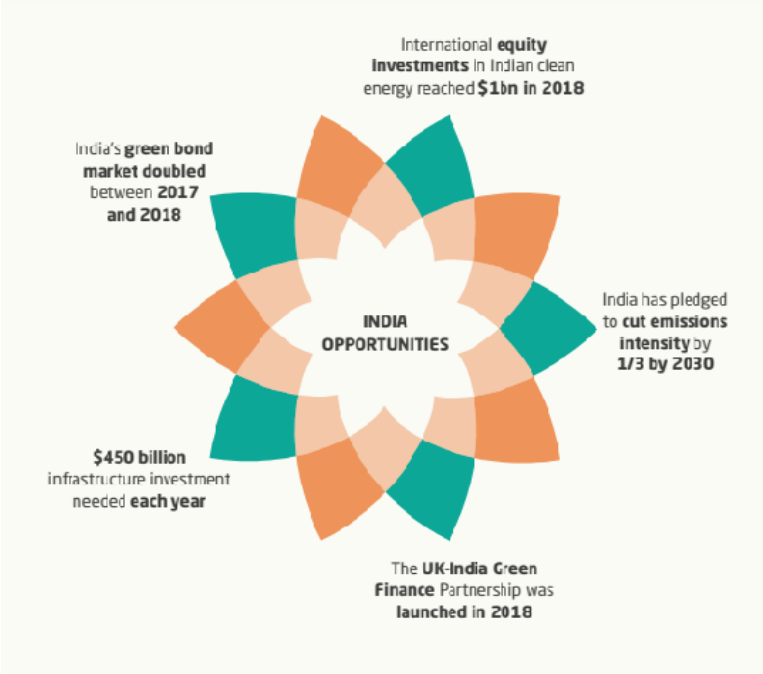


Figure 1.1 Green Finance opportunities in India; Source: Asia-program, green finance India; gov.uk

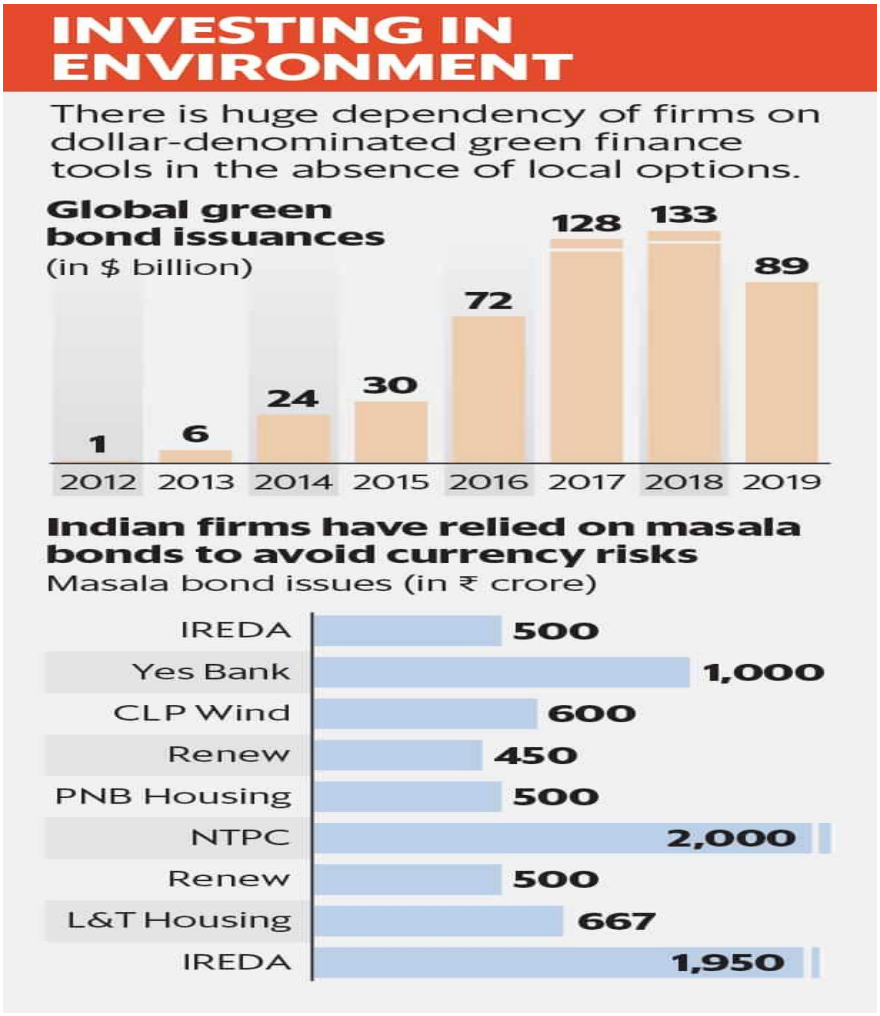


Figure 1.2 Green Bond Issuance; Source: city of London gov uk- green finance-India

In Figure 1.1, Green bond opportunities in India are mentioned**.** India's green bond market saw significant growth, doubling in 2017-18 as the country ramped up efforts to transition to clean energy. This period also witnessed international equity investments in India's clean energy sector reaching $1 billion in 2018, highlighting the global interest in supporting India's sustainability goals. In the same year, the UK-India Green Finance Partnership was launched, further strengthening collaboration in green finance. Figure 1.2 gives the details of various investments in sustainable and environment friendly projects. Despite these advances, India requires an estimated $450 billion in infrastructure investment annually to meet its green energy and infrastructure targets, in line with its pledge to reduce emissions intensity by 2030.

Investing in green finance in India:

1. **Green Bonds**: In 2014, IREDA (Indian Renewable Energy Development Organisation) issued tax-free bonds of Rs 100 crore. 1000 Cr each (Kar and Mishra, 2016). Yes Bank also issued a 10-year green infrastructure bond in 2015 to raise Rs. 1000 Cr. CARE and Brick Works. We rated these bonds AAA (Charles and Philip, 2020).
2. **Green insurance:** The green insurance system is a system that provides risk compensation with low insurance premiums and promotes compensation for eco-friendly products to reduce the impact of global warming (Ranjan, 2024). To provide customers with green reinvestment insurance, achieve Leadership in Energy and Environmental Design, or LEED, in the US, provide compensation for buildings that have international environmental certifications such as BREEAM (Doot and Await, 2021).
3. **Green Loan Scheme:** The SBI Green House Bank- Loan Scheme is a low-grade loan programme designed to incentivize clients to select "green houses," or structures that have been accredited by organisations like Leadership in Energy and Environmental Design, or LEED, in the US. Interest rates in India, the Indian Green Building Council (IGBC), and TERI-BCSD TERI-GRIHA in India were the initial factors. The vehicle financing scheme was launched by ICICI and aims to reduce the interest rate by 50% on loans that citizens receive to purchase vehicles using renewable energy sources (Kumawat, 2022). Farmers can extend their loans from Union Bank of India (UBI) to install solar home lighting systems, solar water pumps, and solar water heaters (Charles and Philip, 2020).

One of the world's most ambitious targets was declared by India in September 2019: 450 GW of capacity for producing renewable energy by 2030 (Elavarasan, et al., 2020). India's Nationally Determined Contribution (NDC) projects that, between 2015 and 2030, the nation will need to spend about ~$162.5 trillion (US$2.5 trillion), or about INR 11 million (US$170 billion), on climate action (Hazra, 2023). Despite the fact that India's energy industry is among the world's fastest-growing and is drawing substantial investment, nation's climate targets will need to be met with a corresponding, revolutionary increase in sectoral investment.

The Indian government's early policy changes and substantial financial backing were crucial in hastening the development of the nation's renewable energy industry (Majid, 2020). However, considering current penetration rates, the state of the industry generally, and COVID19 pandemic slowdown, government need to come up with fresh ideas and unconventional funding sources to support the shift and encourage the private sector to contribute more to a more sustainable future and transformative influence. International finance is also possibly related to the "green thread". As a result, identifying and evaluating important funding sources, the mechanisms for raising and allocating funds, and the recipients of those monies are essential for assessing, organizing, and overseeing green investment initiatives in a nation (Lindenberg, 2014).

The State of Green Finance in India is a unique study by the Climate Policy Initiative that provides the most comprehensive information on green investment flows in India from FY 2017 to FY 2018. This study follows public and private sources. Create a framework to collect funds and monitor the flow of funds from sources to final beneficiaries (Acharya et al., 2020). Thus, we understand the nature and volume of domestic green finance flows and identify methodological issues and data gaps in conducting thorough monitoring.

Financial institutions and government organizations have been using this tool since 2015. Green finance flows in India reached ₹ 111,000 billion (US$17 billion) in FY 2017 and ₹ 137,000 billion (US$ 21 billion) in FY 2018. The average is 124,000 billion rupees (19 billion US dollars) per year, and the total amount of green finance tracked from 2016 to 2018 is 248,000 billion rupees (38 billion US dollars). Green financing in 2019/2020 was approximately Rs. 309,000 crores (approximately $44 billion) per year. In 2021, India increased its climate ambitions, adding 500 GW of fossil fuel-based power capacity and announcing the Panchamrit target, which includes meeting 50 percent of energy demand from

non-renewable sources (Gupta, et al., 2021). With such increased ambition, green finance must be raised much more quickly.

Breakdown of Green Finance Investment

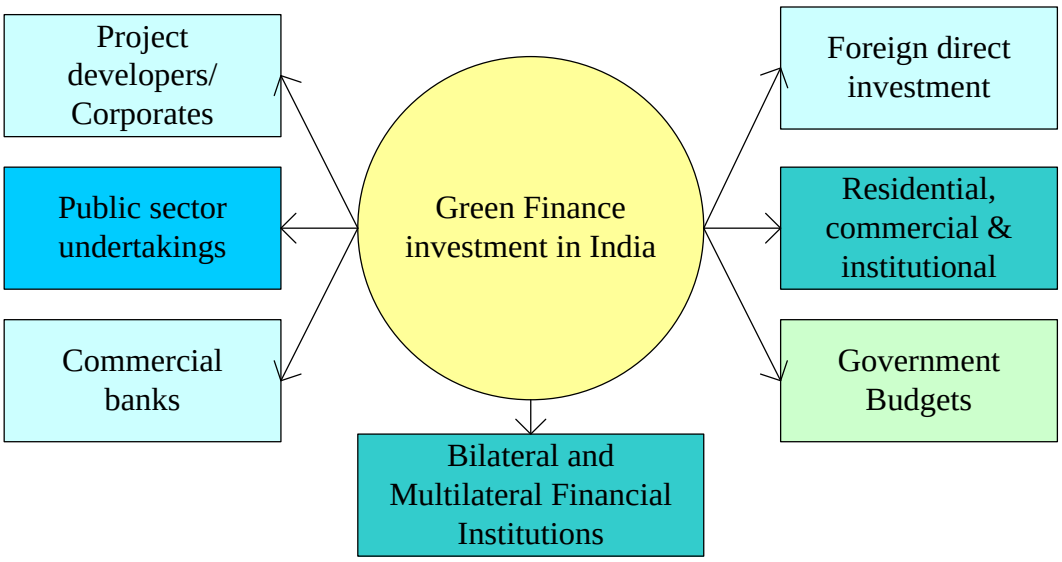


Figure 1.3 Source: Landscape of Green Finance in India

The sustainable funds can be raised through the various sectors in India like FDI, public sector undertakings, commercial banks as mentioned in above figure 1.3

In 2020, the total amount of green bonds issued had surpassed $1 trillion and was at $1.05 trillion, up 60% on average annually since 2015.

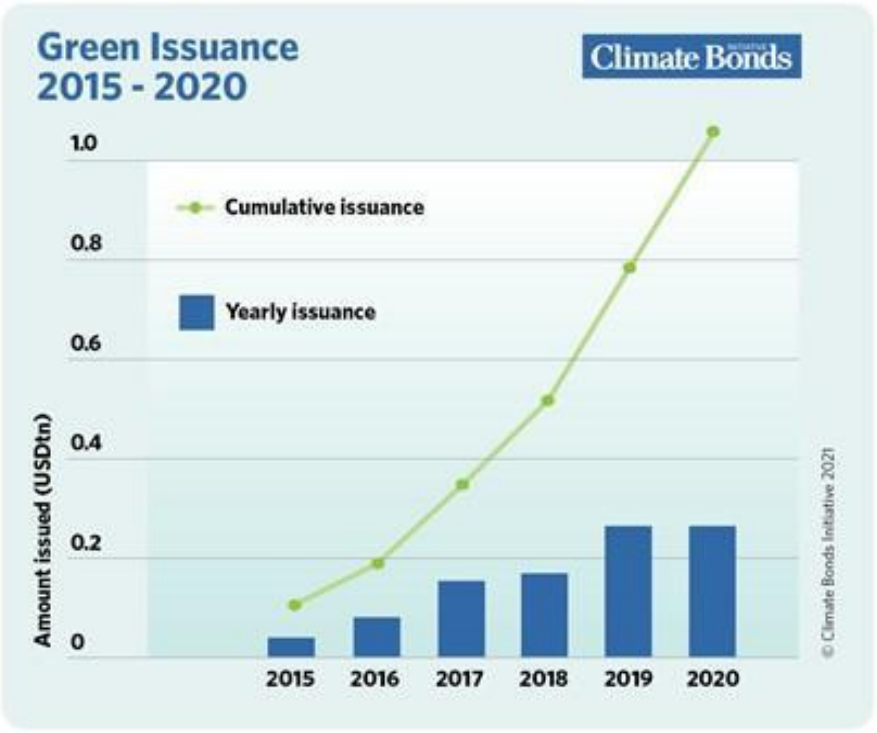


Figure 1.4 Source: MERCOM India- Clean Energy News Insight

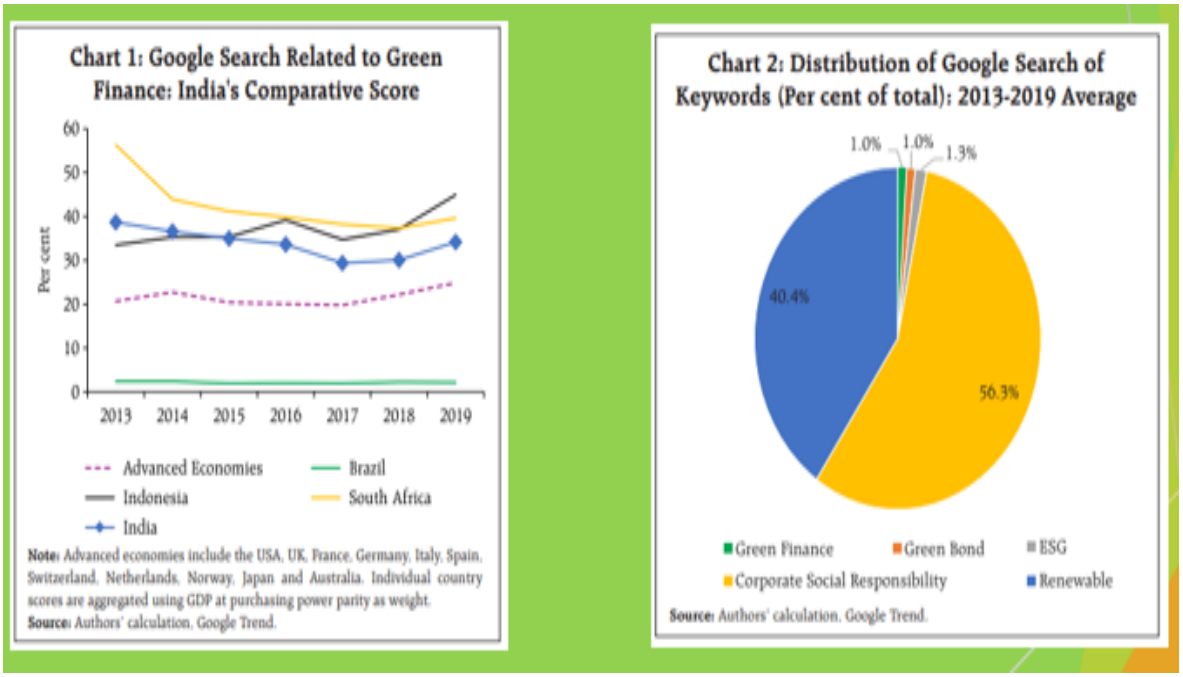


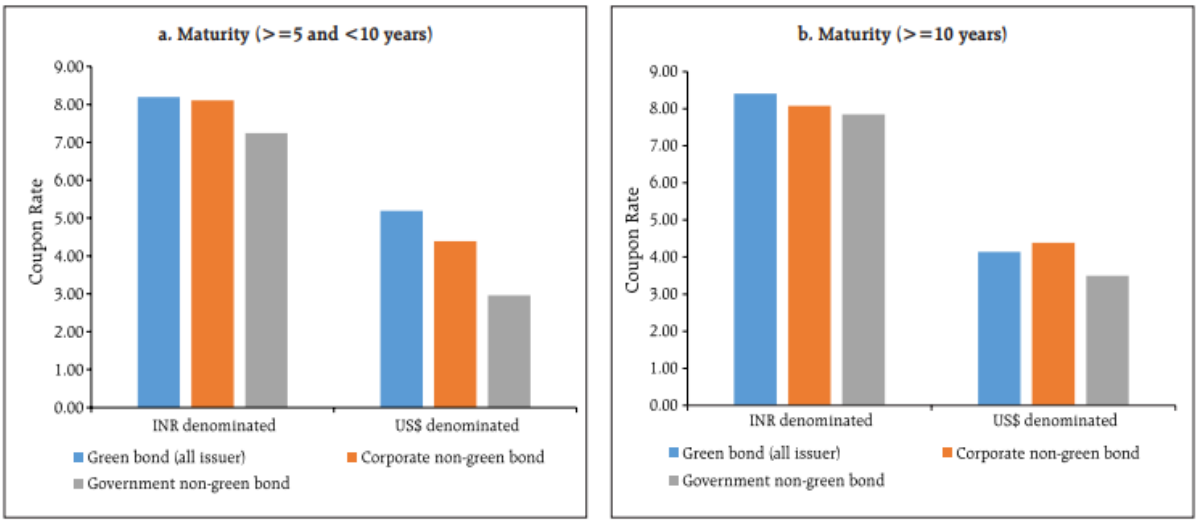
Fig. 1.5 a Fig. 1.5 b

Figure 1.5 Source: RBI Bulletin, 2020-Green- Finance in India: Progress and Challenges

Figure 1.5a illustrates that the volume of Google searches in India pertaining to green finance and climate change is on par with that of established and sizable emerging nations. India's comparison score is higher than that of industrialized nations, as seen in Fig. 1.5a.

Figure 1.5b illustrates how public interest in India is dominated by concerns about renewable energy sources and corporate social responsibility. Web searches for particular goods, such green bonds and green finance, are still rare, accounting for just 2 percent of all keyword searches.

Average coupon rate of deferred bonds issued (percentage)



Source: Authors' calculations based on Bloomberg Data.

Figure 1.6 Source: RBI Bulletin, 2020-Green- Finance in India: Progress and Challenges

In general, price of releasing green bonds in India has continued to be more than that of conventional- bonds. As the panel in Figure 1.6 shows, average coupon rates for green bonds issued after 2015 with maturities of 5-10 years generally remain higher than for corporate and government- bonds of same maturities. Figure 1.6's Panel B depicts a same pattern for the green bonds denominated in Indian rupees. However, US dollar-denominated green bonds with durations of at least 10 years had lower nominal interest rates than corporate bonds.

The liquidity crisis against non-preforming loans and non-bank financial corporations creates opportunities to expand green finance to bridge the investment gap. Within the realm of Indian green finance, green- bonds are at the forefront, showing remarkable performance but if

comparing with green bond market leaders, still there is big gap to cover and reach climate change investment under Paris agreement of $4.5 trillion.

1.4 Green bonds

Bonds used to fund environmentally beneficial projects are known as "green bonds" (Sartzetakis., 2021). Funds are raised for green projects or existing projects that benefit the environment (ICMA, 2016). If the financing is provided through the issuance of debt securities, the debt is considered "green" or "green debt" are used for projects and/or assets under renewable and sustainable energy. Sustainable water management, adaptation to climate change, etc. (KP, 2022).

Currently, green bonds are widely issued as corporate label bonds, green asset-backed securities, green project bonds, transnational bonds, international bonds, government bonds and municipal bonds, etc. become the global green- bond market's growth is depicted in figure 1.7 and also in Table 1.1.

Figure 1.7 Green Bonds in Indian market Source: CBI, 2019

1.5 Green Bond Markets in India

Five reasons account for the emerging share of the green bond market - issuance of green bonds has certain benefits; - The issuance of green bonds entails increased expenses and involves a complicated procedure; - despite significant improvements, the lack of standardization remains the main obstacle for all market participants; - green- bond market is still young, does not offer the level of identity or amount expected by investors; - Greenwashing remains a serious risk for all stakeholders (Deschriver and De Mariz, 2020). All market players face these difficulties, albeit to varying degrees: - Issuers' reluctance to issue green bonds can be attributed to three key factors: a difficult procedure devoid of obvious financial benefits, unclear project funding, and a significant chance of greenwashing. The absence of a standardised structure, the necessary degree of demand, and liquidity issues are the key issues facing investors. In order to issue green bonds, financial institutions need to address operational and governance concerns when interacting with their clients.

1.5.1 India and the market for green bonds

1- Debuted by State Bank of India (SBI) a $650 million certified climate bond in the 2018 Green Bond market (Verma and Agarwal 2020).
2- In the first half of 2019, as reported by the Economic Survey 2019-2020, India surpassed China to claim the title of the world's largest green bond market, with transactions totaling $10.3 billion (Jain,2022).
3- To increase its investments in environmentally friendly projects, in October 2019, India became a member of the International Platform on Sustainable Finance (IPSF) (Ghosh, 2022).

Table 1.1: Details of Green Bonds issuance since February, 2015 till 2017

Date	Issuer	Amount	Coupon	Tenure	Certified	Theme
Feb-15	Yes Bank	INR 10 bn	8.85	10	NA	Renewable energy (RE) and Energy Efficiency
Mar-15	Export Import Bank of India (DOM Bank)	USD 500 M	2.75	S	NA	Low Carbon Transport (LCT)
Sep-15	CLP Wind Farms India	INR 6 bn	9.15	3, 4 & 5	NA	RE
Nov-15	Industrial Development Bank of India (IDBI)	USD 350 M*	4.25	5	Klynveld Peat Marwick Goerdeler (KPMG)	RE, LCT and Water Management
Feb-16	Hero Future Energies	INR 3 bn	10.75#	3 & 6	Climate Bonds Standard	RE
Mar-16	PNB Housing Finance	INR 5 bn	8.01	5	NA	Low Carbon Buildings (LCB)
May-16	Axis Bank	LSD 500 M	2.88	S	Climate Bonds Standard	RE, LCB, and LCT
Aug-16	NTPC Ltd	INR 20 bn•	7.38	5	Climate Bonds Standard	RE
Aug-16	GreenKo Group	USD 500 M*	4.88	7	Sustainalytics	RE
Aug-16	ReNew Power Ventures	INR 5 bn	NA	NA	Climate Bonds Standard	RE
Dec-16	Yes Bank	INR 3.3 bn	7.62	7	NA	RE
Feb-17	ReNew Power Ventures	U5$475 M*	6	5	Climate Bonds Standard	RE
Mar-17	Indian Renewable Energy Development Agency Ltd. (IREDA)	INR 7 bn	8.12 & 8.05	10	Climate Bonds Standard	RE

Bond Yield with Zero-Coupon: * Indicates International Issuance Source: Annual Filings of Climate Bonds Initiative and PNB 2015-16

Indian green bond issuance from 2017 to 2021

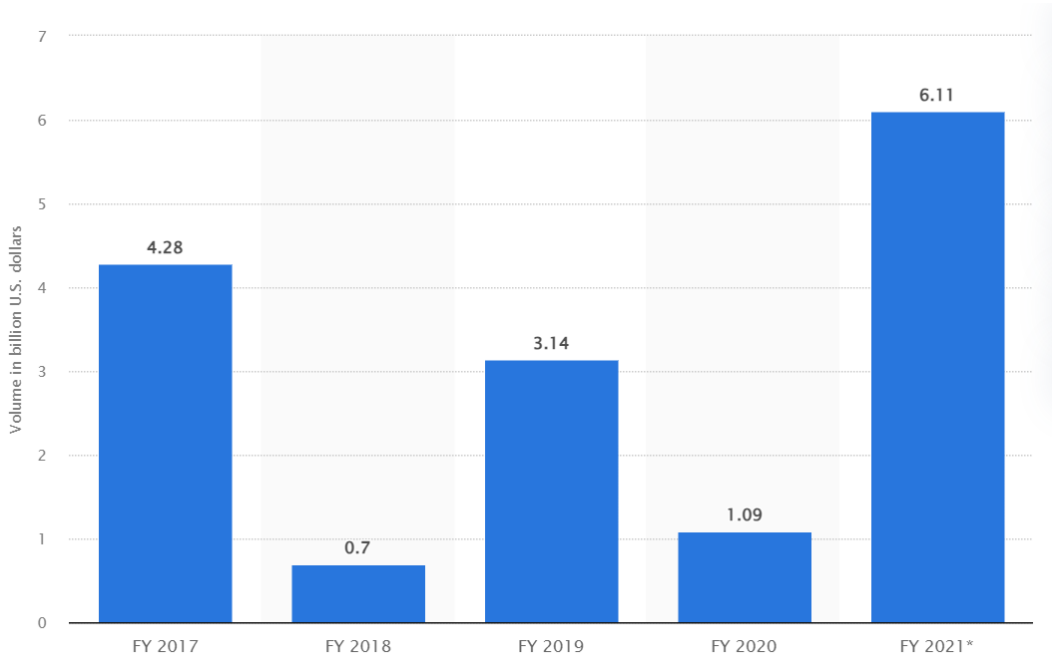


Figure 1.8 Indian green bond issuance from 2017 to 2021, Source: Statista Research Department, Nov 20, 2023

Figure 1.8 shows the volume of green bond issuance from 2017 to 2021 in India. The Indian government intends to raise funds for environmentally friendly infrastructure by issuing sovereign green bonds (Prakash and Sethi, 2021). On January 25, 2023, India issued the first tranche of its first sovereign green bond, which has a value of Rs. 80 billion ($980 million). India issued $21 billion in green bonds by February 2023. The funds raised will support public sector programmes aimed at reducing the carbon footprint of the economy (Kumari and Yadav, 2023).

Issuance of green bonds by issuer type in India

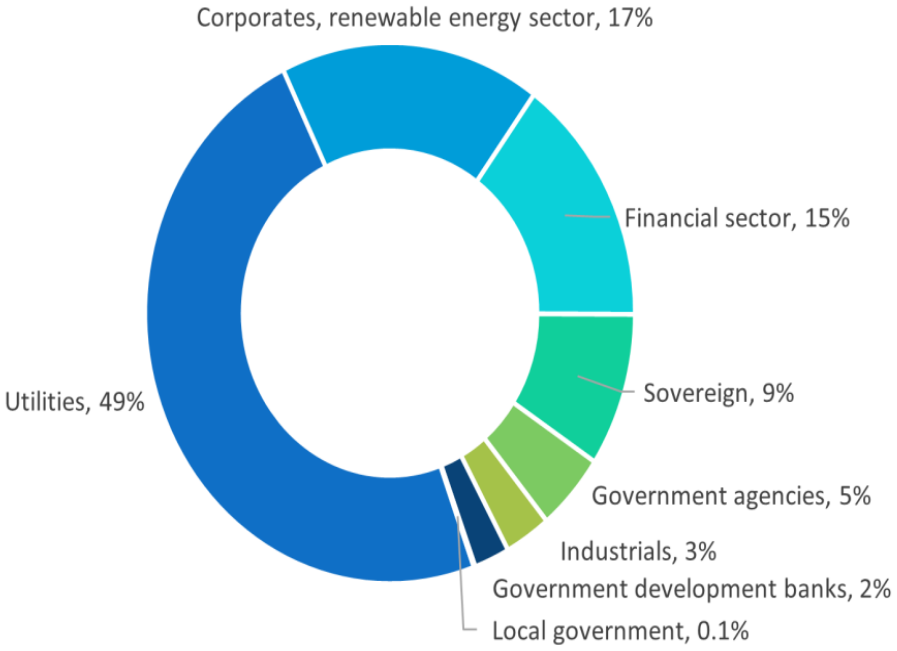


Figure 1.9 Source: World Bank with data from Bloomberg

1.6 The obstacles inherent in Green bond endeavors

Issuance of Green Bonds has generated controversy because of worries about the initiatives they fund; reports suggest that the money raised frequently funds environmentally harmful endeavours as shown in figure 1.6. Additionally, a notable issue in green bond market is the absence of standardized credit ratings or guidelines for both the bonds themselves and the projects they fund. In India, green bonds typically have a tenure of 10 years, which contrasts with the minimum 13-year duration of conventional loans, further complicated by the longer timeframes needed for green projects to generate returns. Furthermore, the issuance of bonds involves a complex and technical process, involving various stakeholders with potentially conflicting interests, which adds another layer of intricacy to the endeavor.

So, in short, a strong green bond market needs standard guidelines (Deschryver and De Mariz, 2020). Investing strategically in the public sector can draw in private capital and increase their trust in green- bond market.

The global bond market is currently confronted with a number of issues pertaining to bond issuance, such as disparate regulatory frameworks, inadequate audits and traceability, unsuccessful settlements, and ineffective issuance procedures (Malamas, et al., 2023).

Total amount of green bonds issued by LMICs (%) between 2012 and 2019

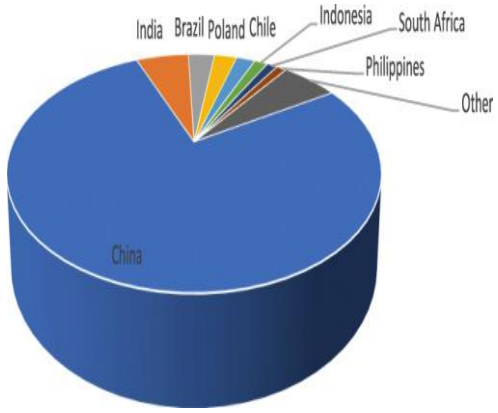


Figure 1.10 Source: Climate Bonds Initiative (2019) Green Bond markets summary.

A recent economic survey identified India as the second emerging market for green bonds after China as shown in figure 1.10. However, the report concludes that "lack of financial resources" remains a constraint on India's implementation of its commitments under the 2030 Sustainable Development Goals (SDGs) and the Paris- Agreement (thehindubusinessline.com/opinion/reimagining-Sustainable-Finding-through-fintech).

To meet these huge capital needs, diversify financial sources and instruments and grow the green bond market requires technological and digital platforms.

Blockchain technology can solve some of the above problems (Lee and Jeong, 2022). Therefore, we have suggested a structure for green bond issuance that leverages blockchain technology. Specifically, we design systems that are compatible and efficient, aiming to minimize intermediary costs while ensuring compliance, scalability, privacy, and security. Utilizing blockchain technology, these systems offer transparency and a decentralized authority that can meticulously monitor funding for eligible environmentally friendly projects (Nawari and Ravindran, 2019).

This study intends to do an analysis of different aspects of green finance and on how active such initiatives are. This helps in understanding India's position in green bonds with respect to technology upgradation, and also the scope for improvement and opportunities available which could be adopted effectively with the help of using new technologies for Indian Green bond market like blockchain technology.

1.7 Blockchain technology in green bond market

The process of issuing bonds is intricate and technical, often involving shareholders who lack mutual trust and possess conflicting objectives (Van der Vansem et al., 2019). At present, the global bond market encounters numerous hurdles pertaining to bond issuance and transaction finalization. For example, although the capital raising process shares common features across jurisdictions, variances exist in market practices and regulatory frameworks governing the debt issuance process, as highlighted by the International Organization of Securities Commissions (2019). Additionally, prevailing bond issuance methods rely on inefficient, manual, and multi-step processes, as noted by Sheikh and Zeka (2019), leading to time-consuming procedures prone to errors.

It's important to highlight that issuing green bonds presents additional challenges. For instance, the absence of standardized criteria can lead to confusion, and issuers of green bonds may encounter reputational risks if questions arise regarding the integrity or credibility of the bond's environmental credentials. Another significant hurdle for green bond issuance involves establishing credibility within a market characterized by low trust, especially concerning the reporting of environmental benefits from investments (HSBC and Sustainable Digital Finance Coalition, 2019). Moreover, many potential issuers lack comprehensive understanding of the green bond issuance process (Climate Bond Initiative and International Institute for Sustainable Development, 2016). Blockchain technology offers a solution to address some of these challenges.

Financial technologies like decentralised digital money (Bitcoin) are the launch of blockchain technology. As technologies shift every day, blockchain deployment is also on the rise in diverse fields, and blockchain also transforms numerous business applications due to its exciting features such as decentralisation. It is trustworthy, null exchange transaction fees and secure data storage structures (that means eliminating the intermediaries in distributed

applications). Normally blockchain platform is formed by five components, or the features of blockchain technology includes as mentioned below:

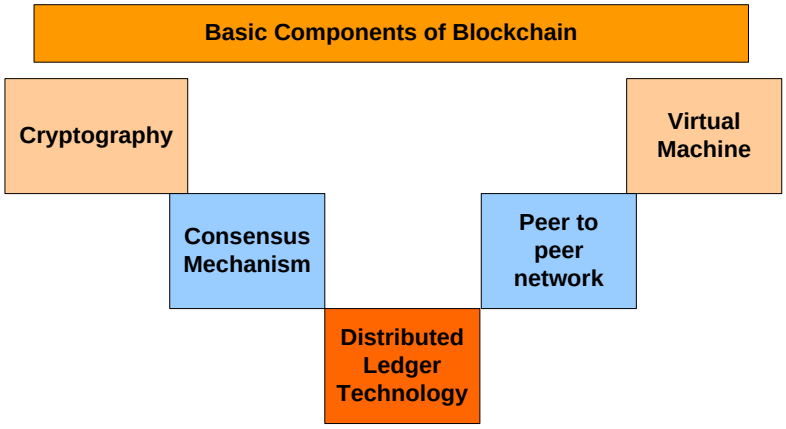


Figure 1.11: Basic elements of Blockchain technology

Distributed Ledger: An electronic- ledger serves as a dynamic database continuously updated to include all transactions. These transactions are organized into blocks, each containing at least one transaction, and interconnected in a chain through cryptographic methods (Dinh et al., 2018).

Peer-to-peer networks or P2P networks: These networks are a decentralized paradigm for communication between multiple users, called peer nodes, independent of a central server or other nodes. In a peer network, each member has the capability to act as both a client and a server. Consequently, once the network is established, every member possesses a copy of the ledger (Li, Z., Barenji, and Huang, 2018). It can be used to store and distribute files without the need for an intermediary.

Consensus mechanism: A consensus mechanism defines a set of guidelines enabling nodes within a peer-to-peer network to synchronize and reach agreement on the validity of transactions eligible for addition to the blockchain. This mechanism plays a crucial role in establishing the accurate state of the blockchain (Wang and Shi, 2021). Different types of blockchain use different consensus technologies. Currently, two common types of consensus procedures are:

Proof of Work: Proof of Work (PoW) involves nodes that collaborate within a system, combining their computational capabilities, typically measured by hash rate (Sathiya Bama et al., 2021). Therefore, the influence of a node on this system is proportional to its hash rate. Therefore, the greater the computational power of an entity, the more likely it is to create a new block that is added to the ordered string of blocks (Bentov, et al., 2016). Through this, users can trust the validity of the system if their computing power is not more than 50% of the total hash rate provided. For a transaction in the blockchain network, a node or user is randomly selected to record the transaction. These are nominated and selected by the transaction initiator (Rohrer and Tschorsch, 2019). Nominees are then verified by other participants. In this process, a nonce (a number used only once) is calculated in the block header. By continuously changing the value, different hash values are calculated. This is how newly created blocks are certified.

Proof of Stake: Unlike the PoW mechanism, Proof of Stake gives one of the system's stakeholders the right to create the next block. Therefore, it is in the interests of interested parties to support the system without creating a false chain, or its share value will decrease. The probability of each organization being selected for account extension depends on its share (Rohrer and Tschorsch, 2019). This means that the probability of being selected as a validator depends on the height of the stock already held. In order to manipulate information in the system, at least 51% of the value circulating in the network must be owned by a beneficiary.

Cryptography: This element ensures that the data in the records or the data sent between the nodes are reliable, authentic, and verifiable. Cryptography developed techniques for unbreakable encryption by learning the basics of mathematics, especially probability theory and game theory. There are primarily two kinds of encryption techniques:

Symmetric encryption: Symmetric encryption is a data security method where data is encrypted and decrypted using the same key as shown in figure 1.12. The key should remain secret because the data needs to be decrypted. As a result, when employing a symmetric key, the sender and recipient require a way to exchange keys prior to data transfer.

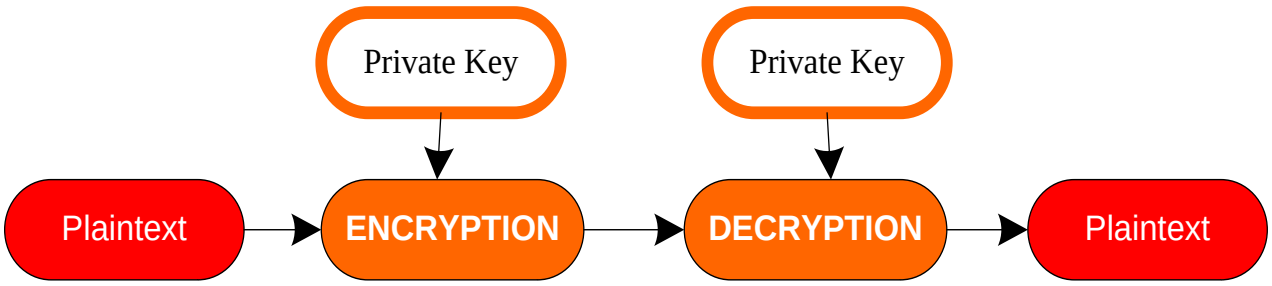


Figure 1.12: Symmetric encryption

Asymmetric encryption: Asymmetric encryption employs a dual-key mechanism, utilizing distinct keys for encrypting and decrypting data, thereby ensuring data security through a unique cryptographic approach as shown in figure 1.13. A public key is a type of key that is used to encrypt data and can be used to identify an individual. Private keys are used to decode the data and are required for security to protect the rights of the recipient.

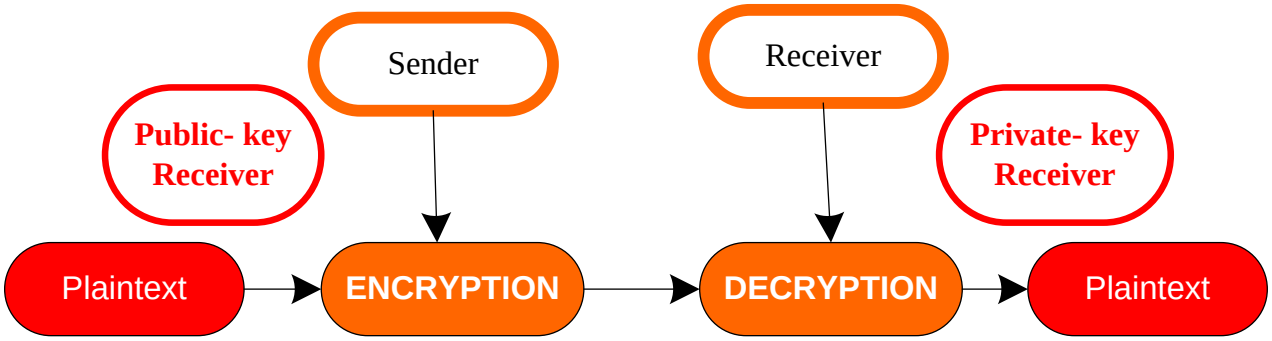


Figure 1.13: Asymmetric encryption

1.8 Relevant Techniques

- **Address in Blockchain**: is a publicly published string of alphanumeric characters that serves as a means for users to send transactions. A public key will be used to generate each Blockchain address. A private key is used to generate this public key, which serves as a means of determining the legal owner of the public key (i.e. the blockchain address). During an interactive transaction with a blockchain network, a user

authenticates their ownership of a blockchain address by employing their private key to generate a digital signature, thus verifying their identity as the rightful owner.

- **Public and Private key**
  In order to engage with a blockchain system, individuals require both public and private keys, collectively forming a cryptographic identity key. This amalgamation enables the creation of numerous key pairs, serving as pseudonyms to represent individuals within the blockchain network. This dual-key arrangement establishes a robust security framework, enabling the sender to sign and encrypt messages using the public key, while the recipient requires the corresponding private key for decryption, thereby ensuring secure communication (Böhme & Pesch, 2017; Joshi et al., 2018).

- **Digital Signature**: An encrypted string of characters known as a digital signature is sent together with the transaction's original data on blockchain- network. In generating a digital signature, the user encrypts, or digitally signs, the transaction data with their private key before submitting it to the recipient. It's important to note that the private key associated with the sender's blockchain address is utilized for this encryption. Any alterations to the transaction data or the use of a different user's private key would result in a modification of the digital signature.

- **Hash function:** A hash function converts an unlimited quantity of input data into output data that has a set length. Data integrity is frequently protected using hash functions.
  Users can verify the authenticity of a transaction by cross-referencing the hash value of the transaction within the application with that found in the block explorer. This comparison serves as a method to confirm the legitimacy of the transaction.

- **Virtual Machine:** A program that simulates a computer system is known as a virtual machine. There is CPU, memory and virtual memory. Virtual machines basically work like physical computers. It may be used to store data, run programs, and work with other virtual machines to run blockchain networks.

Blockchain implementations are not just a technology but often encompass encryption, mathematics, algorithms, economic structures, peer-to-peer network integration and mutual consensus algorithms to solve the coordination of traditional distributed ledger problems. In

peer-to-peer energy exchange, peer-to-peer ride sharing, peer-to-peer insurance and so on, Blockchain is useful to sign a Digital Contract. Private sectors including banks understand that they can use the blockchain concept as a distributed ledger technology to set up a blockchain which is allowed to carry out protected transactions. Validation of this blockchain approved is carried out in the same entity, by representatives of the consortium or by independent organisations.

Users can validate the legitimacy of a transaction by comparing its hash value within the application to that recorded in the block explorer. Depending on the market in which they are issued, bonds can be classified into two categories: onshore (domestic) or offshore (Eurobond market). The dry market can be further divided into two markets. a) In the domestic market, bonds are the obligations of domestic issuers that are offered in the domestic market, b) Bonds are issued by foreign issuers in overseas markets. Internationally issued and traded, eurobonds are frequently not valued in the currency of the nation that issued them (Sendner and Hillebrand, 2019). Unlike foreign bonds, foreign bonds usually have no registration requirements, and possession is proof of ownership. Unlike traditional shares of unsecured loans from the same issuer, Eurobonds have a slightly lower yield. This allows issuers to add new features and has the potential to attract different investors.

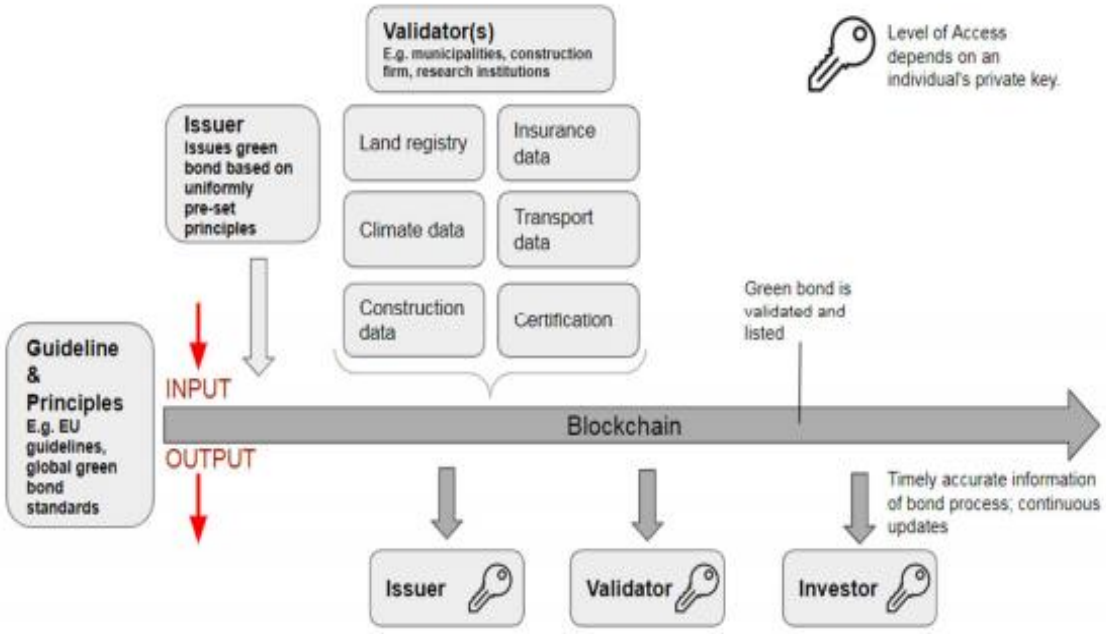


Figure 1.14 Source: Blockchain based Green Bond Process (Julian Bauer and Benjamin Bachmaier, June, 2020)

In the last decade, green and climate bonds have surged in popularity. Despite constituting just 2% of the overall global bond issuance, they hold considerable significance for numerous institutional investors due to their role in advancing sustainable investment practices.

Specifically, green bonds serve as a vital financial tool for funding environmental initiatives through a low-carbon financing approach (Reboredo, 2018). Tailored to finance projects with beneficial effects on the environment and climate, these bonds channel proceeds toward green assets. Environmental and climate-positive projects encompass a broad spectrum, ranging from constructing wind and solar farms to erecting sea walls in vulnerable coastal cities. Similar to conventional bonds, green bonds are financial instruments wherein the issuer sells contracts promising repayment along with specified interest rates (Sanderson, 2018). Green bonds are recognized as a crucial mechanism in facilitating the shift towards a low-carbon economy, particularly in the pursuit of achieving the 17 UN Sustainable Development Goals (SDGs) by 2030. These companies have adopted the green bond guidelines defined by ICMA and are required to use the funds. for predefined investment categories (ICMA (2018)). The annual income distribution pattern shows the intensification of spending on renewable energy, sustainable water, low carbon and other spending categories under the Paris Agreement and SDGs (2019). As reported by the Climate Bonds Initiative (2020), the total market value of green bond issuance surged to $754 billion from the inception of green bond issuance in 2007 until the conclusion of 2019.

Investing in green bonds not only assures investors that their funds will be utilized in environmentally responsible endeavors but also offers substantial financial rewards. Recent research conducted by Tang and Zhang (2020) suggests that issuing green bonds yields advantages for current shareholders of a company. Furthermore, various studies indicate that green bonds outperform traditional bonds financially. Particularly noteworthy is the greater economic benefit observed for corporate issuers, which persists in the secondary market (Gianfrate and Peri, 2019). However, the expansion of the green bond market necessitates enhancing environmental consciousness among investors and providing tax incentives by governments (Aliardi and Agliardi, 2019).

1.9 How Blockchain Technology is currently applied to bonds in India

The applications of blockchain-enabled green bonds can be categorized into three primary domains:

1. Facilitating issuance, structuring, and distribution processes
2. Streamlining ownership transfer, payment, and settlement procedures
3. Enhancing reporting and benchmarking functionalities

The initial two domains are interconnected with each bond, as the technology has been utilized to varying extents in these aspects thus far. In utilising structuring, registration, sales and delivery technologies, the blockchain-based obligation industry is mature. Much of the time the selling of Know Your customers was restricted to pre-authorized investors. Investors may position transactions using an authentication key using a digital interface. Automatic book creation has been possible in real time on the frameworks built by the banks.

Banks also begun recognising the advantages of bond issuance through blockchain technologies. Incorporating IoT and AI in order to report and improve the traceability of Green Bonds results, immediate gain can be gained by incorporating Green Bonds. For the larger bond industry, blockchain offers cost reduction potential by more than 10-fold, eliminated the need for intermediaries and rendered it easier to issue bonds for smaller ventures.

1.10 Blockchain Background

One of the many capital structures is called a bond, which is a debt instrument intended to finance a project (Ehlers, Packers, 2017). The growing recognition of climate change has spurred greater investment in sustainable bonds, which are anticipated to gain even more traction in the coming years (Geiger et al., 2013). Consequently, these financial instruments prioritize environmentally responsible investments (Ehlers, Packers, 2017). Investors are motivated to engage in green bonds for several reasons, including enhancing financial performance (Bauer, Smeets, 2015) and mitigating risk (Krüger, 2015).

Projects oriented towards sustainability are increasingly equipped to meet stringent requirements, such as those outlined in the Sustainable Development Goals established by governments (Ayre, Callway, 2005). Nonetheless, it's crucial to ensure the reliability of stable bond yields. Transparency, thorough documentation, and comprehensive reporting play pivotal roles in showcasing the accountable utilization of sustainable assets (Gonzalez-Ruiz et al., 2019). In recent times, there has been a surge in awareness regarding blockchain technology (Wouda, Opdenakker, 2019), which has already demonstrated its applicability in real estate

transaction processes (Wouda, Opdenakker, 2019). Given its proven efficacy, blockchain technology holds promise for implementation in various other domains, including the realm of green bonds.

1.11 Blockchain Technology and Financial Sector

Blockchain technology, heralded as the cornerstone of the fourth industrial revolution, is anticipated to exert significant influence across various domains (Casino et al., 2019). Initially introduced as the foundational technology for Bitcoin, blockchain serves as the backbone of all digital currencies. Broadly speaking, blockchain can be conceptualized as a distributed database with an append-only structure, akin to a ledger documenting transactions within a peer-to-peer network. Each transaction record is encapsulated within blocks, encompassing a list of transactions, a hash of all transactions, and a hash of the preceding block's transactions. Transactions are meticulously documented and timestamped within blocks, forming a tight linkage facilitated by cryptographic hashes. Once recorded on the blockchain, transactions are exceptionally resistant to alteration or manipulation, rendering the blockchain data virtually immutable. Leveraging the decentralized architecture of blockchain, every node within the network maintains a copy of the ledger.

To establish consensus regarding the network's state, particularly regarding the validity of transactions to be added to the blockchain, nodes rely on a fault tolerance mechanism, also referred to as a consensus mechanism. These mechanisms offer an impartial method to uphold the true network state and safeguard the integrity of transactions conducted on the network. Various mechanisms exist for achieving consensus, with Proof of Work and Proof of Stake emerging as the most prevalent and widely adopted mechanisms in numerous real-world blockchain applications. These mechanisms exhibit distinct characteristics in terms of computational efficiency, transaction speed, security, and scalability. Depending on node authority, blockchain networks are categorized into three types, including federated, licensed, and public networks.

Blockchain networks enable the deployment of software known as smart contracts, which can be understood as digital counterparts to traditional contracts. Essentially, a smart contract is a piece of computer code that operates on a blockchain network, comprising a set of rules or conditions forming a self-executing agreement agreed upon by the involved parties. When

predefined rules or conditions are met, the code within the smart contract is automatically executed. Smart contracts enhance the functionality of blockchain networks, facilitating transaction reliability, automation, and efficiency.

Financial institutions and regulatory bodies have been exploring blockchain technology for several years with the aim of simplifying banking and lending services, reducing operational costs, mitigating counterparty risk, and expediting settlement times (Economic Association, 2015). Noteworthy initiatives include the development of the Corda ecosystem, a distributed ledger platform tailored for recording, managing, and synchronizing financial contracts among regulated financial institutions, alongside various endeavors focusing on blockchain-based security issuance (Maso). For instance, the World Bank collaborated with the Commonwealth Bank of Australia to pioneer the issuance of the first bond entirely managed throughout its lifecycle using blockchain technology, demonstrating notable advancements in the field. Additionally, in early 2019, Santander issued the inaugural blockchain-based green bond (Santander, 2019). The fintech-related blockchain market is poised for substantial growth, with projections indicating an expansion from USD 231.63 million in 2017 to USD 67.006 million by 2023, boasting a remarkable compound annual growth rate (CAGR) of 75.2% during the forecast period (Future Market Research, 2020).

Increasing efficiency is a crucial component of cutting costs. The number of parties engaged in the bond procedure can be decreased with the use of blockchain. It not only makes distribution easier (smart contracts, for example, can manage intricate rules for competitive bidding), but it also lessens the need for error or fraud checks during reconciliation (cryptographic signatures, for example, eliminate this requirement) and enhances settlements (e.g., from two to three days to instant).

1.12 Opportunity Loss of Inadequate Adoption of BC in GBs

Table 1.2 Source: HSBC and Sustainable Digital Finance Alliance (2019): Blockchain: Gateway for Sustainability Linkage Bonds; This figure shows the opportunity loss of not using BC technology in GB market.

Standard Vs Blockchain Cost Estimates Comparison Table		
Green Bond Process (USD)	Standard Process	With full Blockchain Automation
Structuring, price setting, risk rating	10,00,000	20,000
Legal review	1,00,000	40,000
Investor whitelisting and matchmaking	5,00,000	n/a
Internal review and green classification	50,000	20,000
Third party validation and green benchmarking	50,000	5,000
Registration and listing	15,000	n/a (if sold on blockchain exchange)
Brokerage and sales	15,00,000	40,000
Payment and settlement	84,000	0
Custodianship	3,50,000	2,000 (blockchain dependent)
Data gathering (full lifecycle)	12,00,000	3,50,000 (including IoT devices)
Data aggregation (full lifecycle)	4,00,000	1,15,000
Reporting (full lifecycle)	12,00,000	1,00,000
Total	64,49,000	6,92,000

While cost savings alone are a significant opportunity for DLT adoption, many other benefits create additional opportunities for the green bond market. For instance, integrating Distributed Ledger Technology (DLT) with other data technologies like the Internet of Things (IoT) can bolster trust and revolutionize existing practices. This integration provides investors with direct and real-time insights into the environmental impact of their investments, enhancing efficiency, reporting, and benchmarking activities.

These digital ecosystems' "trusted granular data" presents a possibility for the aggregation of numerous smaller assets into a bond, or for the fragmentation of ownership of green assets. Innovations of this kind have the ability to democratise access to sustainable finance. This implies that everybody has the ability to invest in or be an investor in sustainable projects, assets, or activities.

The report additionally offers a set of suggestions aimed at expediting the adoption of these technologies. One such recommendation is the introduction of "Bonds as a Service," which strives to enhance accessibility to bond issuance by leveraging automation and digitization.

While the report from HSBC and Sustainable Digital Finance Alliance makes a notable contribution to the burgeoning industry, it does have some limitations in terms of its scope. For e.g., numbers shown in the table above are estimates (e.g. hidden costs for organizations, assessment of the literature on standard fees and procedures, as well as interviews with a variety of professionals) & numbers are not reliably proven. It is based on different assumptions. Another aspect that needs more work is recommendations. For e.g., report recommends that all stages/areas of Green Bonds be piloted on DLT platforms, but that "the technology provides details on legal and legal/policies" is limited. These limitations show that much work needs to be done. The majority of these platforms are not yet compatible, despite DLT's quick development. Standardisation might be necessary to encourage broader acceptance among different bond process parties. Further research and development also needed to guarantee that weaknesses are not taken advantage of (For e.g., if weaknesses in the code are exploited by bad actors) and to fix existing DLT flaws.

The report concludes that " even though the industry is still in its infancy and technology is still developing, the time has arrived for the critical next move to be made." Further proof of concept across all jurisdictions and involving all essential stakeholders is required and the Blockchain and Climate Institute is presently engaged in this endeavour. Numerous chances are presently available, and more can become reality in the near future, as all of the early tests have demonstrated.

1.13 Present situation of India's Blockchain Technology Bond market

After early 2018, many financial institutions have released bonds and other debt items, mostly for the structuring, issuing and transition of funds, with blockchain technology. The bond environments are also not protected by digital impact reporting, digital asset automatic coupon purchases and complete delivery across opened investment options with automated "Know Your Customer." Its yet to realise the most powerful advantages which enable scaling. On the basis of above content the blockchain factors need to be studied for the benefit of green bond market stakeholders. This study intends to do an analysis of different aspects of green finance and on how active such initiatives are. This helps in understanding India's position in green bonds with respect to technology upgradation, and also the scope for improvement and opportunities available which could be adopted effectively with the help of using new

technologies for Indian Green bond market like blockchain technology. This this concludes to the below business problem.

1.14 Business Problem

Facilitating environmental limitations are leading to inadequate blockchain technology adoption in India.

1.15 Motivation/ Need for the Research

The motivation for researching the business problem of inadequate blockchain technology adoption in India stems from the critical need to address facilitating environmental limitations, particularly within the context of the green bond markets. The insufficient uptake of blockchain technology in these markets not only results in opportunity loss but also exacerbates cost inefficiencies. By failing to leverage blockchain's potential for enhancing transparency, efficiency, and security in green bond transactions, India's environmental initiatives face significant hurdles. Consequently, there is an urgent imperative to explore solutions that enable greater blockchain adoption, thereby fostering sustainable growth and mitigating environmental constraints within the country's financial ecosystem.

1.16 Disposition of the Study

Chapter 1: Introduction. An introduction highlighting the need for the proposed project and the objective of the thesis will be meticulously given in this section. The research questions are then presented, together with a discussion of the thesis's goal. It concludes with the thesis's constraints and limits after briefly describing the study design and methodologies that were used.

Chapter 2: Literature Review: Results of the literature survey conducted will be summarized in this section. It explains theory and illustrates the selected techniques. It describes and defends the methodology of obtaining particular data. Additionally, it justifies the chosen interviewee and clarifies the constraints of the environment in which the thesis was composed.

Chapter 3: Underpinning Theories. This chapter covers to determine the most appropriate theoretical foundation for the study, an additional new review of the literature was performed. The main emphasis of this study is the viability of implementing blockchain technology in the

financial and bond markets, according to the initial evaluation the research area is connected to various theories of technology adoption.

Chapter 4- Hypothesis creation and testing: In this chapter the format method of investigating the relationship between variables has been conducted. This chapter consist of the hypothesis made on the basis of the proposed framework for the adoption of blockchain technology in green bond market which is based on the send model of TAM theory.

Chapter 5- Research Methodology. This chapter comprehensively outlines the study's aims, the identified problem, the research inquiries, the objectives, and the adopted research methodology for data collection and result generation. Additionally, this chapter examines the role of blockchain technology in green bond market, sampling process, conducting a survey and statistical approach followed for data analysis.

Chapter 6- Data Analysis and Interpretation. This section will cover the details of data collection and its analysis with the help of primary data collection with the help of Likert scale questionnaire filled by the sample of 160. Snowball sampling has been done and data analysed by using SEM with regression and factor analysis and path analysis in AMOS software. Then the output of qualitative analysis leads to the input of quantitative framework analysis of blockchain technology in green bond markets will be detailed in this section. To develop a conclusive framework and address the research inquiries utilizing ATLAS.ti, the interview results are scrutinized and correlated with the earlier literature review.

Chapter 7- Conclusion, Recommendation & Future Scope. This section will cover the results obtained from the investigation and will be discussed in detail. Building upon the study's findings, recommendations are formulated. The key discoveries of the study are synthesized and presented. Additionally, the final section offers researchers an outlook for future studies in the realm of blockchain technology and green bonds.

1.18 Chapter Summary

This chapter lays the foundation that provides an overview of the significance of blockchain technology in addressing environmental challenges and fostering sustainable development. It begins by addressing the past literature survey in the area of green finance which consist of sustainable bonds markets and other tools of sustainable finance like green. Then the pressing research problem: the hindrance posed by facilitating environmental limitations to the blockchain technology adoption within the Indian context. This issue is critical, considering

the pivotal role blockchain technology plays in ensuring transparency, efficiency, and security, particularly in sustainable finance initiatives such as green bonds.

It emphasizes the potential of blockchain to revolutionize the green bond markets by streamlining processes, enhancing trust among stakeholders, and reducing transaction costs. However, despite its promising capabilities, the blockchain technology adoption in India's green bond markets remains inadequate, primarily due to various environmental constraints.

Moreover, the chapter outlines the objective of the research: to explore and propose a suitable framework for overcoming these limitations and facilitating the adoption of blockchain technology in India's green bond markets effectively. It highlights the importance of conducting a detailed literature review in the subsequent chapter to gain insights into existing studies, methodologies, and strategies related to blockchain adoption and sustainable finance.

The introduction chapter serves as a preamble to the in-depth exploration of the research problem and the development of a sturdy framework aimed at overcoming the obstacles to blockchain technology adoption in India's green bond markets. By conducting a meticulous review of pertinent literature, this study aims to offer discerning analysis and recommendations that can propel sustainable finance initiatives within the Indian context.

CHAPTER 2. LITERATURE REVIEW

2.1 Introduction

To gain comprehensive understanding of topic, conducting a literature review proves beneficial. This systematic, organized, and replicable approach aids in assessing the extent of prior research, identifying areas for exploration, and limiting researchers by offering valuable insights into methods unsuitable for investigation (Antons, D., 2023).

This chapter serves as a gateway to the exploration of key themes within the realm of green finance, encompassing "green finance," "green bonds in green finance," and "blockchain technology." The convergence of these themes holds significant implications for sustainable financial markets. This chapter delves into the intricate interplay between green finance, the specific dimension of green bonds within this framework, and the transformative potential of blockchain technology in shaping green finance markets.

The review unfolds systematically, shedding light on the existing body of knowledge surrounding these themes. By scrutinizing scholarly works, we aim to elucidate the current landscape, discerning how these concepts have been conceptualized, studied, and applied by researchers and practitioners alike. The lens of investigation extends to the intersection of blockchain technology with green finance, exploring the innovative ways in which decentralized ledger systems can contribute to sustainability efforts.

Furthermore, this literature review seeks to identify and analyse selected research gaps within the current discourse. By pinpointing areas where existing knowledge falls short, we pave the way for a more focused and purposeful exploration. The subsequent sections will delve into these identified gaps, framing the foundation for the research questions and objectives that guide this study. Through this comprehensive review, we aim to contribute to the evolving dialogue on green finance, green bonds, and blockchain technology, fostering a deeper understanding of their synergistic potential and addressing gaps that warrant further investigation.

2.2 Green Finance and its overview

Green finance is a relatively recent phenomenon that combines environmental preservation and financial and economic development. It emphasises the words "green" and "finance," two concepts that may seem contentious, but in the end it establishes the framework for sustainable development (Cigu, E. L. E. N. A., et al., 2020).

With products being produced for sustainability, green finance is the first endeavour in the financial industry to integrate financial performance with good environmental effect (Mohanty, S., et al., 2023). The European Union's legislative and regulatory agenda for financial markets has made sustainable finance, which was formed by the Commission in 2018, a primary goal. The global financial markets have included a range of sustainable and ESG products, including bonds and loans that are tied to sustainability, green issues, and ESG (Driessen, M. 2021).

Green credit guarantee schemes and distributed ledger technologies can reduce green finance risk and increase project returns, while also increasing transparency in green finance and investments (Taghizadeh-Hesary, F., & Yoshino, N.,2019). The traditional fundamental tasks of central banks could be considerably impacted by climate hazards. Therefore, in order to protect macro-financial stability, the physical and transition hazards related to climate change should be incorporated into the policy frameworks of all institutions. (Dikau, S., & Volz, U., 2021).

Green finance promotes sustainability by financing green investments and policies, aiming to reduce risk perceptions and internalize environmental externalities (Falcone, P. M., 2020). The advancement of green finance is steered by a consortium of entities including financial institutions such as banks, institutional investors, global financial organizations, central banks, and regulatory bodies. These stakeholders enact policy measures tailored for various asset classes (Lee, J. W., 2020).

The inability to internalise environmental externalities, information asymmetry, a lack of analytical capability, and a vague definition of "green" are only a few of the microeconomic issues that have hindered the mobilisation of resources for green initiatives. Significant disparities persist between the long-term nature of green investments and the notably short timeframes associated with savings and investor perspectives. Moreover, there has frequently

been a lack of coordination between financial and environmental policy measures. In addition, many governments fail to make it apparent how and to what degree they are supporting the green transition (Berensmann, K., & Lindenberg, N., 2016).

The obstacles associated with green financing in India comprise inadequate establishment of green policies and strategies, exorbitant debt capital costs, high project investment costs, insufficient investor awareness, and a deficient framework for the effective assessment of sustainable projects (Jha, B., & Bakhshi, P., 2019).

2.3 Green Bonds in Green Finance

EIB (European Speculation Bank) propelled the primary "Climate Mindfulness Bond" in 2007 with the deliberate of raising cash for ecologically inviting wanders in reaction to financial specialist mindfulness of climate alter and the higher benefits related with maintainable ventures (Arzenton, E. 2019). The World Bank and Skandinaviska Enskilda Banken AB (SEB) started issuing green bonds as well in 2008 (World Bank, 2018). Green bonds picked up footing in 2018 and made up 4.4% of all bonds issued universally. In differentiate to the 5.3% extent of maintainable bonds in Europe, the sum of green bonds issued in Swedish Krona (SEK) indeed come to a tallness of 11%. (EU, 2019). Ehlers and Packer (2017) foresee a sharp rise over the coming a long time, whereas SEB (2020) predicts that by 2020, there will be more than one trillion dollars' worth of green bonds exceptional universally. Caldecott (2017) and Schoenmaker (2017) say climate alter as a noteworthy component in connection to resource speculations, though (Shishlov et al. 2016) trait the development to expanded speculator acknowledgment of contributing in green resources and the coming about benefits. The particular money related vehicle known as a "green bond" has been created to encourage green speculations and uncovers a number of profitable natural and financial characteristics (Pham, 2016). Existing ventures are habitually renegotiated utilizing green bonds. By utilizing the investors' cash as use, the so-called value discharge can be utilized to dispatch other economic activities. According to the Climate Bonds Initiative (2020), 257.7 billion USD worth of green bonds were issued in total in 2019, with properties accounting for almost 30% of that total. Most Green Bonds, according to the Climate Bonds Initiative (2020), are asset-linked or bonds for the use of proceeds.

2.4 Blockchain Technology

The conveyed record innovation (DLT), peer-to-peer (P2P) arrange, cryptography, agreement prepare, and legitimacy criteria that underlie that pivotal state. As a result, a least of two clients trade a record peer-to-peer. On such system, exchanges can be carried out in a confirmed way without or with less brokers, whereas still following to the already built- up agreement strategy. By following to the legitimacy criteria, this structure empowers approved parties within the P2P arrange to construct modern squares (Wouda, Opdenakker, 2019; Bauer, J., &Bachmaier, B. 2020). Individuals lock in in a blockchain framework by snaring up their contraptions to the web. In this way, the web serves as a communication channel that empowers people, or "hubs," to connect and take off the arrange at any minute. As a result, the hubs take part in a disseminated agreement component on a peer-to-peer premise. By leveraging computing control to total cryptographic operations, this procedure upgrades the information on each hub. Due to the truth that this control starts from the hubs, the framework is resistant to control by facilitated hub assaults (Bauer, J. and Bachmaier, B., 2020). Moreover, this information synchronization empowers the previously mentioned anytime passage and take off of individuals (Böhme, Pesch, 2017).

Casino et al. (2019) list specialists as often as possible displaying blockchain as the nostrum as one of the existing issues with the innovation. There are applications, nevertheless, where information capacity isn't vital, and as a result, blockchain cannot contribute any esteem. The qualification between composing Savvy Contracts in comparison to other programming dialects is another point Bartoletti et al. (2020) bring out. As a result, it isn't continuously straightforward to get it, and since of its complexity, programming botches may result. The information is blocked off in the event that a blockchain part loses their private key (Joshi et al., 2018). Although no one else is able to get to the information, typically still a concern since the get to is misplaced and the key can't be recouped. In expansion, agreeing to Biggs et al. (2017), blockchain innovation faces troubles when it comes to broad appropriation, counting issues with administration, lawful oversight, and integration with already-existing handle foundations. Furthermore, conclusion users' behavioural deliberate to really utilize this emanant innovation is considerably associated with social adequacy of it (Lou, Li, 2017).

Blockchain itself is mostly safe but not private, supposing the stakeholders are reliable. Because of this, a user-defined arbitrary programme gets uploaded to the distributed ledger.

That programme might be a "smart contract" (Kosba et al., 2016). This is not merely an electronic contract nor an AI-powered car. Instead, it is a self-triggering, tamper-proof technology. This lessens human interaction and the dangers of uncertainty or rising prices that go along with it. Smart contracts allow for the easier exchange of products like real estate through the automatic execution of functions by a predefined algorithm (Cong, He, 2019).

2.5 Blockchain in Green Finance

The literature review examines the current state of research on blockchain technology and green bonds. As a result, using the backward system, many publications were explored in greater detail. As a result, references that were cited in journals were given closer scrutiny. That method allows for the observation of earlier phases in the evolution of the technology.

This is significant since understanding sustainable green bonds' basics as well as blockchain technology is necessary to comprehend this thesis's final architecture. In addition, a number of studies and recommendations from reliable organisations are examined in order to determine the standards for certification of sustainable properties and to show how conventional and green bonds differ in general.

In the financial markets, the use of blockchain technology is arguably still in its infancy. Nonetheless, a number of powerful individuals and legislators in the financial industry have started to vie for the opportunity to profit from blockchain technology's potential in the securities market. Seretakis (2019). HSBC and the Sustainable Digital Finance Alliance (2019) identified three key applications of blockchain technology for the issuance of green bonds: The subjects covered include structure, issuance, and distribution, to name a few. Others include benchmarking, reporting, payment and settlement, and ownership transfer. For security issuance procedures, several records of information are required (such as payment details, contract terms, and records of financial instrument holdings), and these data are currently maintained centrally by reliable third parties. Blockchain technology offers an alternate means of managing securities issuance data and certificates by entirely digitising the entire process (Spielman, A., 2016). Agreeing to later thinks about, the productivity preferences of bond issuance forms utilizing blockchain innovation are at slightest 10 times more noteworthy than those utilizing non-blockchain innovation. The greatest productivity picks up (measured in terms of cash spared) would come from decreased costs for detailing, brokerage, and deals as

well as organizing, cost assurance, and hazard appraisal (Nawari, N. O., & Ravindran, S., 2019). Other preferences of utilizing blockchain innovation within the issuing of securities incorporate moved forward possession recording and following, speedier clearing and settlement, less middle people, and easier information collecting and sharing for supervisory purposes (Seretakis AL, 2019). By inserting one-of-a-kind security characters into the exchange lifecycle methods, blockchain innovation may too make it simpler to send a unique reference framework within the securities markets, concurring to Capgemini (2016). Moreover, the issue of corporate bonds has gotten uncommon consideration. Blockchain innovation is being explored by advertise members for the issuance and exchanging of corporate bonds, particularly to robotize the calculation, instalment, and recovery of coupons. Jain and Workie (2017). As of late, it has been proposed that "asset-backed" borrowing programs like Sukuk Shaikh and Zaka may use blockchain innovation (2019). The utilize of blockchain within the issuance of securities raises a number of lawful questions, be that as it may, because it may be a generally unused innovation. (Henly, C., et al., 2018). The creators of Ryan and Donohue (2017) offer counsel to trade legal counsellors who must render a legitimate judgment with respect to the issuing and deal of resources on a blockchain.

From a maintainability point of view, blockchain innovation is respected as a game-changer within the issue of securities by HSBC and Maintainable Advanced Fund Union (2019). In later a long time, blockchain innovation has been seen as the motor that will impel the change to a low-carbon, feasible, and climate-resilient economy, in this manner assembly the destinations of the Paris Understanding Cultivate (2019). Blockchain innovation, in specific, has the potential to scale climate activity and progress affect approval of green bond issuance much appreciated to its traceability-by-design highlights, opening up more subsidizing openings for ecologically neighbourly ventures, concurring to the Climate Bonds Activity and the Universal Founded for Feasible Advancement (2016). For occasion, backers can transparently and straightforwardly pass on their green bond offerings and achievements in an engaging arrange for speculators by utilizing the Green Resources Wallet, an free and trust-by-design created stage for green securities5. Other captivating programs incorporate "timberland bonds," which are monetary structures implied to halt deforestation Sanderson (2018). By upgrading the traceability of the by and large issuance forms and giving confirmation and auditability of relevant prerequisites, blockchain technology is anticipated to create the method of issuing green bonds less demanding Poberezhna (2018). Also, blockchain innovation is expected to assist distinctive partners comply with and implement different climate-related

laws and money related administrative systems in a low-cost and fast way (Zhang X., et al., 2018)

The growing amount of articles, whitepapers, and reports suggesting the use of blockchain technology for bonds—particularly green bonds—highlights how this invention has the ability to scale up climate action on a worldwide scale.

For numerous a long time, the budgetary industry has been testing with disseminated record innovation (DLT). For example, the renowned Corda environment, also referred to as CorDapps, commenced development in 2015 with widespread financial interest. In March 2018, Credit Suisse and ING successfully executed the platform's inaugural live securities lending transaction. Later that year, the World Bank and the Commonwealth Bank of Australia collaborated to issue the first blockchain-based "bond." The primary "Blockchain Green Bond" was issued by BBVA in February 2019. Comparable to the World Bank, BBVA centered on streamlining methods and financial specialist transactions by utilizing innovation to abbreviate arranging times.

Blockchain: Door for sustainability-linked bonds is the title of a report distributed by HSBC and Maintainable Computerized Fund Collusion. It provides a comprehensive analysis of the current state of affairs, encompassing global efforts in this expanding sector of finance. A key focus of the report is the objective comparison between "blockchain" and "traditional" bonds, offering insights into why these advancements warrant greater scrutiny to foster the development of transparent climate measures. The ponder appears that blockchain offers prospects for taken a toll reserve funds of more than 10 times for the bigger bond showcase.

The Sustainable Digital Finance Alliance claims that given the current global issues, supporting sustainable development is an important factor (Bayat-Renoux et al., 2018). In order to explore the possibilities of FinTech technologies for sustainable development, the United Nations Environment and Ant Financial Services formed this cooperation. Three case studies have been completed to show the viability of cutting-edge methods for green investments, including the use of blockchain technology Using the Internet of Things (IoT) and blockchain, a Chinese project run by the Shenzhen Green Financing Committee in 2017 attempted to digitise and automate the certification process for green finance. Finding better certification mechanisms

for green investments is the goal. Insufficient information and ineffective certification procedures are two potential problems that should be resolved using innovative strategies.

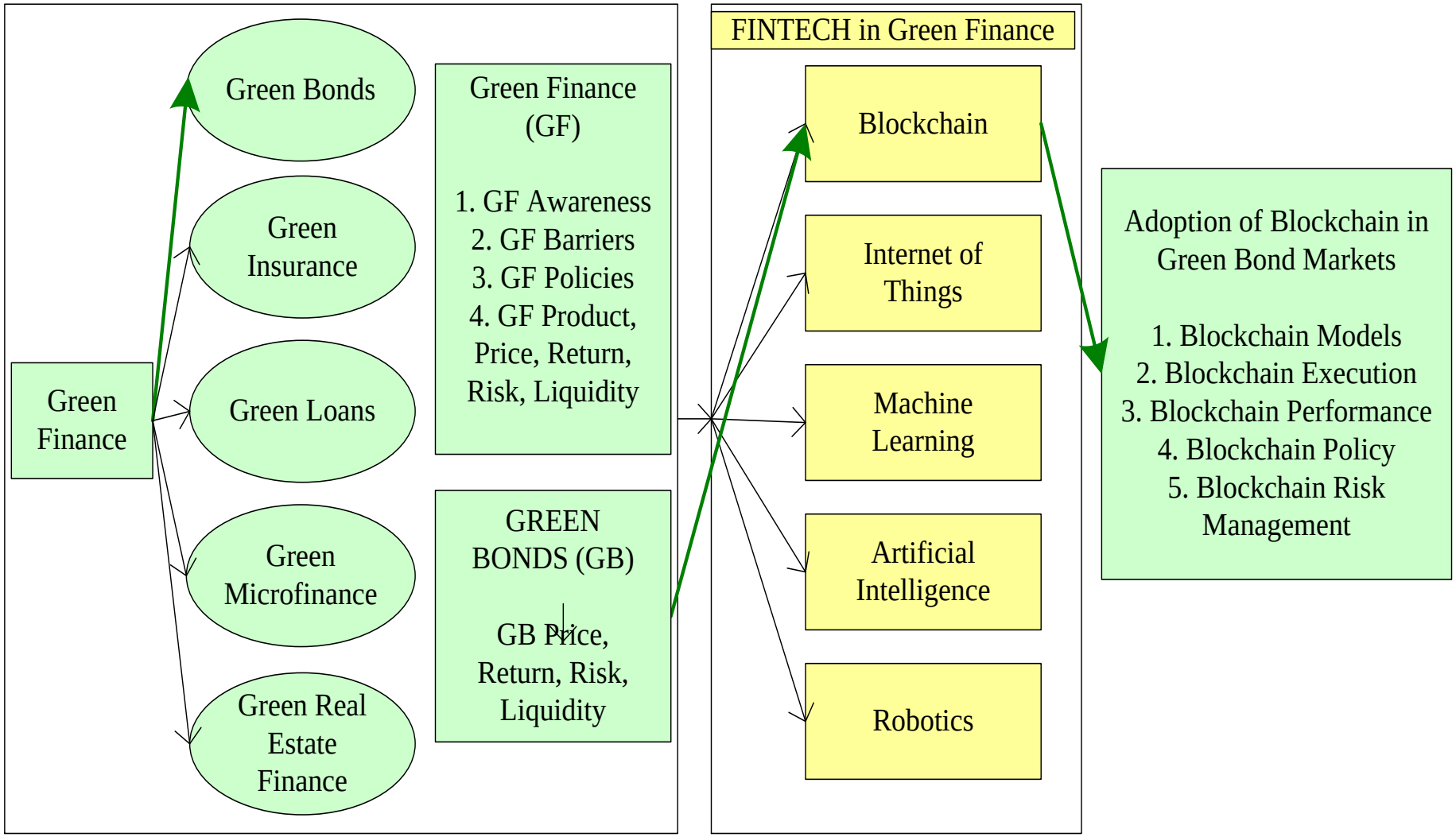


Figure 2.1 Flow of Literature review

The figure 2.1 illustrates the flow of the literature review, employing a funnel-down approach. Commencing with an exploration of Green finance, the review delves into various branches such as green bonds, green insurance, green loans, green microfinance, and green real estate finance. Within the realm of green finance, numerous barriers emerge, including issues surrounding awareness, policy formulation, risks, returns, and liquidity. However, amidst these challenges, green bonds emerge as pivotal players, significantly influencing the sector's trajectory.

Global financial markets have increasingly integrated sustainable and ESG (Environmental, Social, and Governance) products to advance sustainable objectives. Financial technologies, including blockchain, Internet of Things (IoT), machine learning, artificial intelligence, and robotics, must be incorporated in order to achieve these objectives. Notably, blockchain technology is one that is especially significant. The issuance of green bonds can make a substantial contribution towards the accomplishment of sustainable financial goals. Moreover, leveraging financial technologies, particularly blockchain, can further propel the green bond market towards attaining sustainable financial goals by enhancing operational efficiency and practices.

2.6 Discussion of Gaps

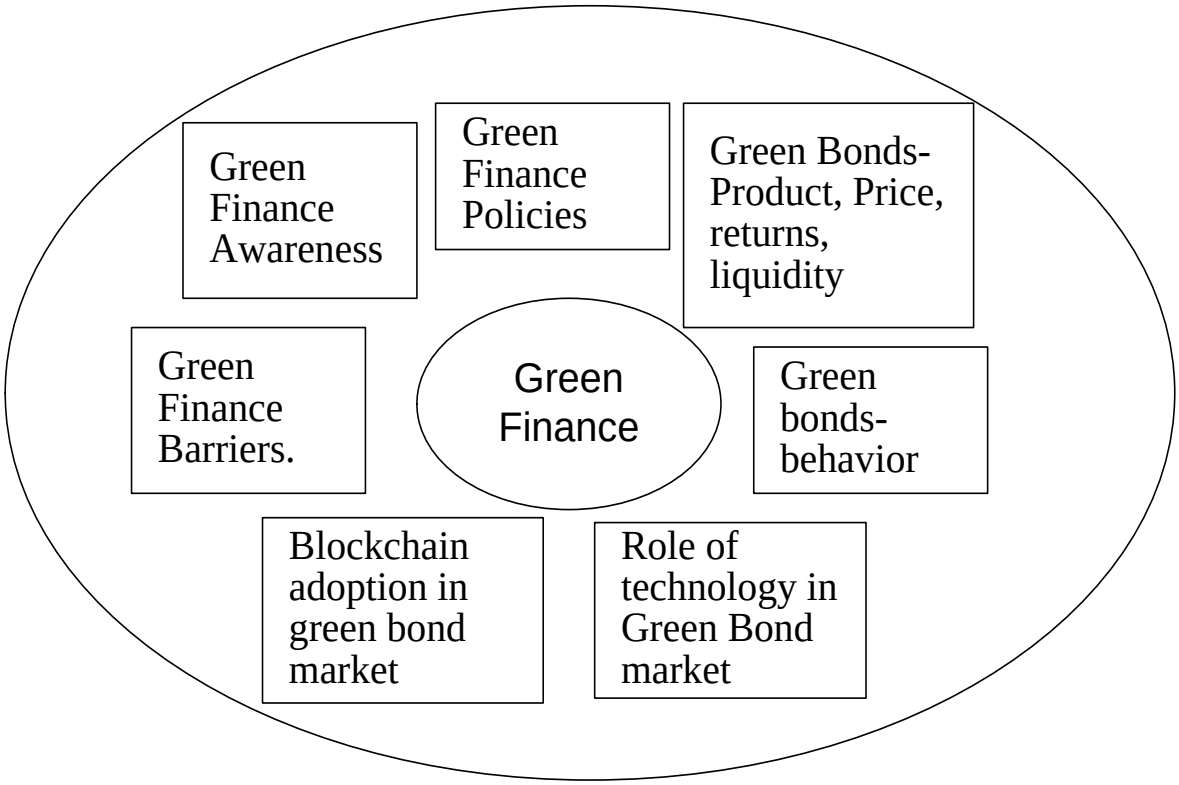


Figure 2.2 Major themes of the literature

The literature review commenced with an overarching exploration of green finance, delving into approximately 250 research papers. From this broad investigation, the focus narrowed to scrutinize the green bond market specifically within India. While the Indian green bond market demonstrates a remarkable growth trajectory, it is not without its shortcomings. Among these deficiencies, a prominent issue is the absence of standardized practices. This lack of uniformity poses a significant obstacle, eroding confidence among both investors and issuers. Consequently, there emerges a pressing need for the establishment of standardized guidelines to fortify the green bond market's resilience. Encouragingly, strategic investments from the public sector possess the potential to entice private investors and still faith in the market's integrity. Moreover, there exists an imperative for research to investigate the adoption of blockchain-based applications within the Indian context, a potentially transformative avenue for advancing the efficacy and transparency of green finance mechanisms. The proceeding chapter covers the literature of the theoretical base, which covers the theories related to the adoption of technologies in various aspects.

Table 2.1: Theme 1- Consolidation of Literature review of Green Bonds and Blockchain Technology.

No	Themes	Research Gaps	No of doc. Referred	References
1	**Green Finance Awareness**	No study has been found which addresses the consequences to improve the awareness of investors about green investment which will result to solve the issue of sufficient investment in the green projects.	15	Chowdhury, Tasnim and Datta (2013), Raj, G. P., & Rajan, A. P. (2017)., Dikau, S., & Volz, U. (2018), Babita Jha (2019), Banga, J. (2019)., Labanya Prakash Jena (2020), Chen, C. (2023)., etc
2	**Green Finance Barriers**	A study was conducted with the intention of examining the issues concerning GF from several angles, such as those of early-stage technologies within the green industry at various regional scales.	10	Pasquale Marcello Falcone (2019), Gincy Charles (2020), Sharif Mohd (2018), Chowdhury, Tasnim and Datta (2013), Babita Jha (2019)
3	**Green Finance Policies**	On the creation of policy benchmarking, research is advised. A healthy Green Bond market requires uniform regulations. Private investors' belief in the Green Bond market may increase as a result of strategic public-sector initiatives.	18	Pauline Deschryver (2020), Zhiyong Li (2019), Maria Jua Bachelet (2019), MadurikaNanayakkara (2019), M. Chiesa (2018), Gianfranco Gianfrate (2018), Josué Banga (2018), Louis William Wagner Ley (2017), Shishlov, I., &Censkowsky, P. (2022).
4	**Green Bonds-Product, Price,**	Some of the main problems with the green bond market in developing nations are the absence of suitable institutional	15	Chuc Anh Tu (2020), Asi Guha (2019), Clarence Tolliver, Alexander Ryota Keeley (2019), Maria Jua

	returns, liquidity	arrangements for managing green bonds, the question of minimum size, and the high transaction costs related to issuing green bonds. Therefore, more research can be done to investigate the factors that can be removed from the market.		Bachelet (2019), Josué Banga (2018), Caroline Flammer (2021), Olivier David Zerbib (2018), Irene Monasterolo (2022), Szilard Erhart (2018), Abhirup Ghosh (2017), Igor Shishlov (2016), Steuer, S., & Tröger, T. H. (2022).
5	**Green bonds-behaviour (Role of non-financial parameters-performance)**	It is advised to conduct more study on the standardisation of issuing through the creation of a standard framework for green bonds using blockchain technology, which will draw in more issuers and investors. Performance can be analysed using non-financial metrics such Aspects related to the economy, politics, society, culture, and infrastructure were looked into in order to expand and grow the GB market in India.	14	Pauline Deschryver (2020), Marco Schletz (2020), Thomas Puschmann (2020), Zheng He (2020), Yushi Chen (2020), Eugenia Macchiavello (2022), Julian Bauer and Benjamin Bachmaier (2020), Singh, M. K., (2022), Gabriel Callsen (2020), Katherine Foster (2021), Vangelis Malamas (2023), Tao Cen (2018)
6	**Role of technology in Green Bond market**	More study is required on Fintech's impact on emission allowances and green bond markets, sustainable bond markets, ESG ratings and disclosures, and benchmarking regulations.	15	Pauline Deschryver (2020), Marco Schletz (2020), Thomas Puschmann (2020), Zheng He (2020), Yushi Chen (2020), Eugenia Macchiavello (2020), Julian Bauer and Benjamin Bachmaier (2020), Manoj Kumar Singh (2020), Gabriel Callsen (2020), Katherine Foster (2021), Vangelis

				Malamas (2023), Tao Cen (2018)
7	**Blockchain adoption in green bond market**	There is a need for research on the adoption of blockchain-based applications by Indians with the help of TAM or other available models. The application of blockchain technology acceptance by TAM and IDT model was suggested by writers. The proposed model will be explored through survey method in the future research with the help of sampling method. Further research can be done based on focus could be placed toward investors – the essential stakeholders in a transaction process.	19	Pedro Baiz (2020), Karsten Schulz (2020), Anna Roy (2020), Shaik V. Akram (2020), Marco Schletz (2020), Thomas Puschmann (2020), Zheng He (2020), Yushi Chen (2020), Julian Bauer (2020), Sebastian Schuetz (2019), Olaniyi Evans (2019), Hoxha (2019), Wouda, H. P., &Opdenakker, R. (2019), Nallapaneni Manoj Kumar (2018), He Sun (2019), Walid Al-Saqaf & Nicolas Seidler (2017), Lou, A. T., & Li, E. Y. (2017).

Although the green bond market is still in its infancy and technology is still developing, now is the perfect moment to move on to the next phase. TAM model is suggested to analyse the scalability of green bond market in India through Blockchain technology.

Several research gaps that can be filled with further study were found as a result of the literature review. Below is a list of some of the most significant gaps:

1. No study has been found which addresses the consequences to improve the awareness of investors about green investment which will result to solve the issue of sufficient investment in the green projects.

2. Research aimed at investigating the importance of GF from different perspectives. For example, in terms of early-stage technologies in green industry in different geographical dimensions.

3. Research on the development of policy criteria is suggested. A resilient green bond market necessitates standardized guidelines. Strategic investment from the public sector can entice private investors and bolster their trust in the green bond market.

4. In developing nations, the green bond market encounters several key challenges, including the lack of appropriate institutional frameworks for managing green bonds, concerns regarding minimum size, and elevated transaction costs. Further research is essential to examine the green bond market as a pivotal segment and identify components to mitigate these issues.

5. Research is suggested on elimination certain facilitating limitations (situational variables) of blockchain technology (e.g., scalability, privacy, cost efficiency).

6. More research is needed on blockchain in relation to benchmarking regulation, green bond and licensing markets, ESG (environmental, social and governance) disclosure and rating, and sustainable bond markets.

7. Further work on the large-scale implementation of Fintechs that expand the bond market use case is suggested to examine the architectural scalability and other scalability factors of blockchain technology in the green bond market.

List of some of the most significant Gaps

No study has been found which addresses the consequences to improve the awareness of investors about green investment which will result to solve the issue of sufficient investment in the green projects.
This study aims to explore the significance of GF from different perspectives, for example from the perspective of emerging technologies in green industry in different geographical dimensions.
Research on the development of policy criteria is suggested. A stable green bond market needs uniform regulations. Investing strategically in the public sector can draw in private capital and increase their trust in the green bond market.
Several key issues in the green bond market within developing nations include the lack of suitable institutional frameworks for managing green bonds, apprehensions regarding minimum size requirements, and the high transaction costs associated with green bond issuance. Therefore, additional research may be necessary to uncover the catalysts for addressing and alleviating these challenges within the green bond market.
Research is suggested on elimination certain facilitating limitations (situational variables) of blockchain technology (e.g., scalability, privacy, cost efficiency).
In the area of blockchain, more research is needed on benchmarking regulation, green bond markets and emissions, ESG (environmental, social and governance) disclosure and rating, and sustainable bond markets.

After identifying potential research areas, two significant gaps were chosen for this project and are further explained below in figure 2.3. The criteria used for selection were the characteristics of green bonds, their existing state, and the lack of a framework enabling the use of blockchain technology in green bond markets.

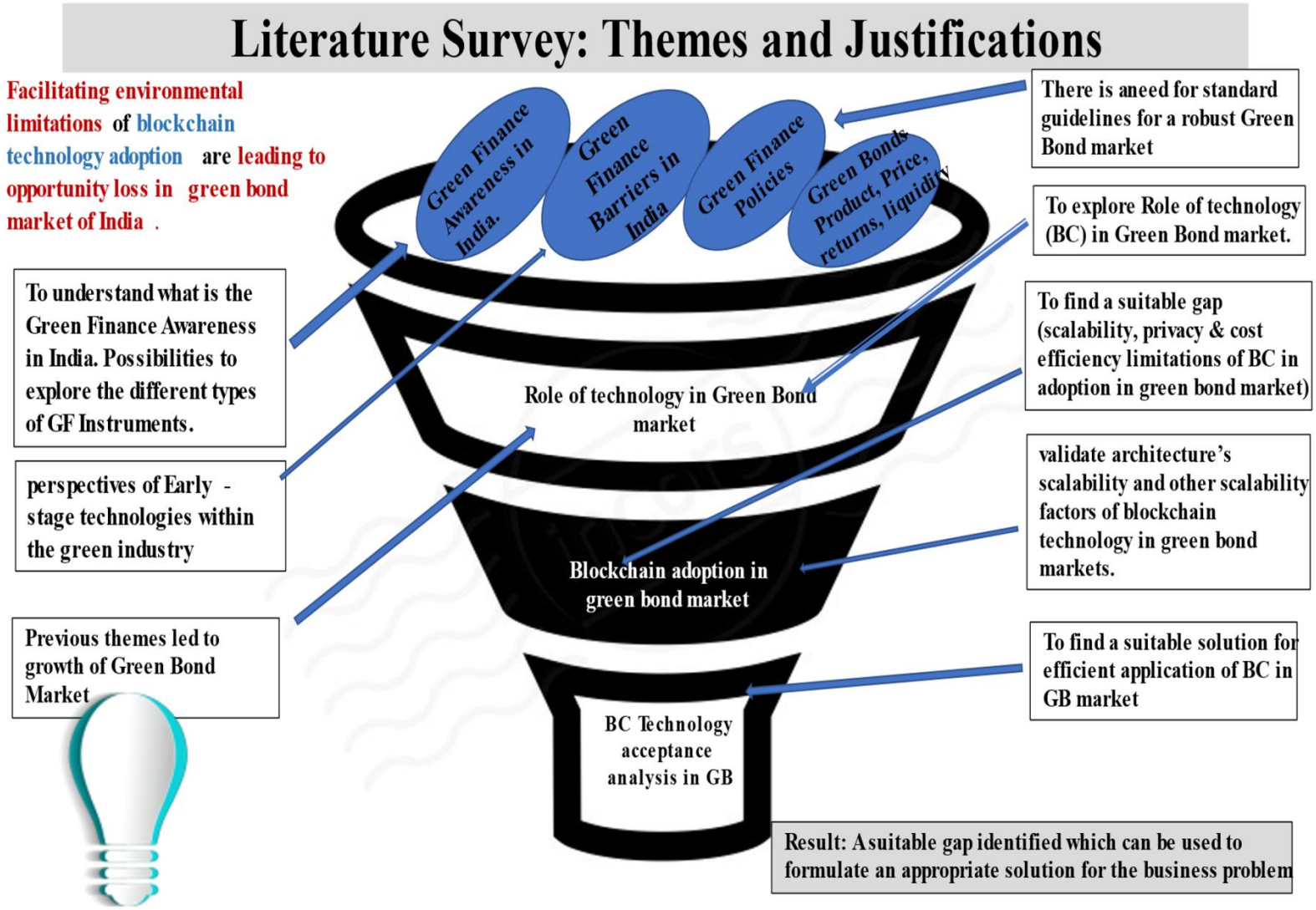


Figure 2.3: Literature Survey, Themes and Justifications

2.7 Selected Research Gaps:

On the basis of the review of various themes of sustainable green bonds and blockchain technology, two key gaps were identified from the literature review, and they are discussed below as shown in figure 2.4:

- Less studies could be found on how does facilitating conditions like scalability, privacy and cost efficiency limitations affect the adoption intention of blockchain technology in Green bond market of India.
- Less studies could be found on the measures to overcome the scalability, privacy and cost efficiency limitations for ensuring effective adoption of blockchain technology in Green bond market in India.

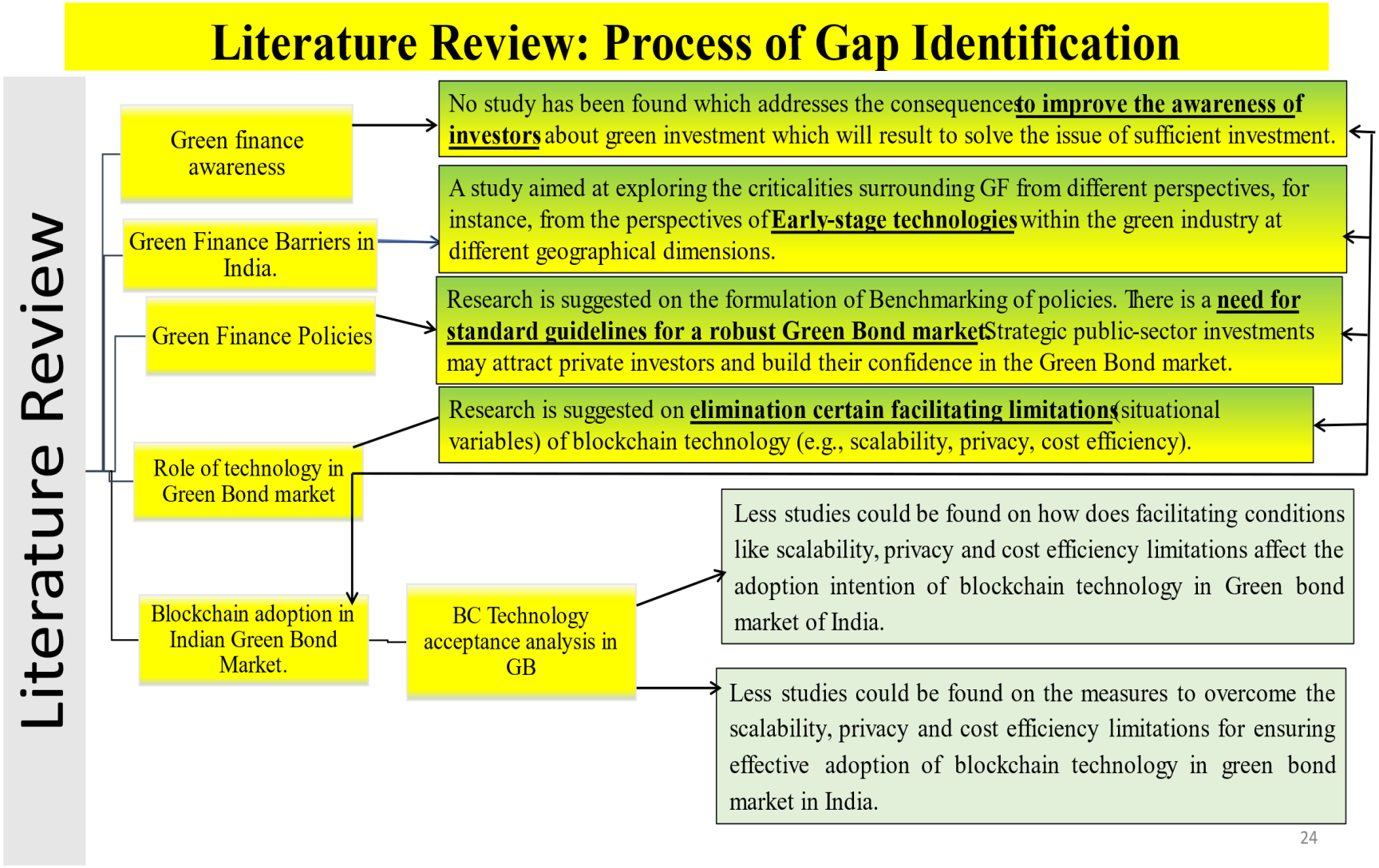


Figure 2.4 Literature review process and Gap identification

2.8 Final Gap Significance

Though studies have identified enabling factors leading to adoption of blockchain, but there is scarce literature which investigates the effect of facilitating conditions (scalability, privacy and cost efficiency) as limiting factors. The literature is also silent about the measures to overcome these limiting factors.

As will be discussed in the following chapter, the theoretical underpinning of the research gaps and its applicability to the current study were examined prior to framing the research approach.

2.9 Chapter Summary

Using the funnel- down approach, a thorough literature review was conducted to determine an appropriate solution for the business challenge. Initially four themes were chosen which emerged directly from the research problem, like, “Green finance awareness”, “Green Finance Barriers”. “Green Finance policies”. The funnel- down approach of literature review leads to “Role of technology in Green Bond market”. While reviewing the role of the various financial technologies it was identified that previously the research has not been down on the “Blockchain adoption in green bond market”. So, finally after the study reached to the final Gap of the significance (Kwong, R., 2023).

CHAPTER 3. UNDERPINNING THEORIES

3.1 Introduction

The symbiotic relationship between theory and research is fundamental to academic inquiry. The development of theory hinges on the empirical insights gleaned from research, while research endeavour relies on established theories to frame their investigations. Theories serve as indispensable frameworks that facilitate the comprehension, elucidation, and prognostication of various phenomena. Often, theories are subjected to scrutiny and expansion, broadening the scope of knowledge within their conceptual confines. A robust theoretical foundation not only elucidates the research problem at hand but also guides the analytical and interpretative processes. Consequently, all research endeavours necessitate a solid theoretical backdrop. Simultaneously, theories must undergo continual scrutiny and refinement through empirical research. The findings of such research not only enrich the existing literature but also contribute to the evolution and refinement of the theories underpinning the research inquiry.

In light of the research gaps that were identified and discussed in the preceding chapter, to determine the most appropriate theoretical foundation for the study, an additional new review of the literature was performed. The main emphasis of this study is the viability of implementing blockchain technology in the financial and bond markets, according to the initial evaluation the research area is connected to various theories of technology adoption.

In recent years, the intersection of blockchain technology and sustainable finance has garnered significant attention as a promising avenue for enhancing transparency, efficiency, and accountability within the green bond market (CCICED, 2021; Maiellare, 2022). With the urgent need to address environmental challenges, such as climate change and resource depletion, stakeholders in both public and private sectors are increasingly turning to innovative solutions to align financial activities with sustainability goals (Clark, 2018).
By synthesizing existing research and theoretical perspectives, this review seeks to provide a comprehensive understanding of the drivers and barriers shaping the adoption process of technologies in various fields (Saghafian, 2021), thereby laying a foundation for empirical investigation and practical implementation in the burgeoning field of sustainable finance of green bond markets.

Amidst this landscape, the theoretical frameworks of technology adoption offer valuable insights into the complexities of integrating blockchain within the realm of green finance (Kwong, R., 2023). How rapidly clients embrace modern advances as they progress and create depends on a number of factors, counting the openness of the innovation, customer comfort, buyer require, security, and other empowering factors counting adaptability, protection, and taken a toll adequacy (Richey, 2016). There have been a number of analysts tending to the consumers' selection of modern innovations (Meuter, Ostrom, Roundtree, and Bitner, 2000; Dapp, Stobbe, and Wruuck. 2012). Comprehensively checked on the concepts, applications and improvement of innovation selection models and hypotheses based on the writing survey with the center on potential application for the oddity innovation of Blockchain innovation for the Green Bond markets. The consider incorporates, but were not limited to, the Hypothesis of Dissemination of Advancements (DIT) (Rogers, 1995), the Hypothesis of Sensible Activity (TRA) (Fishbein and Ajzen, 1975), Hypothesis of Arranged Behaviour (TPB) (Ajzen, 1985, 1991), Deteriorated Hypothesis of Arranged Conduct, (Taylor and Todd, 1995) (Latif, 2012), the Innovation Acknowledgment Demonstrate (TAM) (Davis, Bogozzi and Warshaw, 1989, Innovation Acknowledgment Show (TAM2) Venkatesh and Davis (2000) and Innovation Acknowledgment Demonstrate (TAM3) Venkatesh and Bala (2008).

How rapidly clients embrace modern advances as they progress and create depending on several variables, counting openness of innovation, customer comfort, buyer require, security, and other empowering factors counting adaptability, protection, and taken a toll adequacy (Richey, 2016). Numerous analysts have been monitoring how buyers choose contemporary technology (Bitner, Roundtree, Meuter, Ostrom, and Roundtree (2000); Dapp, Stobbe, and Wruuck (2012). Thoroughly examined the ideas, uses, and development of innovation selection models and hypotheses derived from the writing survey, with a focus on the possible applications of Blockchain innovation's strangeness for the Green Bond markets. The consider incorporates, but were not limited to, the Hypothesis of Dissemination of Advancements (DIT) (Rogers, 1995), the Hypothesis of Sensible Activity (TRA) (Fishbein and Ajzen, 1975), Hypothesis of Arranged Behaviour (TPB) (Ajzen, 1985, 1991), Deteriorated Hypothesis of Arranged Conduct, (Taylor and Todd, 1995) (Latif, 2012), the Innovation Acknowledgment Demonstrate (TAM) (Davis, Bogozzi and Warshaw, 1989, Innovation Acknowledgment Show (TAM2) Venkatesh and Davis (2000) and Innovation Acknowledgment Demonstrate (TAM3) Venkatesh and Bala (2008).

3.2 Diffusion of Innovation Theory (DIT) (Rogers, 1995)

According to Rogers (1995), research on adoption and acceptance of innovations should be based on the theory of "diffusion of innovations". By synthesizing evidence from over 508 diffusion studies, Rogers formulated the innovation diffusion theory, which elucidates the adoption of innovations among both individuals and organizations. This theory delineates the mechanisms through which innovations are disseminated over time among various components of a social system via specific channels (Rogers, 1995).

In its basic form, diffusion refers to the gradual spreading of an innovation among individuals within a social system through specific channels. According to Rogers' (1995) innovation diffusion theory, the process of innovation adoption unfolds across various stages, as outlined in the S-shaped adoption curve: innovators, early adopters, early majority, late majority, and laggards. It includes perception, persuasion, selection, implementation and approval. See Figure 3.1 below.

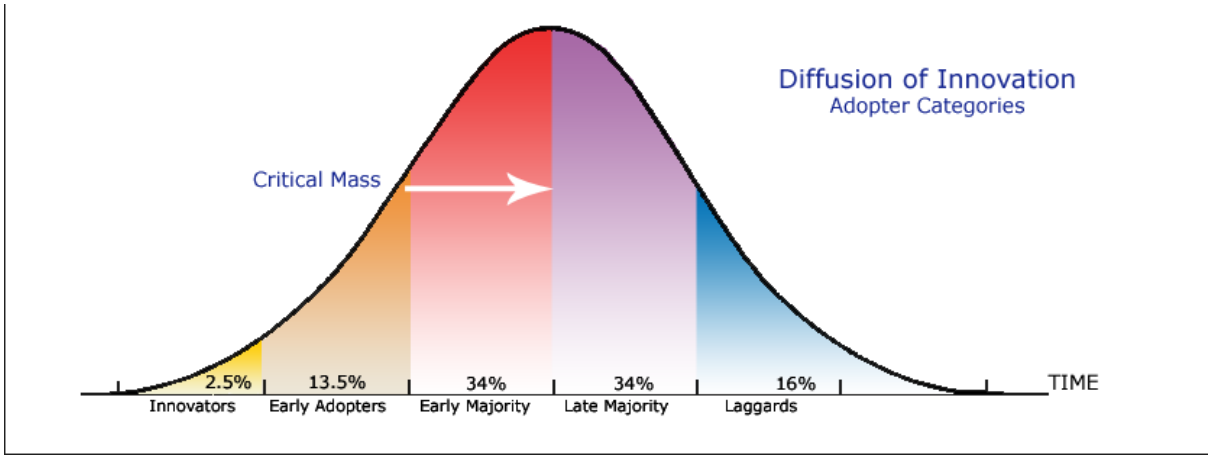


Figure 3.1 Innovation Adoption Curve by Roger, 1995

3.3 Technology Readiness (TR)

Readiness to innovate (TR) denotes individuals' readiness to adopt and utilize novel advancements to attain objectives in both family and professional domains (Parasuraman & Colby, 2001). Parasuraman and Colby (2001) classify innovation consumers based on individual innovation availability and innovation availability scores into five innovation readiness segments: pioneers, early adopters, skeptics, paranoiacs, and slow movers. We will

help you do this. This may be contrasted with Rogers' (1995) pioneer, early adopter, early mass, late milk share, and slow S-shaped selection curves.

Given their market-oriented focus, both innovation diffusion and technological readiness are crucial for the successful implementation of an organization's strategies.

3.4 Task-Technology Fit (TTF)

Goodhue (1995) highlights that task-technology fit (TTF) underscores individual influence. The concept of "individual impact" pertains to enhancements in effectiveness, efficiency, and/or quality. According to Goodhue (1995), a good fit of work technology not only increases the likelihood of its use, but also increases its impact on performance because it is more in line with users' demands and preferences for work. As shown in Figure 3.2, this paradigm is suitable for examining how technology is used in practice, especially when testing new technologies and receiving feedback. Assignment suitability helps evaluate technology apps already on the market, such as the Google Play Store or the Apple App Store (iTunes).

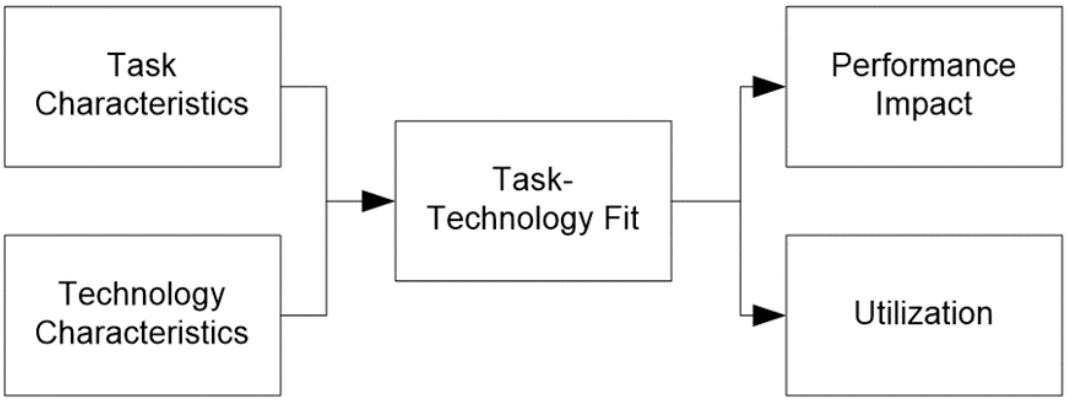


Figure 3.2 Task-technology fit by Goodhue and Thompson in 1995

3.5 Theory of Reasonable Action (TRA) (Fishbein and Ajzen, 1975)

The theory of reasoned action (Fishbein & Agen, 1975) stands as one of the most universally embraced concepts, elucidating the factors that shape an individual's attitude toward a specific behaviour, as depicted in Figure 3.3. Fishbein and Agen (1975) delineated "attitude" as an individual's assessment of an object, "belief" as the connection between an object and an attribute, and "behaviour" as an outcome or objective. A set of beliefs about the purpose of an

action forms the basis of an affective attitude (Rutherford & Di Vani, 2009) (e.g., credit cards are convenient). A person's subjective norm about how group members feel about a particular behaviour (eg, “My peers use credit cards, and having a credit card is.”) is the second element.

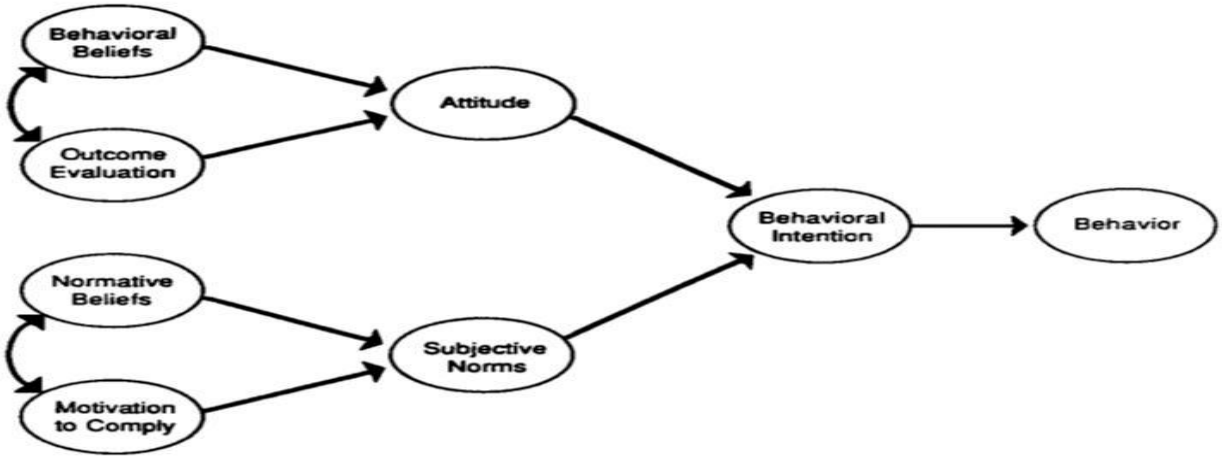


Figure 3.3 “Theory of Reasonable Action” Fishbein and Ajzen in 1975

3.6 Theory of Planned Behaviour (TPB) (Ajzen, 1985, 1991)

Ajzen (1991) formulated the theory of planned behaviour, which centers on a single factor influencing an individual's behavioural intentions, as illustrated in the figure. The initial two components closely resemble those of the theory of reasoned action (Fishbein & Agen, 1975). A third aspect encompasses the controls that consumers perceive as potentially constraining their actions (e.g., Can I apply for a credit card? What are the requirements?).

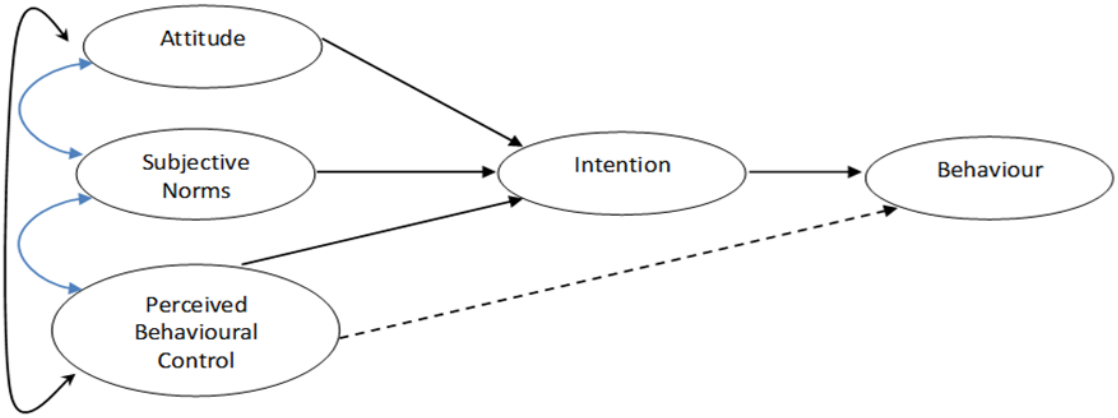


Figure 3.4 The Theory of Planned Behavior (Ajzen, 1991)

3.7 Decomposed Theory of Planned Behaviour (Decomposed TPB)

Taylor and Todd presented the Decomposed Theory of Planned Behaviour (Decomposed TPB) (1995). The demeanour, subjective standards, and seen conduct control are the three key components of the Decayed TPB that impact conduct purposeful and real conduct selection. Shih and Tooth (2004) looked at the TPB and the Decayed TPB to explore the take-up of web banking.

The Theory of Planned Behaviour (Ajzen & Fishbein, 1980; Sheppard, Hartwick, & Warshaw, 1988), Theory of Planned Behaviour (Ajzen, 1991), and Decomposed Theory of Planned Behaviour (Taylor & Todd, 1995) have been extensively studied, predominantly focusing on products already available in the market and considering societal perspectives (Subjective norm).

3.8 Technology Acceptance Model (TAM)

With all suggested and researched hypotheses and frameworks to analyse emerging technology adoption, the Technology Acceptation Model (TAM) has been very common and commonly used for the evaluation of a new Method by researchers around the world (Rondan-Cataluña, 2015).

3.8.1 Versions of TAM

In 1986, Fred Davis proposed the Technology Acceptance Model (TAM), which is shown in the figure 3.5 TAM is a modification of the theory of reasoned action and was specifically developed to simulate consumer acceptance of technology and information systems (Rahman and Marakarkandy, 2017).

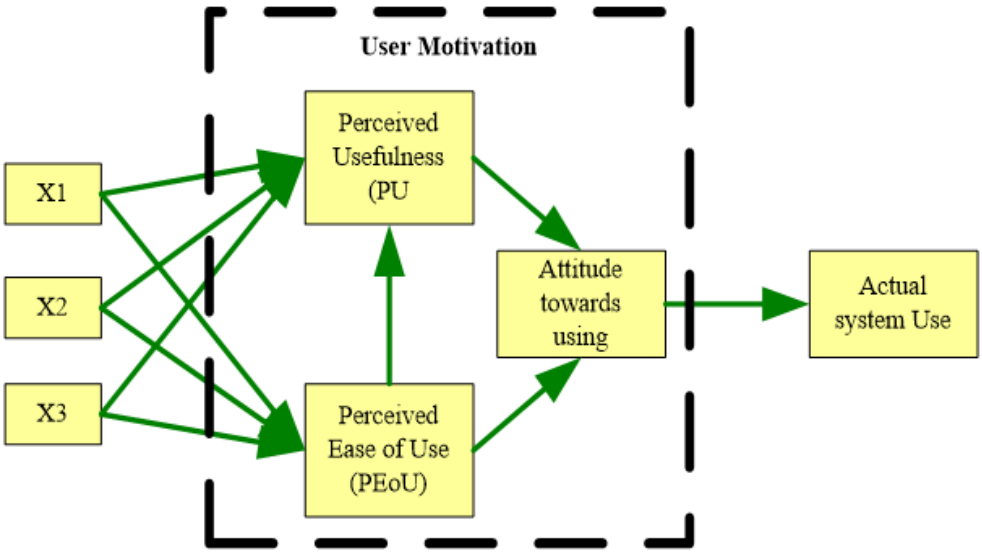


Figure 3.5 Source- Original Technology Acceptance Model, Davis 1986

In 1989, Davis applied the Technology Acceptance Model (TAM) to elucidate the patterns of computer use depicted in the figure 3.6. Davis' (1989) TAM seeks to unveil the fundamental factors influencing user behaviour regarding various end-user computing technologies and user demographics (Xu and Quaddus, 2007). Perceived usefulness (PU) and perceived ease of use (PEU) were two specific beliefs examined in the foundational model of TAM (PEU). Perceived usefulness refers to the subjective likelihood of a prospective user to utilize a specific system (Pan and Jordan-Marsh, 2010), such as a unified electronic payment platform. Perceived ease of use, on the other hand, hinges on the anticipated ease with which potential users expect to interact with the intended system (Davis, 1989). Additionally, external variables, termed as such in TAM, can impact individuals' perceptions regarding the adoption of the new technology system (Jin, 2014).

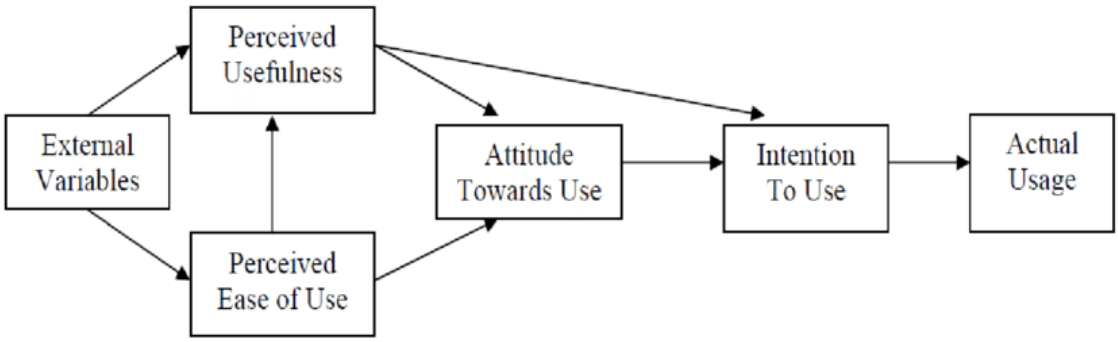


Figure 3.6 Source-First modified version of TAM, Davis, 1989 .

In line with groundbreaking discoveries indicating that perceived usefulness and ease of use have a direct impact on behavioural intentions, there arises a diminished necessity for attitudinal constructs, Venkatesh and Davis (1996) argue that technologies such as our final version We developed the acceptance model. It is shown in the figure 3.7.

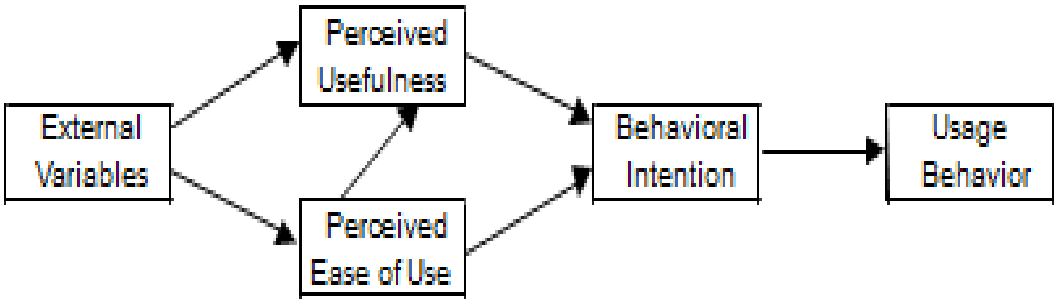


Figure 3.7 Source- Final Version of TAM, Venkatesh and Davis in 1996

Venkatesh and Davis (2000) introduced TAM 2, illustrated in Figure 3.8, which offered a more comprehensive understanding of why users perceive a particular system as valuable at three distinct time points: pre-installation, one-month post-deployment, and three months post-deployment. According to TAM2, users' perception of a system's effectiveness is shaped by their subjective evaluation of workplace objectives and the significance of the outcomes derived from using the system to fulfil their job requirements (Venkatesh & Davis, 2000). The findings indicated that TAM 2 exhibited significant efficacy in both mandatory and voluntary settings.

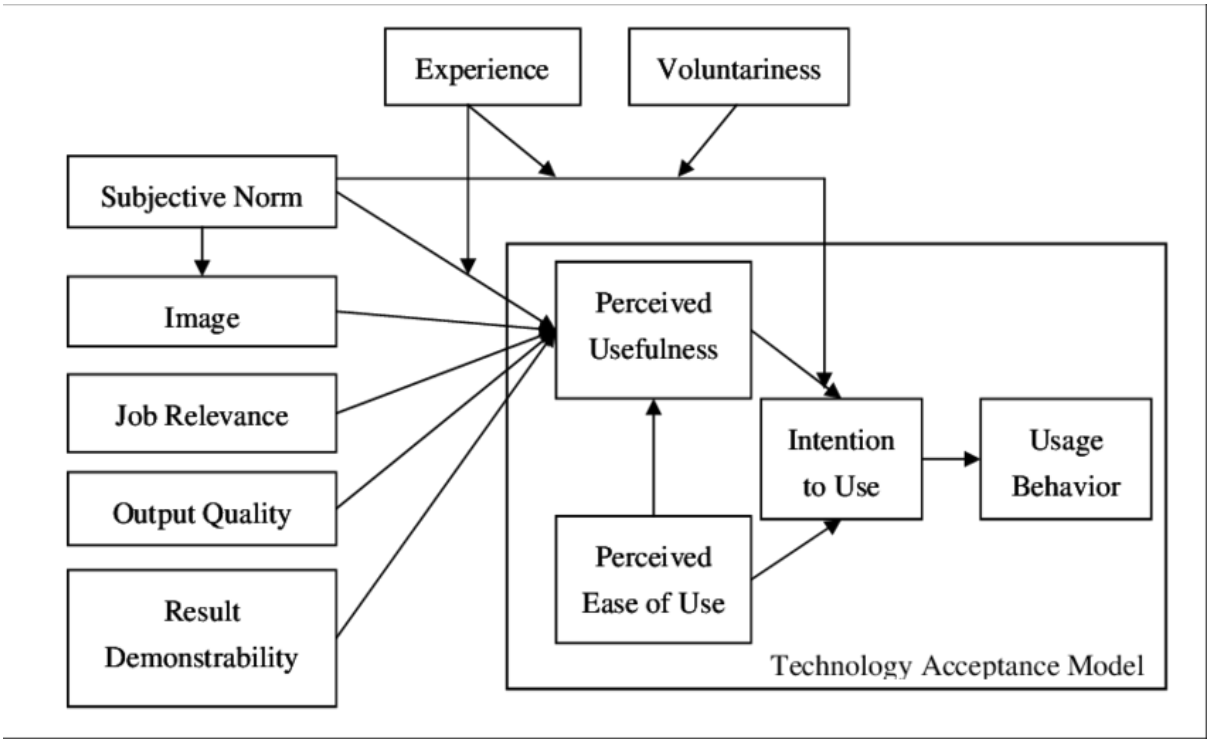


Figure 3.8 Source Technology Acceptance Model (TAM 2) (Venkatesh and Davis, 2000).

Venkatesh and Bala (2008) introduced TAM3, depicted in Figure 3.9 below, by integrating TAM2 (Venkatesh and Davis, 2000) with determinants of perceived ease of use (Venkatesh, 2000). The authors incorporated individual differences, contextual factors, social influences, and motivational aspects into TAM3's design, which constitute the determinants of perceived usefulness and ease of use.

In the TAM3 research model, experience acts as a moderating factor in the connections between perceived usefulness and perceived ease of use, computer anxiety and perceived usefulness, and perceived usefulness and behavioural intentions (Tırpan & Bakırtaş, 2020). The TAM3 research framework underwent testing within an authentic IT deployment setting.

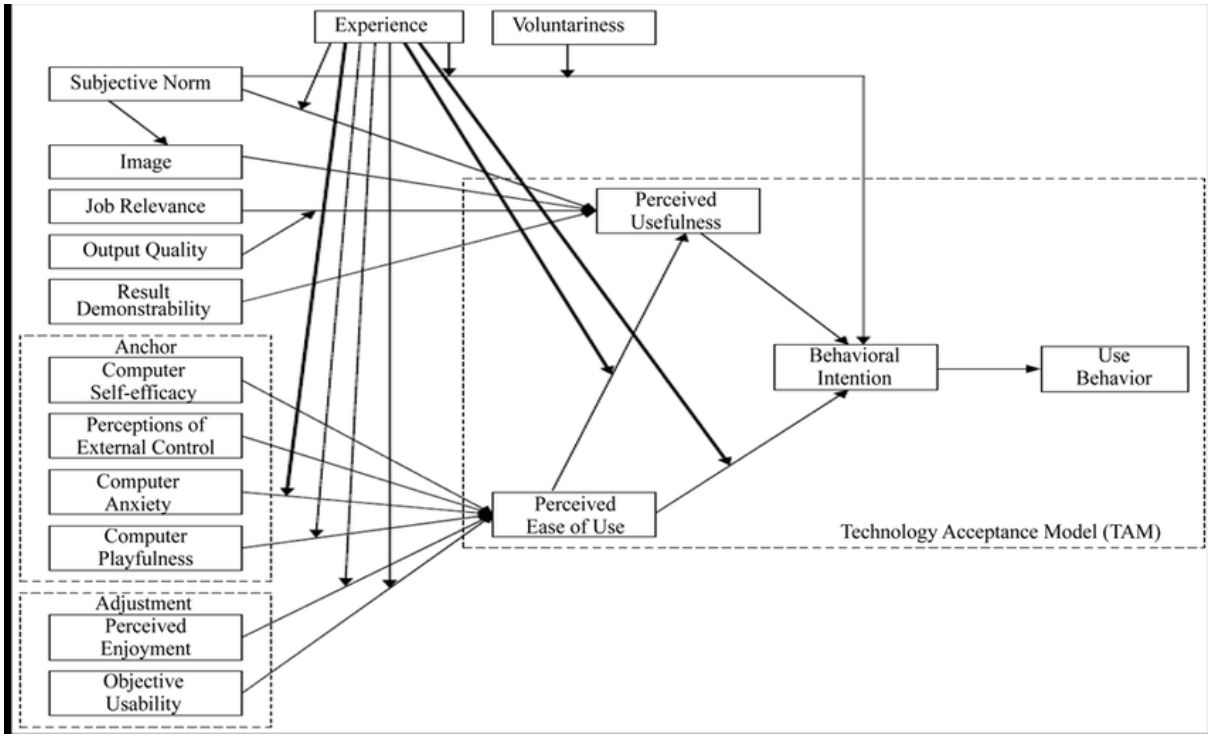


Figure 3.9 Source TAM Venkatesh and Bala (2008)

Figure 3.10 illustrates the Unified Theory of Technology Acceptance and Use (UTAUT), which was formulated by Venkatesh, Morris, Davis, and Davis in 2003 subsequent to an in-depth examination of prior models and theories. Expected performance, expected effort, social influence, and facilitators are the four determinants of users' behavioural intention that constitute UTAUT (Catherine, 2017; Fedorek, 2021). In the UTAUT model, performance expectations encompass five interconnected dimensions: perceived usefulness, extrinsic motivation, job fit, relative advantage, and outcome expectations (Twum, 2022). On the other hand, effort expectancy incorporates the concepts of perceived simplicity and complexity. According to a validation study conducted by Venkatesh in 2003, social environment had no effect on volunteering conditions.

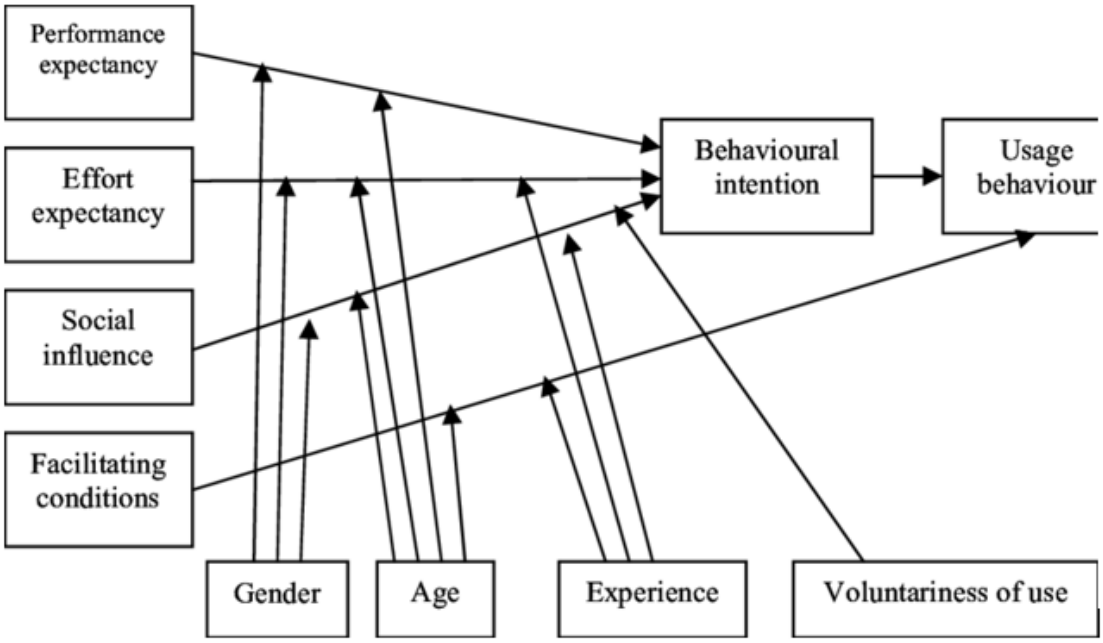


Figure 3.10 Source-Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis and Davis, 2003).

3.9 TAM Theory & Blockchain Technology

This study seeks to delve into the theoretical foundations of technology adoption, with a specific emphasis on the Technology Acceptance Model (TAM) and other relevant models. The objective is to unravel the factors that shape the adoption of blockchain technology in facilitating the development of green bond markets. The purpose of this proposal is to concentrate on the utilization of blockchain methodologies to establish viable green bond markets in India. In this study, we have formulated a conceptual TAM model incorporating various system quality aspects, including Market access, premium pricing, traceability and reliability, transparency and fair trade, sustainability, guidelines and principles, complexity and security, discomfort, insecurity, perceived self-efficacy, and validation as dependent variables. The independent variables encompass perceived ease of use, perceived usefulness, attitude towards use, and behavioural intentions. As such, we have developed a framework and proposed a theoretical model. To date, there appears to be no published research that has effectively amalgamated the TAM framework with a thorough examination of system quality facets. Considering the importance and applicability of this field, it necessitates further exploration.

In the world of industry, technical innovation still plays an important part. Technological advancements also encourage information dissemination. However, technology is of no value before it is approved or utilised (Oye, Iahad, and Rahim 2014). While the word adoption describes a person basis, diffusion may be regarded as mass adoption. Adoption of technologies would expand (Sharma and Mishra 2014). Therefore, it is highly necessary to consider technological acceptance. Carr, 1999 has described technological adoption as the 'process for a person or company choosing a technology for their usage.' Technological adoption may also be defined as a desire among a community of individuals to use technology in regards to their advantage (Samaradiwakara and Gunawardena 2014). Several studies found that acceptance of technology is not linked only to technical aspects but has grown into a much more complicated mechanism that involves aspects of consumer behaviour, personality and social influence (Venkatech, Thong and Xu 2012) (Ajcen and Fishbein 1980), confidence, as well as a number of criteria for facilitation (Gefen, Karahanna and Strauben 2003; Thompson, Higgins, and Howell 1991; Mattke, 2022).

Ma et. al (2018) analyses Source separation of municipal solid waste (MSW) is a crucial determinant for the progress of the entire MSW management mechanism, particularly in China. MSW's separate selection relies strongly on the involvement of the community, which motivates a detailed knowledge of the key variables that affect. The paper analyses the impact of household behaviours, subjective norms, assumed behavioural influence and environmental influences on their overall actions via an expanded Theory of Planned Behaviour (TPB). A case study was performed in Guilin, Guangxi Zhuang Autonomous Zone, China which represents large areas with a below national average GDP. A path analysis was performed after collecting 848 valid responses of questionnaires. The results show that the actions of individuals and situational variables are major predictors of their behavioural intentions whereas behavioural regulation and intention play a significant role in predicting MSW source-separated behaviour in collection. The ramifications of these results were also explored for the design of marketing campaigns and for the improvement of waste management programmes.

Verma and Sinha, 2018 reported that the implementation of AES as a method for inclusive rural farmland growth can be used. This study delves into prior endeavours concerning mobile AES, aiming to pinpoint crucial factors influencing the adoption of such technology in rural areas, with a specific emphasis on the principles of technology acceptance (TAM). A survey involving 327 rural residents was conducted to examine the interplay of various factors

influencing the adoption of mobile AES. Structural equation modeling was employed to analyse the relationships among perceived utility (PU), perceived ease of use (PEOU), social influence (SI), attitude (At), perceived economic well-being (PEWB), and behavioural intention (BI). The findings reveal that social influence impacts PEOU, PEWB, and PU, but not BI. Furthermore, PEOU influences PU and attitude, whereas BI is influenced by attitude and PU. Additionally, PEOU and PEWB are found to precede PU. However, the study indicates that PEWB does not influence either attitude or BI.

Larasati and Santosa (2017) mentioned the growing usage of technical readiness and consumer adoption as a reference in the introduction of new technology. The collaboration of the Technology Readiness Index (TRI) and the Technology Adoption Model (TAM) involves evaluating the integration of new technology adoption constructs tailored to a particular business sector. The data was obtained in the Yogyakarta Regency of Indonesia from 40 individuals covering 222 Craft Micro, Small and Medium Enterprises. An integrated data system (ERP) was developed using four basic modules, such as Development, Sales, Marketing and Finance, in the context of research on SMEs in Indonesia carried out by other former researchers. The analysis revealed that the combined frameworks of TRI and TAM offer enhanced insights into the functioning of ERP systems.

Issa and Hamm, 2017 discusses Syrian FFV farmers' intentions and behaviours towards organic farming and their prospects of turning their farms into organic farming in the next 5 years. 266 traditional FFV farmers were chosen for this survey via a two-stage cluster sampling process in 75 villages in separate districts of the coastal area of Syria. From December 2012 to mid-May 2013, Data collection involved conducting face-to-face interviews as a component of a collaborative project in Syria, specifically engaging with the Citrus Fruit Committee in Tartous. Utilizing the Theory of Planned Behaviour as the conceptual framework and employing Partial Least Squares Path Modeling as the primary analytical approach, the research uncovered that a significant proportion of farmers practiced methods consistent with certified organic production. Additionally, they demonstrated favourable attitudes and intentions towards embracing organic production techniques over the forthcoming five years.

Xie (2017) identified the primary factors for citizens' behaviour in e-government, discussing the interactions between these variables, and whether the model suggested will offer an overall explanation of e-government adoption. Data collection involves conducting a survey to assess

The Cronbach's alpha coefficient was computed to assess the internal consistency reliability of the measurement scales, validating confirmatory factor variables for the measurement model, and employing a structural equation model to examine the proposed theories and determine the determinants of e-government acceptance. The findings demonstrate that the model presented is a robust model with clear explanations for variation. Moreover, there are some modern ties in the field of e-government, the trustworthiness of which has positive impact on societal expectations, while perceived risks affect perceived behaviour control negatively.

Oliveira, 2014 stated that the cell phone unquestionably has created a paradigm change that affects the lives of both the user and the business community. The introduction of mobile banking has a major effect on cost savings and retail banking improvements. Factors influencing the decision to adopt or utilize mobile banking significantly impact mobile banking service providers. The findings suggest that TRI-TPB and TAM serve as valuable indicators for comprehending the behaviour of Indian mobile banking users.

In his study on Blockchain innovation (BT), Howell (2016) proposed that BT has the potential to revolutionize the way transactions are conducted within the supply chain. By mitigating trust-related challenges in supply chains, BT fosters increased accountability and transparency. Howell constructs and tests a model to elucidate consumer expectations regarding BT adoption in the supply chain. This model integrates three theoretical frameworks: the Technology Acceptance Model (TAM), the Technology Readiness Index (TRI), and the Theory of Planned Behaviour (TPB). The proposed demonstration has been evaluated based on a study involving 181 supply chain professionals in India. The inquire about discoveries uncovered that the develops seen convenience and demeanour, state of mind and purposeful, believe and demeanour, and seen ease of utilize and seen utility have positive and solid relationship.

Alalwan (2016) outlines the principal factors driving Jordanian customers' decisions to adopt mobile banking (MB). Building upon the Technology Acceptance Model (TAM), a conceptual model (TAM) was proposed, enhanced by integrating perceived risk and self-efficacy as external influences. Structural equation modeling (SEM) was employed to analyse the data collected from a field survey conducted with Jordanian banking customers, utilizing a convenience sample. The results revealed a significant impact of behavioural intention on perceived usefulness, perceived ease of use, and perceived risk.

According to Folkinshteyn and Lennon (2016), the Technology Acceptance Model (TAM) serves as a crucial tool for examining the social dynamics of technology adoption, garnering considerable attention in the literature. In order to examine facets of the technology adoption process, the author uses the TAM paradigm in Cryptocurrency, by thoroughly examining current theoretical and realistic literature on TAM and Bitcoin as money as well as blockchain as financial technology. The study Recommends use of TAM model for analysing the bitcoin adoption behaviour.

Kumpajaya and Dhewanto (2015) deal with this problem by creating a technical acceptance model that meets Indonesia's Environment specific features by expanding the TAM. The (TAM). applied Bitcoin information, and potential risk as additional external variables to TAM, in the perceived compatibility of Invention Diffusion theory, by Everett Rogers (1962). These data were gathered from 108 Bitcoin users from separate online forums in Indonesia, and examined with Path Modelling from a partial least square (PLS). The findings showed that compatibility and knowledge actually influence the intention of users towards Bitcoin. The findings indicate that perceived compatibility and awareness viewed for Bitcoin impact Bitcoin's purpose of adoption.

In their work, Gao and Bai (2014) build up a comprehensive show of factors to evaluate the adequacy of IoT innovation by the client. On the premise of the innovation tolerating show (TAM), the creators proposed a three-factor IoT acknowledgment demonstrate (seen value, seen ease of utilize and believe); one social foundation calculate (social impact) and two person highlights (seen delight and seen behavioural control). For the calibration of the think about demonstrate utilizing the basic condition demonstrate, information from 368 Chinese shoppers were utilized. The discoveries were particularly clear in support of the suggestions of seen convenience, seen ease of utilization, social affect, seen satisfaction and see conduct control. Believe, in any case, played a minor part in foreseeing the deliberate. Besides, seen ease of utilize and believe moreover impacted seen convenience.

Table 3.1 Theme 2- Gap in Theoretical Premise (TAM)

No	Theme- TAM Sub- Themes	Gap	No of doc. Referred	References
1	**Self- efficacy**	Further investigation can be done on continuance intention to adopt blockchain technology in Finance by adopting models like Innovation Diffusion Theory (IDT) model, TAM, TRA, TBP, TTF and Technology Acceptance Model (TAM).	10	Ajay Kumar Shrestha (2019), Kamble, Gunasekaran & Arha (2018), Ullah (2018), Antonio T.F. LoU (2017), Daniel Folkinshteyn (2017), Junita JuwitaSirega (2017), Carolyn A. Lin (2016), QingfengWang (2016), Ariff (2012), Holden (2011),
		This work opens the door for further investigation of the development of Bitcoin and related blockchain technologies for researchers and illustrates the efficiency of the TAM in analysing features of new technology.		
		Few businesses in India are planning to incorporate the relatively new notion of BT in their organisations. The authors anticipate that BT will be adopted more widely.		
		There is a need for research to investigate the relationships among situational factors, social variables (including various forms of social interaction),		

		experience with traditional games, and game content (such as narrative style) concerning the inclination to engage in computer gaming.		
2	**Resistance to change**	Additional investigation is necessary to enhance comprehension of the motivation for and receptivity to mobile learning. It is necessary to use various educational settings with higher sample sizes.	6	W. Boonsiritomachai (2017), Amornkitpinyo (2017), Rese (2014)
		Further research is needed to gain a deeper understanding of the motivation for and acceptance of mobile learning. It is necessary to use various educational settings with higher sample sizes.		
3	**Situational variable, Social variable, Experience**	To determine whether they are beneficial as outside variables for the TAM, many additional components still need to be investigated. Moreover, IS scientists can continue explore M-learning acceptability and adoption by expanding TAM with elements from other theories/models.	7	Mostafa Al-Emran (2018), Bazelais (2018)

		Future research may attempt to extrapolate the TAM to additional SBL contexts with various student groups, levels of higher education, and programme offerings.		
4	**Intention to accept-influence of unexpected factors/events**	In order to better understand motivation for and acceptance of mobile learning, further research is required. It is necessary to use various educational settings with higher sample sizes.	4	Lisa Schmidthuber (2020), Surabhi Verma (2018), Stavros A. Nikou (2021), Chien-fei Chen (2017)
		Industry and policy makers should continue to look into consumers' wants, worries, and perceptions of the technology's features in light of the swift development of SMs and smart home technology, and they should propose rules based on the examination of these elements.		
		These findings can assist policymakers create framework conditions that are conducive to the adoption of services based on technological advancements, and this knowledge could		

		promote a more prosperous economy and society.		
		To prevent combining research studies that evaluate elements at various levels of abstraction, comparative studies must define the operationalization and conceptualization of the constructs. A method for anticipating and comprehending the mediating effects of various elements is developed through the identification and testing of alternative models.		
5	**Intention-situational variable, social variable, experience**	To determine whether they are beneficial as outside variables for the TAM, many additional components still need to be investigated. Moreover, IS scientists can continue explore M-learning acceptability and adoption by expanding TAM with elements from other theories/models.	4	Rohollah Rezaei (2020), Arash Vahdat (2021), Mostafa Al-Emran (2018), David John Lemay (2018),
		Future research may attempt to extrapolate the TAM to additional SBL contexts with various student groups,		

		levels of higher education, and programme offerings.		
		This study offered a road map for a deeper comprehension of the critical elements influencing farmers' ecological conservation behaviour as well as post-implementation initiatives aimed at promoting IPM technology in developing nations.		
		To identify the evolving patterns of customers' demands and wishes, a longitudinal study of customer behaviour in respect to a certain mobile app could be carried out.		

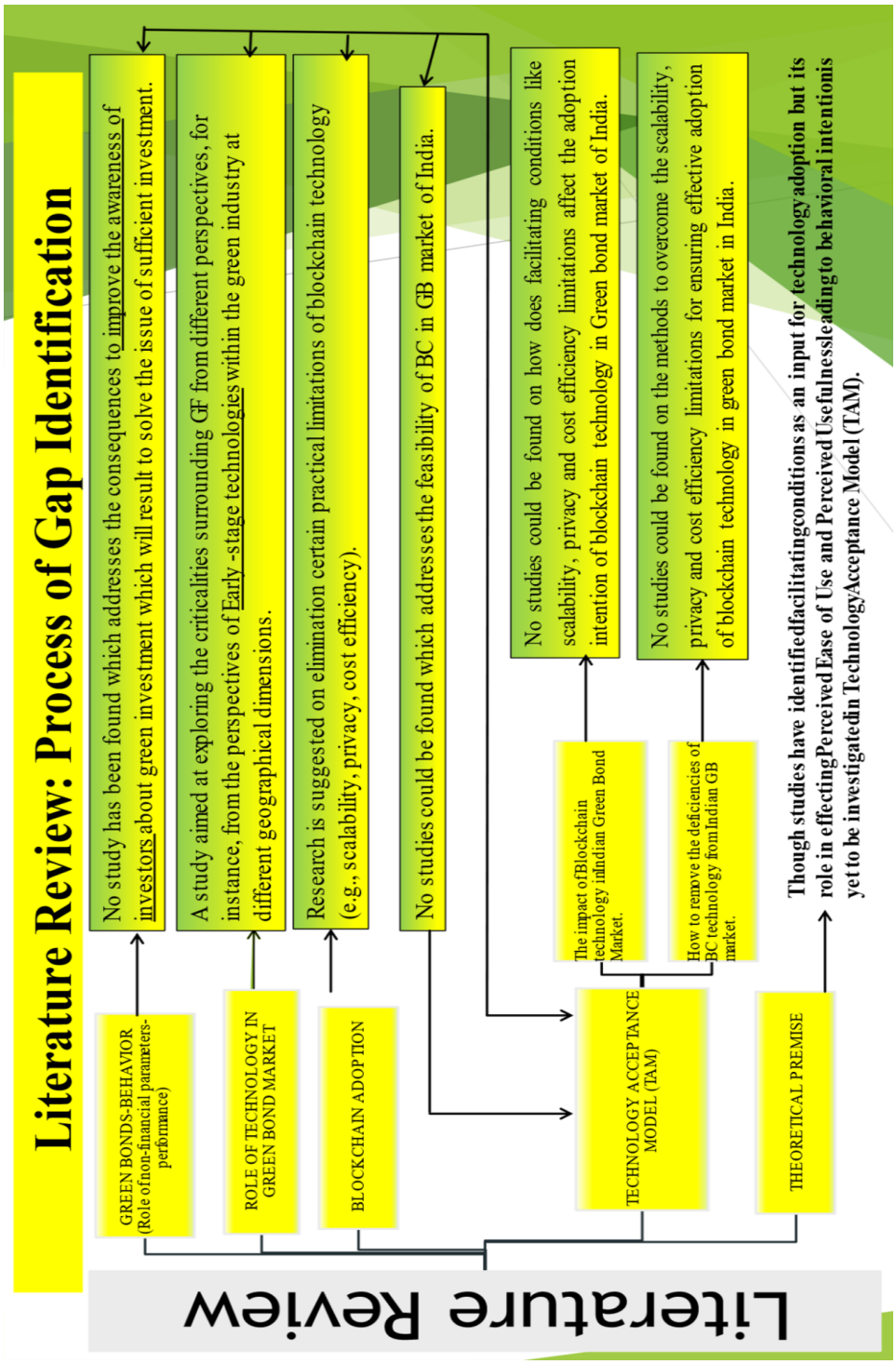


Figure 3.11 Literature Review: Process of Gap Identification

On the basis of above literature study of the theoretical premise, it has been found that the Technology Acceptance Model Theory is the most relevant for this study. Also, previously researchers have not yet worked about the blockchain technology adoption for Green bond markets.

After reviewing the existing literature, the final gap identified is that while previous studies have recognized facilitating conditions as a factor in technology adoption, its specific role in enhancing perceived ease of use and perceived usefulness, ultimately influencing behavioural intention, remains unexplored within the Technology Acceptance Model (TAM).

3.10 Gaps in the Theoretical Premise

Based on the gaps identified during the literature survey, main gaps were formulated which are given below:

Though studies have identified facilitating conditions (scalability, privacy and cost efficiency) as an input for technology adoption but its role in effecting the investigation of how Perceived Ease of Use and Perceived Usefulness contribute to behavioural intention within the framework of the Technology Acceptance Model (TAM) remains an area that requires further exploration.

The study examines external constructs such as facilitating conditions (including scalability, privacy, and cost efficiency) as inputs for the adoption of blockchain technology and their influence on Perceived Ease of Use and Perceived Usefulness, ultimately impacting behaviour intention. This relationship has not yet been explored within the Technology Acceptance Model (TAM). Therefore, the variables to be analysed in this study encompass the association between facilitating conditions and stakeholders' perceptions of usefulness and ease of use, which subsequently influence their intention to adopt blockchain technology and, ultimately, its actual usage. So, for analysing the relationship of all these variables the TAM 2 version is the best fit as the theoretical base for this study as mentioned in figure 21 First modified version of TAM, Davis, 1989.

3.11 Research Problem

“How facilitating conditions (scalability, privacy and cost efficiency) effect the behavioural intension of technology adoption in Green Bond markets?”

3.12 Chapter Summary

All research endeavours rely on a robust theoretical framework to facilitate thorough analysis and interpretation. Simultaneously, theories must undergo continual scrutiny and refinement through empirical studies. In the context of this investigation into technology adoption within green bond markets, it is pertinent to connect with relevant theories. The study examines external constructs such as facilitating conditions (including scalability, privacy, and cost efficiency) as inputs for the adoption of blockchain technology and their influence on Perceived Ease of Use and Perceived Usefulness, ultimately impacting behavioural intention. This relationship has not yet been explored within the Technology Acceptance Model (TAM). Therefore, the variables to be analysed in this study encompass the association between facilitating conditions and stakeholders' perceptions of usefulness and ease of use, which subsequently influence their intention to adopt blockchain technology and, ultimately, its actual usage.

The findings derived from TAM have played a pivotal role in developing a wide range of applications, including but not limited to market access, premium pricing, traceability and reliability, transparency and fair trade, sustainability guidelines and principles, complexity and security considerations, as well as aspects such as discomfort, insecurity, and perceived self-efficacy. These are viewed as dependent variables, while perceived ease of use, perceived usefulness, attitude towards use, and behavioural intentions are regarded as independent variables, among others.

Despite the extensive utilization of TAM in various contexts, there appears to be a notable gap in comprehensive studies focusing on its application to blockchain adoption within green bond markets. This study endeavours to address this gap by examining how facilitating conditions such as scalability, privacy, and cost efficiency impact the behavioural intentions associated with technology adoption within green bond markets.

Every research problem presents unique challenges and necessitates tailored solutions that align with its specific nature. The next chapter covers the hypothesis development on the basis of the relationship between the constructs of the proposed framework.

CHAPTER 4- RESEARCH METHODOLOGY

4.1 Introduction

Research methods comprise the tactics, processes, or approaches employed to collect and analyse data for uncovering new insights or enhancing understanding of a subject (Rassel et al., 2020). The selection of a research methodology depends on the specific characteristics of the issue under investigation (Amaratunga et al., 2002). Research methodologies encompass quantitative, qualitative, and mixed methods approaches (Taherdoost, 2022). Selecting the most suitable methodology is contingent upon the specific characteristics and objectives of the study at hand.

Quantitative methodology entails the systematic analysis of measurable data obtained throughout the study, while qualitative methodology involves subjective evaluation of various attributes (Johnson, 2007). Mixed methodology integrates elements of both quantitative and qualitative approaches (Guetterman & Fetters, 2018). The process of selecting the methodology was undertaken during the research design phase of this study, as detailed in the subsequent sections.

This section delineates the rationale behind the study, articulates the problem statement, formulates research questions, delineates research objectives, and elucidates the research design employed for data collection and analysis. Additionally, this chapter explores the impact of blockchain technology on the green bond market, details the sampling process, outlines survey administration procedures, and expounds upon the statistical methods utilized for data analysis.

4.2 Research Problem

> How facilitating conditions (scalability, privacy and cost efficiency) affect the behavioural intention of technology adoption?

The study focussed on the facilitating conditions for the adoption intentions for blockchain technology of the stakeholders and to develop a framework to overcome any limitations for the

adoption of the technology. So, on that basis many research questions arise and this study focuses on the following questions:

4.3 Research Questions

Research objectives serve as a roadmap outlining the precise steps necessary to tackle the research problem effectively. In response to the research problem outlined in the preceding chapter, The research objectives outlined are as follows:

1. To investigate the relationship between facilitating conditions (specifically scalability, privacy, and cost efficiency limitations) and the intention to adopt blockchain technology in the Green Bond markets.

2. To examine how facilitating conditions (including scalability, privacy, and cost efficiency limitations) influence the adoption intention of blockchain technology within the Green Bond market.

4.4 Research Objectives

The study concentrates on identifying the facilitating conditions influencing stakeholders' intention to adopt blockchain technology and aims to devise a framework to address any limitations hindering the technology's adoption. Hence, the research objectives are delineated as follows:

1. To study the relationship of facilitating conditions (scalability, privacy and cost efficiency limitations) with technology adoption intention of blockchain technology in Green Bond markets in India

2. To develop a suggestive framework to overcome the scalability, privacy and cost efficiency limitations for adoption intention of blockchain technology in Green Bond markets in India.

In accordance with the research objectives, a sequential research methodology has been adopted for this study, integrating both qualitative and quantitative approaches, commonly

referred to as mixed methodology. Figure 5.2 illustrates the key factors central to the overall research study plan, visually depicting the interconnectedness of both methodologies.

4.5 Research Design

As per Hakim (2012), a research design entails organizing conditions for data collection and analysis in a way that strives to balance relevance to the research purpose with efficiency in procedure.

Types of research

A research study can be classed as descriptive, correlational, explanatory, or exploratory depending on its objectives.

Descriptive research endeavors to systematically depict a scenario, topic, phenomena, service, or program. It may also offer insights into aspects such as the living conditions of a community or attitudes regarding a particular issue. Correlational research aims to identify or establish relationships or interdependencies between two or more characteristics of a situation (Furnham & Ribchester, 1995). Explanatory studies seek to elucidate why and how two or more features of a situation or phenomena are interconnected. Exploratory research is undertaken to gain deeper insights into a subject with limited existing knowledge or to assess the feasibility of conducting a specific research project, such as a feasibility study or pilot study (Dawson, 2002). **In this study a combination of the all these three categories is used.**

Additional research methodologies include Quantitative research and Qualitative research. Quantitative research involves explaining phenomena by gathering numerical data that are analysed using mathematically based methods, particularly statistics (Lewin, 2005). *Qualitative research seeks to offer insights into the causes and mechanisms driving human behaviour, providing detailed understanding of human behaviour (Rosenthal, 2016). Quantitative methods facilitate hypothesis testing through systematic collection and analysis of data, whereas qualitative methods enable thorough exploration of ideas and experiences.*

In this study Mixed method approach is used. Quantitative method used is Structural Equation Modelling (SEM) followed by qualitative method of Framework Analysis.

The term "mixed methods" describes a developing research methodology that promotes the systematic blending or integration of quantitative and qualitative data in a single study or ongoing research endeavor. This methodology operates on the fundamental principle that such integration allows for a more comprehensive and synergistic utilization of data compared to separate quantitative and qualitative data collection and analysis processes (PCMH Research Methods Series, 2013).

The proposed work is intended to be conducted by using mixed method approach of Quantitative method used is Structural Equation Modeling (SEM) followed by qualitative method of Framework Analysis.

4.6 Research Process Overview

Prior to delving into the specifics of research methodology and techniques, it is pertinent to provide a succinct overview of the research process. The research process entails a series of sequential activities or steps crucial for conducting research effectively. Thus, the flowchart outlining the steps undertaken to accomplish research objectives is depicted in Figure 4.1 below.

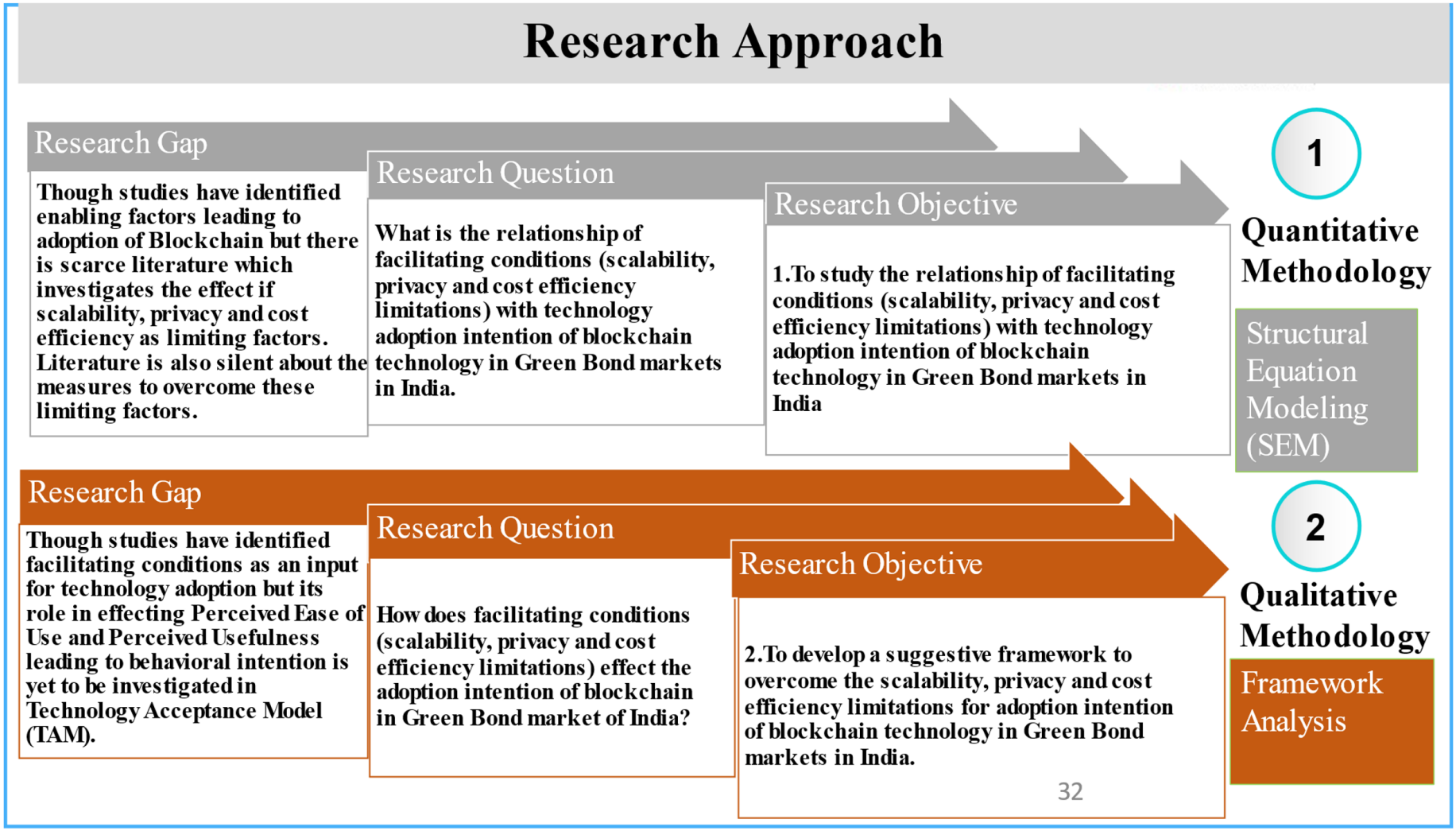


Figure 4.1: The Research approach comprise of the above-mentioned activities which include identification of research gap, followed by research question and on the basis of questions research objectives are formulated to be achieved.

4.7 Research Approach

In figure 4.1, the complete research approach has been mentioned. Based on the research gaps identified through the literature review, the research questions were formulated, which subsequently led to the establishment of the research objectives. For analysing the first objective quantitative methodology has been applied in which SEM analysis has been done through the AMOS software.

Subsequently, the outcomes of the first objective inform the progression to the second objective, which involved qualitative research analysis. In this phase, framework analysis tools were employed, encompassing document analysis and expert panel interviews.. The results then coded through the vivo coding in ATLAS-ti qualitative analysis software.

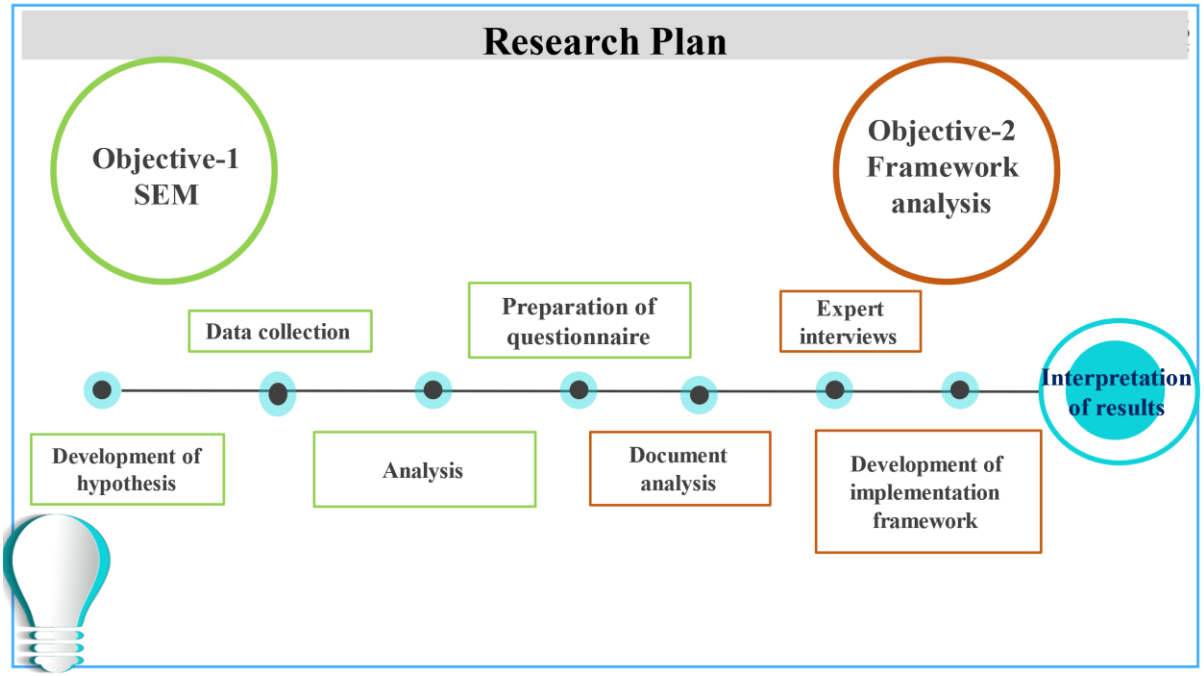


Figure 4.2: The research plan revolves around two primary research objectives, each facilitated by specific analytical tools aimed at deriving meaningful outcomes. For objective 1, Sequential equation modelling is used as analytical tool for objective 1 and framework analysis for objective 2.

As mentioned in figure 4.2, the complete research plan which explains that in SEM analysis, the first the data has been collected through the questionnaire and then the analysis has been

done. In framework analysis the document and interview analysis has been done on the basis of which the final interpretations were mentioned and a framework has been proposed.

Table 4.1 Factors and Methods of research

Factors	Description
Business Problem	Facilitating environmental limitations of blockchain technology adoption are leading to opportunity loss in green bond market.
Research Gaps	1. Less studies could be found on how does facilitating conditions like scalability, privacy and cost efficiency limitations affect the adoption intention of blockchain technology in Green bond market. 2. Less studies could be found on the measures to overcome the scalability, privacy and cost efficiency limitations for ensuring effective adoption of blockchain technology in green bond market.
Theoretical Gaps	Though studies have identified facilitating conditions as an input for technology adoption but its role in effecting Perceived Ease of Use and Perceived Usefulness leading to behavioural intention is yet to be investigated in Technology Acceptance Model (TAM).
Research Problem	How facilitating conditions (scalability, privacy and cost efficiency) effect the behavioural intension of technology adoption?
Research Question	1.What is the relationship of facilitating conditions (scalability, privacy and cost efficiency limitations) with technology adoption intention of blockchain technology in Green Bond markets? 2.How to overcome the facilitating conditions (scalability, privacy and cost efficiency limitations) for ensuring effective adoption of blockchain technology in Green Bond Market?
Research Objectives	1.To study the relationship of facilitating conditions (scalability, privacy and cost efficiency limitations) with technology adoption intention of blockchain technology in Green Bond markets.

	2.To develop a suggestive framework to overcome the scalability, privacy and cost efficiency limitations for adoption intention of blockchain technology in Green Bond markets
Research Methodology	1.Quantitative Methodology by Sequential Equation Modelling (SEM) Analysis and grounded theory. 2.Qualitative Methodology by Framework Analysis (Combination of Document analysis and interview analysis).

In above table 5.1, the factors and methodology of the research have been mentioned.

4.8 Objective 1.

To study the relationship of facilitating conditions (scalability, privacy and cost efficiency limitations) with technology adoption intention of blockchain technology in Green Bond markets.

4.8.1 Structural Equation Modeling (SEM)

Structural equation modeling (SEM) is a statistical technique devised to explore the interconnections among numerous variables, incorporating both exogenous and endogenous factors (Hair, 2021). Multiple regression, route analysis, and factor analysis are the three statistical methods that make up the methodology (Musil, 1998). The aim of structural equation modeling (SEM) is to evaluate the extent to which a specified theoretical model, often characterized by a set of relationships among different constructs, is validated by the gathered data. SEM is a method for confirmatory rather than exploratory analysis (Perry, 2015). This entry serves as a non-mathematical introduction to SEM with a focus on its advantages, applications, and fundamental underlying premises. The methodology's key ideas are explained, along with concise comparisons to other multivariate analyses (Salkind, 2010). The term "auxiliary condition demonstrating," because it is presently utilized in human science, brain research, and other social sciences, advanced from Sewall Wright's past approaches to genetic course displaying. Within the 1960s and 1970s, computer-intensive executions gave rise to their modern forms. SEM created in three unmistakable bearings: frameworks of condition relapse strategies, which were essentially created at the Cowles Commission; iterative greatest probability way investigation calculations, which were clear mission at the

Instructive Testing Benefit and afterward at Uppsala College by Karl Gustav Jöreskog; and iterative canonical relationship fit calculations, which were moreover created at Uppsala College by Hermann Wold. A noteworthy parcel of this advancement took put at a time when robotized computing was giving critical advancements over the calculator and simple computing strategies that were as of now in utilize, both of which were the results of the blast of office hardware developments within the late 20th century. The 2015 content Basic Condition Modelling: From Ways to Systems gives a history of the strategies. (Westland, 2015). Structural Equation Modelling: From Paths to Networks. New York: Springer.)

SEM serves as a comprehensive statistical approach for examining connections between latent and observable variables (Hoyle, 1995). It involves the representation, computation, and evaluation of a theoretical framework consisting primarily of linear relationships among variables (Rigdon, 1998). It examines potential directional and nondirectional relationship patterns between a group of measurable and latent variables that are both observed and measured (MacCallum & Austin, 2000). In SEM, two primary objectives are pursued: 1) comprehending the patterns of correlation or covariance among a group of variables, and 2) elucidating as much of their variability as feasible through the specified model (Kline, 1998)002E

Structural equation modeling (SEM) is a methodology employed to depict, estimate, and examine a network of connections among variables, encompassing both measured variables and latent constructs.

4.8.2 Rational of SEM

Conventional statistical methods for data analysis tend to be inflexible, relying on predefined models and assuming error-free measurement. In contrast, structural equation modeling (SEM), a multivariate approach integrating both observed variables and latent constructs, necessitates the formulation of a model grounded in theory and empirical research, explicitly acknowledging measurement error (Zhang, 2021). It is possible to specify the relationships between variables using a model.

"In scientific research, structural equation modeling (SEM), an influential multivariate approach, is increasingly employed to examine and evaluate complex causal relationships. Unlike other modeling methodologies, SEMs assess both direct and indirect effects on

hypothesized causal linkages. Developed over nearly a century, SEM has evolved through three generations of statistical techniques".

The primary era of SEMs created the rationale of causal modelling utilizing way examination. The social sciences afterward changed SEM to consolidate figure investigation. "The second generation of SEM witnessed a surge in capability, marked notably by Judea Pearl's development of the "structural causal model" and Lee's integration of Bayesian modeling, signaling the onset of the third generation of SEM around 2000 (Pearl, 2012)." Over the past 16 a long time, ecologists have utilized SEM to assess a assortment of multiple-variable speculations. SEM can look at the complex networks of causal associations in ecosystems (Shipley 2021). One of the primary biologists to utilize SEM in environmental investigate was Chang (1983), taken after by Maddox and Antonovics (1983), who clarified the conceptual and methodological associations between relationship and causation. The primary total book on SEM essentials with noteworthy illustrations from a few natural thinks about was distributed by Elegance (2006). Presently, within the later decade, a fast increment of SEM in biological sciences has been seen (Eisenhauer et al. 2015, Fan et al. 2016).

Confirmatory calculate investigation and way examination are two measurable methods that are combined to form SEM. The objective of corroborative calculate investigation, which has its roots in psychometrics, is to survey covered up mental qualities like demeanour and fulfilment as mentioned by Galton 1888; Pearson and Lee 1903; Spearman 1904. On the other hand, course investigation started in biometrics and looked for to recognize the causal relationship between factors by drawing a way graph (Wright 1918, 1920, 1921). The way examination in prior econometrics was displayed with concurrent conditions (Haavelmo, 1943). Within the early 1970s, SEM combined the two previously mentioned strategies (Joreskog, 1969, 1970, 1978; Joreskog and Goldberger 1975) and got to be well known in numerous areas, such as social science, commerce, restorative and wellbeing science, and normal science.

This think about serves as an upgrade to Elegance (Eisenhauer, 2015), both of which advertised a exhaustive and opportune examination of the utilize of SEM in environmental examinations. Compared to the past two audits, which concentrated on common environmental distributions utilizing SEM from 1999 to 2016, this audit is distinctive. And (Eisenhauer, 2015), confined their consideration to SEM applications in soil environment happening some time recently 2012. We laid out the conceivable applications for SEM models that are regularly neglected in this investigate, as well as the concerns and challenges in executing SEM, as SEM is still

moderately new to numerous biologists. Our investigation centered on three critical inquiries: (1) Is the application of SEM in biological research statistically robust? (2) What are the prevalent challenges encountered in SEM applications? and (3) What is the future outlook of SEM in biological studies?

4.8.3 General approach to SEM

In spite of the fact that each strategy within the SEM family is diverse, the taking after viewpoints are common to numerous SEM strategies.

1. Model specification

The auxiliary demonstrates, which delineates potential causal connections between endogenous and exogenous components, and the estimation demonstrate, which portrays the connections between inactive factors and their pointers, are the two essential components of models that can be recognized in SEM. Way graphs can be thought of as SEMs that as it were contain the basic parcel, while exploratory and corroborative calculate examination models, for occasion, as it were have the estimation part.

When characterizing a model's pathways, the modeler can set two distinctive sorts of connections: (1) free pathways, in which conjectured causal (in reality, counterfactual) connections between factors are tried and are in this way cleared out "free" to differ, and (2) connections between factors that as of now have an evaluated relationship, regularly based on earlier considers, and which are "settled" within the model.

2. Estimation of free parameters

Comparing the genuine covariance frameworks that show the connections between variables with the assessed covariance frameworks of the finest fitted show is how parameter estimation is done. This is often fulfilled through asymptotically distribution-free approaches, weighted slightest squares, greatest probability estimation, quasi-maximum likelihood estimation, or numerical boost through expectation-maximization of a fit basis. Numerous of the accessible particular SEM investigation programs can be utilized to realize this.

3. **Assessment of model and model fit**

Investigators will want to interpret the programme that they have evaluated. The pathways that have been evaluated can be ordered or graphically shown as a manner show. The impacts of variables are determined by applying way-following rules.

4. Way analysis

A method analysis was conducted to assess the relationships among multiple variables (Wright 1918, 1920, 1921). Formerly known as SEM without latent variables, it proved highly effective in testing and refining structural hypotheses by accounting for both direct and indirect causal effects. However, the terminology has evolved, and now the two effects have been interchanged. Through path analysis, the causal relationships between several variables can be elucidated. Mediation is a common function of path analysis, demonstrating how a variable can impact an outcome either directly or indirectly through another variable. For instance, variables such as aboveground temperature (Ts), discussed temperature (Ta), and light intensity (Illuminance) might all exert indirect influences on net ecosystem exchange.

Structural equation modeling (SEM) is an approach utilized for estimating latent constructs in biology, such as climate change, biological system structure, resistance, and environmental benefit. These latent variables serve as inferred common measures of various factors, revealing cause-and-effect relationships. SEM has been used to determine social and environmental impacts on grassland productivity, urban expansion, and tree characteristics. Composite factors, which do not require factor analysis, are introduced for environmental applications, representing a linear combination of marker factors.

5. Latent and observable variables

Evaluating theoretical concepts such as "climate change," "biological system structure and composition," "resistance and resilience," and "environmental benefit" in the field of biology can present difficulties. While factual methods can derive values from relevant factors, these abstract ideas may lack direct measurements or units. Structural equation modeling (SEM) employs a corroborative analysis to estimate latent constructs. These latent variables serve as inferred common measures of various factors, revealing a model's cause-and-effect

relationships. In studies, latent factors have been instrumental, for instance, in examining the social and environmental effects on grassland productivity in Inner Mongolia, China, and Mongolia, Chen et al. (2015) employed SEM. Tian et al. (2013) utilized SEM incorporating latent factors such as land cover change, population, and economy to investigate the potential impacts of land use, demographic, and economic changes on urban expansion in Shenzhen, China. In another study, Liu et al. (2016) utilized tree characteristics as latent variables. Grace and Bollen (2008) introduced composite factors in SEM for environmental applications, which, unlike latent variables, do not necessitate factor analysis and presume no error variance among indicators. These composite variables represent a linear combination of marker factors based on specified weights. For instance, in Chaudhary et al.'s (2009) study on environmental interactions in semiarid scrublands, hyphal density and Bradford-reactive soil proteins were combined into a composite variable to assess fungal abundance. Jones et al. (2014) similarly employed a composite variable for soil minerals, representing concentrations of zinc, iron, and phosphorus in soil.

6. Corroborative calculate analysis

The confirmatory factor analysis (CFA) approach is employed for estimating latent variables (Hoyle 1995; 2011; Kline 2010; Byrne 2013). It isolates the latent structure from other parameters and elucidates the most significant variation among interconnected components. For instance, soil properties such as soil salinity, organic matter content, and flooding depth (as illustrated in Figure 2, Elegance et al. 2010) could serve to quantify abiotic stress as a latent variable. Assessing latent factors based on associated fluctuations in the dataset (e.g., correlation, causal relationship) can streamline data dimensions, standardize the scale of various indicators, and capture the relationships depicted within the dataset (Byrne 2013). Therefore, one should be concerned about the justification for guessing an inactive variable. The disturbing influence and community stretch are inactive elements that account for the association found in the dataset in the abiotic push instance discussed above. Shao et al. (2015) used CFA to reduce the soil-nutrition highlights to a single variable that considered the ratio of carbon to nitrogen, the amount of nitrogen in the litter, and the natural carbon content of the soil. Additionally, using CFA, Capmouteres and Anand (2016) described the territorial work as a natural marker that explained both plant cover and local flying creature plenitude for the woods biological systems.

Apart from CFA, exploratory factor analysis (EFA) is an additional type of factor analysis. For both, the same statistical estimating method is used. While the EFA is used to identify the underlying latent variables, the CFA is used when the indicators for each latent variable are specified in accordance with relevant theories or prior knowledge (Joreskog 1969; Brown 2006; Harrington 2009). When there is limited prior knowledge about the latent concept, EFA is typically used in practice to identify the appropriate underlying latent constructs for CFA (Browne and Cudeck 1993; Cudeck and Odell 1994; Tucker and MacCallum 1997).

SEM consists of two main components: the measurement model and the structural model. Measurement models evaluate latent variables or composite variables (Hoyle 1995; Kline 2010), whereas structural models, employing path analysis, examine all potential dependencies (Hoyle 1995, 2011; Kline 2010).

7. Performing SEM

The five sequential stages in SEM encompass model specification, identification, parameter estimation, model fit evaluation, and model modification (Kline 2010; Hoyle 2011; Byrne 2013). It shows determination portrays expected connections between the factors in a SEM. Demonstrate distinguishing proof includes deciding in case a show is over-, fair-, or under-identified. Only the just-identified or over-identified model allows for the estimation of model coefficients. Quantitative indicators derived for overall goodness of fit aid in model evaluation, assessing model performance or fit. Adjustment, also known as post hoc model modification, refines the model to enhance model fit. Validation is the process to improve the reliability and stability of the model. Popular software for SEM applications often comes with comprehensive guides, such as AMOS, Mplus, LISREL, lavaan (R-package), piecewise SEM (R-package), and Matlab (Rosseel 2012; Byrne 2013; Lefcheck 2015). Although the specifics of SEM applications can be intricate, users can seek assistance from tutorials provided by Grace (2006) and Byrne (2013).

8. Show assessment indices

The fit indices, such as the p-value and standard error for testing a single path coefficient, along with calculated fit indices like chi-square ($\chi 2$) and RMSEA, form the basis for SEM evaluation. Literature suggests that model fit indices can be utilized in various contexts. The likelihood of

rejecting a misspecified model generally increases with the number of fit indices applied to a SEM, indicating a higher chance of rejecting good models as well. Consequently, it is recommended to combine at least two fit indices (Hu and Bentler 1999). While there are recommended cutoff values for some indices, none serve as the definitive rule for all applications (Fan et al. 1999; Chen et al. 2008; Kline 2010; Hoyle 2011).

9. Considerations

The utilization of SEM can be influenced by both the study hypothesis being tested and the necessity for an adequately large sample size.

A target ratio of 20:1 between the number of participants and the number of model parameters is considered optimal, although a 10:1 ratio may be feasible. Estimates could become unstable if the ratio falls below 5:1. Additionally, factors such as measurement tools, multivariate normality, parameter identification, outliers, missing data, and interpretation of model fit indices also influence SEM outcomes (Schumacker and Lomax, 1996).

10. SEM Process

The proposed method for SEM analysis consists of the following steps:

Step 1: Review relevant theory and research literature to aid in model specification.
Step 2: Specify the model, which may involve creating diagrams or equations.
Step 3: Determine model identification, ensuring unique values for parameter estimation and positive degrees of freedom (df) for model testing.
Step 4: Select measures for the variables included in the model.
Step 5: Gather data.
Step 6: Perform preliminary descriptive statistical analysis, including scaling, handling missing data, addressing collinearity issues, and detecting outliers.
Step 7: Estimate parameters within the model.
Step 8: Evaluate model fit.
Step 9: Respecify the model if necessary.
Step 10: Interpret and present the results.

11. SEM-specific software

Fitting structural equation models can be done with a variety of software programmes. The first such programme was LISREL, which was originally made available in the 1970s.
Additionally, the R open-source statistical environment has a number of packages. A more advanced and open-source version of the Mx programme is offered via the OpenMx R package. Another open-source R package for SEM is lavaan. Rosseel, Yves (2012-05-24)
Because different software packages and versions have different capabilities and often employ somewhat different approaches to conduct similarly titled tasks, academics believe that it is best practise to disclose this information.

4.8.4 STEPS TAKEN FOR THE SEM APPLICATION

Here's a general guide to conducting SEM and obtaining the outcome through final path analysis:

Define the Research Question and Hypotheses:

- Clearly articulate the research question and hypotheses regarding the relationships among variables.

Select Variables and Develop a Conceptual Model:

- Identify the key variables involved in your study.
- Develop a conceptual model illustrating the hypothesized relationships among these variables.

Data Collection:

- Gather data for the identified variables through surveys, experiments, or other appropriate methods.

Data Preparation:

- Prepare and preprocess the data to ensure it conforms to the assumptions of SEM.
- Check for missing data and handle it appropriately.

Specify the Model:

- Use specialized software (e.g., Mplus, AMOS, lavaan) to specify the SEM model.
- Define observed variables and latent constructs.
- Specify the hypothesized relationships among variables using paths.

Estimation:

- Use the chosen software to estimate the parameters of the model.
- The estimation process will involve finding the values for the model parameters that best fit the observed data.

Model Fit Evaluation:

- Evaluate the model-data fit utilizing fit indices such as chi-square, Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA).
- Adjust the model as needed in response to fit indices.

Interpretation of Results:

- Analyse the estimated path coefficients (regression weights) to comprehend the magnitude and direction of the relationships among variables.
- Interpret the significance of the coefficients and assess the practical significance of the findings.

Final Path Analysis:

- Based on the results, conduct a final path analysis, focusing on the significant paths in the model.
- Evaluate the overall model fit and the contribution of each path to the explained variance.

Report Findings:

- Present the SEM results in a clear and organized manner, including tables and figures.
- Explore the implications of the findings concerning the research question and hypotheses.

Following mentioned the steps taken for the research:

- Total score for each dimension was obtained.
- The scores were rescaled by (maximum-obtained)/ (maximum-minimum)
- The conceptual model was formulated
- Multi-layered multiple regression was used with the variables on the left side of the arrow as independent and the one on the right side as dependent.
- The beta coefficients were depicted on the arrows.
- The level of significance was 0.05.

Table 4.2: SEM dependent and independent variables for path analysis.

Relations	Dependent	Independent
1	PEOU	S, P, PU, CE
2	PU	S, P, CE and PEOU
3	A&BI	S, P, CE, PU and PEOU
4	AA	S, P, CE, PU, PEOU and A&BI

The beta coefficients in each layer are the path coefficients of the respective layer. The coefficients were deemed highly significant when $p < 0.05$ and moderately significant when $0.05 < p < 0.10$. Any beta coefficient with a corresponding p-value greater than 0.01 was considered nonsignificant (Ye, Q., et al., 2022).

4.9 Sampling Design

To develop the sample design, the following points were considered:

4.9.1 Type of Universe:

To establish a sample design, the researcher must delineate the universe, which may be finite or infinite. In our study, the universe is finite.

4.9.2 Population Targeted:

The surveyed target population for this analysis comprises individuals and organizations with experience or involvement in blockchain, green finance, and green bonds. This includes entities from both the public and private sectors, regulatory bodies, equipment manufacturers, consultants, service providers, and academia. The targeted population size is set at 300.

4.9.3 Units of Sampling:

The sampling unit comprises of an individual having substantial knowledge of green finance and blockchain technology and have around 3 years of experience in public or private companies, regulator, consultants, service providers, and academicians and investors.

4.9.4 Sample size:

Yamane (1967:886) provides a straightforward formula for determining sample sizes. The formula used to calculate the sample size (Louangrath, & Sutanapong, 2019) is as follows:

n = N/ (1+ N (e)2)

where "*n"* represents the sample size, "*N"* denotes the population size, and "*e"* signifies the level of precision.
When applying this formula to the aforementioned target population with a 95% confidence level, the resulting sample size is:

$n = 300/(1+300*(0.05)^2)= 171$

4.9.5 Technique of Sampling

Snowball sampling was employed for data collection, with respondents' contributions to survey responses contingent upon their availability.

Snowball sampling, also referred to as chain-referral sampling, is a non-probability sampling technique used when samples possess unique characteristics. This method relies on referrals from current participants to identify the sample populations required for a study.

The sample size for this study is 171.

4.10 Development of Questionnaire

Through the collaborative efforts of action mapping and brainstorming sessions involving industry experts and stakeholders, a questionnaire was formulated to gather responses across the fintech, green bonds, and blockchain technology sectors. This encompassed perspectives from issuers, investors, operators, equipment providers, suppliers, customers, and other relevant stakeholders. The questionnaire employed a five-point Likert scale ranging from "1" representing strongly agree to "5" indicating strongly disagree (Brown, 2010; Vagias, 2006; Vogt, 1999) regarding the adoption of blockchain in the green bond market. Subsequently, the collected data underwent analysis through factor analysis and ranking methodologies to identify significant operational and financial risks and their corresponding rankings, facilitating the formulation of mitigation strategies.

4.11 Reliability and Validity of the questionnaire

Validity and reliability are essential aspects of the study as they ensure the credibility of the conclusions (Brink, 1993). LeCompte and Götz (1982) argue that validity establishes the genuineness and accuracy of scientific findings, while Brains et al. (2011) assert that it evaluates how closely a study's results align with the real world. Interviews are conducted with relevant professionals in the blockchain, sustainability, or green bond investing sectors.

Furthermore, because there are no rigid requirements for binary answers, the interviews are semi-structured, allowing participants to respond in as much depth as they like. Additionally, the responses can differ from interview to interview owing to more in-depth inquiries regarding particular issues based on a person's background and knowledge. Although safeguards were taken, there may still be some problems with validity and reliability. Due to company security concerns, sharing of data or procedures among participants who work for particular companies may be restricted. Additionally, because the interviewees come from a range of organisational structures, from start-ups to well-established businesses, it is possible that their comprehension of new technologies and readiness to integrate them into established procedures would differ. Scale dependability is most frequently ensured using Cronbach alpha (Bonett, 2015). The Cronbach alpha for each factor in this study was calculated in order to assess factor reliability.

Table 4.3: Reliability & Validity

Reliability Statistics

Cronbach's Alpha	N of Items
.971	81

Table 4.3 presents the Cronbach Alpha values, ranging from 0.538 to 0.649. Depending on the nature of the study, various acceptable Cronbach Alpha values can be considered. According to Kline (1999), a threshold of 0.7 is more acceptable for ability tests, while a value of 0.8 is suitable for cognitive tests such as intelligence tests. Nunnally (1978) suggests that values as low as 0.5 are adequate for preliminary research stages. Moreover, a high Cronbach alpha score indicates a strong correlation among variables, which may result from the questionnaire containing redundant items. Field (2018) notes that including additional items on an unreliable scale can inflate the Cronbach alpha score. For factor analysis in this study, a low Cronbach alpha is acceptable due to the limited number of variables and survey items that are interrelated (Tavakol& Dennick, 2011).

4.12 Objective 2.

- **To develop a suggestive framework to overcome the scalability, privacy and cost efficiency limitations for adoption intention of blockchain technology in Green Bond markets.**

4.12.1 Framework Analysis: An Overview

The Social and Community Arranging Investigate Organized in London, Britain, is where Jane Ritchie and Liz Spencer, 1994 made the broadly utilized subjective procedure known as system investigation in 1994 (Srivastava & Thomson, 2018). This kind of examination is superior suited to ponders that are conducted over a brief period of time and utilize specific questions to target pre-selected proficient members. The essential qualification between this hypothesis and ground hypothesis, agreeing to Ritchie & Spencer (1994), is this theory's capacity to clarify and dissect occasions that take put in a setting.

Researchers have the flexibility to gather all the information and after that dissect it or to do examination whereas the information is being collected, much appreciated to system examination. The assembled information will be prepared, plotted, and classified based on the major concerns and subjects, which involves the taking after five processes:

1. Familiarization: This method includes acclimating the analyst with the transcripts of the information that was accumulated (such as meet or center gather transcripts, perception or field notes), as well as picking up an outline of the information that was assembled (Ritchie & Spencer, 1994). In other words, through tuning in to audiotapes, watching the field, or perusing the transcripts, the analyst submerges themselves within the information. The analyst will ended up mindful of vital concepts and rehashing topics as this prepare advances and will note them. The analyst might not have time to go over everything since of the gigantic sum of information that can be assembled in subjective investigate. As a result, a subset of the information set would be utilized. The choice would be based on a number of variables related to the information collection strategy. For occurrence, the assortment of procedures utilized (such as interviews, archives, and perceptions), the number of analysts included (more questioners cruel a differences of world sees which may inspire diverse reactions from members), the enhancement of the participants and situations within the inquire about venture, and the amount of time required to gather the information are all important variables (e.g. the think about may include regular labourers and their see point may shift agreeing to whether they are working or not). So, it is crucial that the analyst guarantees that are assortment of sources, time periods and cases are chosen (Ritchie & Spencer, 1994).

2. Recognizing a topical system: After getting to be recognizable with the information set, the analyst moves on to the moment organize, where they recognize unused subjects or issues. The analyst must presently let the information decide the rising subjects and concerns, indeed in spite of the fact that they may have begun from a priori subjects and issues. The analyst uses the notes made amid the acquaintance stage to achieve this objective. The key issues, concepts and subjects that have been communicated by the members presently shape the premise of a topical system that can be utilized to channel and classify the information (Ritchie & Spencer, 1994). In spite of the fact that the analyst may have a set of a priori issues, it is imperative to preserve an open intellect and not drive the information to fit the a priori issues. The subject system, be that as it may, is most likely to be impacted by the a priori issues that the inquire about was built around. Ritchie and Spencer accentuate that the topical framework is merely

provisional which there's still room for change in afterward stages of think about (1994). Making and fine-tuning a theme system requires both consistent and natural thinking; it isn't a programmed or mechanical handle. It involves making choices around understood joins between concepts, pertinence and significance of points, and meaning. It moreover involves guaranteeing that the starting inquire about themes are completely tended to in connected social approach investigate.

3. Indexing: This implies that one locates pieces or groups of the data that relate to a specific theme. All of the acquired textual data is put through this method (i.e. transcripts of interviews). Ritchie and Spencer (1994) advise using a numerical system to index reference and to annotate them in the margin next to the text for convenience's sake. Such a task is best suited for subjective data analysis software like NVivo and Atlas ti.

4. Charting: The person pieces of data that were record within the past step are presently put in charts of the points within the fourth organize. This implies that the data is taken out of its unique printed setting and put into charts with headings and subheadings that were made amid the topical system, or from a priori investigate questions, or in a way that's thought to be the foremost effective strategy to display the inquire about (Ritchie & Spencer, 1994). It's significant to be beyond any doubt that, in spite of the fact that being evacuated from its setting, the information still clearly distinguishes the occasion from which it was collected. Cases ought to continuously be displayed within the same grouping in each chart for clarity's sake (1994).

5. Mapping and translation: This final step involves dissecting the significant characteristics as appeared within the charts. The analyst will be helped in their translation of the information set by this analysis' capacity to allow a schematic delineation of the occasion or event. The analyst is presently mindful of the objectives of subjective examination, which incorporate "characterizing concepts, depicting the scope and character of occasions, building typologies, recognizing affiliations, advertising clarifications, and planning methodologies" (Ritchie and Spencer, 1994). These thoughts, advancements, and affiliations, once more, are a reflection of the individual. As a result, the researcher's strategies and proposals continuously reflect the participants' genuine conclusions, feelings, and values.

The steps involved in the data analysis is illustrated in below figure

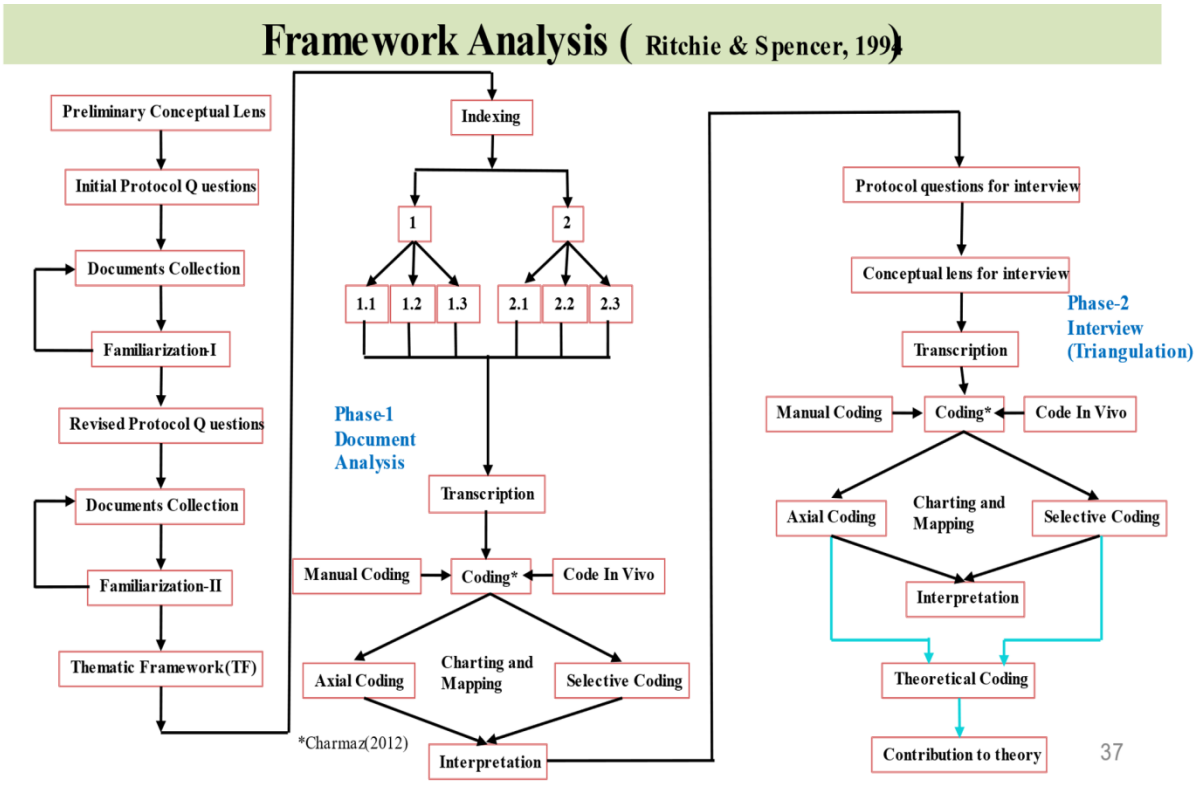


Figure 4.3 Framework Analysis Model

4.13 Research Analytical Tools Used

Given this objective used a two steps approach for data analysis which are as follows.

4.13.1 SEM through AMOS software for quantitative analysis objective 1.

AMOS is an added SPSS module, and is specially used for Structural Equation Modeling, path analysis, and confirmatory factor analysis. It is also known as analysis of covariance or causal modeling software. AMOS is a visual program for structural equation modeling (SEM) as mentioned by Collier, 2020. AMOS to be the most user friendly of all the SEM (Collier, 2020).

4.13.2 Framework analysis through ATLAS software for qualitative analysis of objective 2. According to Amirzadeh and Barakpour (2019), framework analysis provides a transparent and systematic approach to qualitative research, enabling the management, reduction, and analysis of large datasets while preserving the original context.

Coding qualitative data- Qualitative coding is almost always a necessary part of the qualitative data analysis process.

In the qualitative data analysis process, coding involves meticulously examining the data line by line. The researcher develops a codebook by identifying segments of data that can be encapsulated by words or brief phrases.

4.14 Chapter Summary

This chapter outlines the formulation of research objectives and questions derived from the problem statement. It provides a detailed discussion of the overall approach and rationale for the research study, logically explaining philosophical assumptions, scientific paradigms, research methods, and approaches. Additionally, data collection methods are elucidated, with a focus on the development of a questionnaire employing a 5-point Likert scale. The questionnaire was distributed to respondents from upstream, midstream, and downstream organizations, as well as consultants and academia.

Data were additionally gathered through semi-structured interviews employing the snowball technique. The methods employed to guarantee the quality of research are elaborated upon in detail, encompassing sample adequacy testing, reliability testing, and assessment of internal consistency.

After finding the output of quantitative analysis using SEM analysis in AMOS software, qualitative research has been done by framework analysis through Atlas ti. In framework analysis, document and interview analysis has been done.

CHAPTER 5- HYPOTHESIS CREATION & TESTING

5.1 Introduction

Hypothesis testing is a structured process employed to explore our conjectures about the world utilizing statistical analysis. Scientists utilize it to evaluate particular predictions, referred to as hypotheses, by determining the probability that a observed pattern or relationship between variables could have occurred by random chance (Savin, 1984).

Hypothesis Creation & Testing

Blockchain isn't a brand-new innovation, but it still hasn't found utilize cases in genuine segments. It continuously moves from early tests in cryptocurrency to those in spaces like supply chain administration or green bond exchanges. Aside from crisply set up businesses, well-known businesses and money related educate have been testing with blockchain innovation (Nasdaq, 2019), which proposes that money related items can be upgraded by the technology's joining into various methods. On the basis of review of literature, many opportunities and limitations are found for the adoption of blockchain technology in green bond markets. So, the following research problem raised:

5.2 Research Questions

Based on the research problems mentioned in Chapter 3, following research questions have been framed.

1.What is the relationship of facilitating conditions (scalability, privacy and cost efficiency limitations) with technology adoption intention of blockchain technology in Green Bond markets in India.?

2.How to overcome the facilitating conditions (scalability, privacy and cost efficiency limitations) for ensuring effective adoption of blockchain technology in Green Bond Market of India?

5.3 Research Objectives

Derived from the research questions, the subsequent research objectives are delineated:

1.To study relationship of facilitating conditions (scalability, privacy and cost efficiency limitations) with technology adoption intention of blockchain technology in Green Bond markets in India.

2.To develop a suggestive framework to overcome the scalability, privacy and cost efficiency limitations for adoption intention of blockchain technology in Green Bond markets in India.

5.4 Hypothesis Development

Before formulating research hypotheses, it is imperative to establish a clear understanding of the research objectives. In this study, the primary objective is to investigate the relationship between facilitating conditions—specifically, scalability, privacy, and cost efficiency limitations—and the intention to adopt blockchain technology within the Green Bond markets of India. Scalability pertains to the system's capacity to efficiently manage growing workloads or transactions. Privacy concerns address the protection of sensitive information within blockchain transactions, while cost efficiency limitations encompass the economic viability and operational costs associated with implementing blockchain technology. By exploring these facilitating conditions, this research aims to discern their impact on the adoption intention of blockchain technology within the context of Green Bond markets in India. This understanding will contribute to elucidating the factors influencing technology adoption decisions in environmentally sustainable financial markets, thereby informing stakeholders and policymakers about strategies to enhance the adoption and utilization of blockchain technology in fostering sustainable development initiatives.

This chapter comprises hypotheses formulated based on the proposed framework for the adoption of blockchain technology in the green bond market, rooted in the extended model of the Technology Acceptance Model (TAM) theory. Figure 5.1 shows the relationship between the constructs some external factors like scalability, privacy and cost efficiency with the perceived ease of use (PEoU) and perceived usefulness (PU), which further related to the behavioural intention and finally to the adoption of blockchain technology in green bond

markets. Hence, the objective of this proposal is to concentrate on the utilize of blockchain techniques for naturally neighbourly economical bonds in India. In arrange to decide whether information ought to be conveniently connected to the innovation, a system is made. In this manner, the objective of this proposal is to concentrate on the utilize of blockchain procedures for ecologically inviting maintainable bonds in India.

The Stimulus Theoretical Framework serves as the scaffolding upon which the research hypothesis is built.

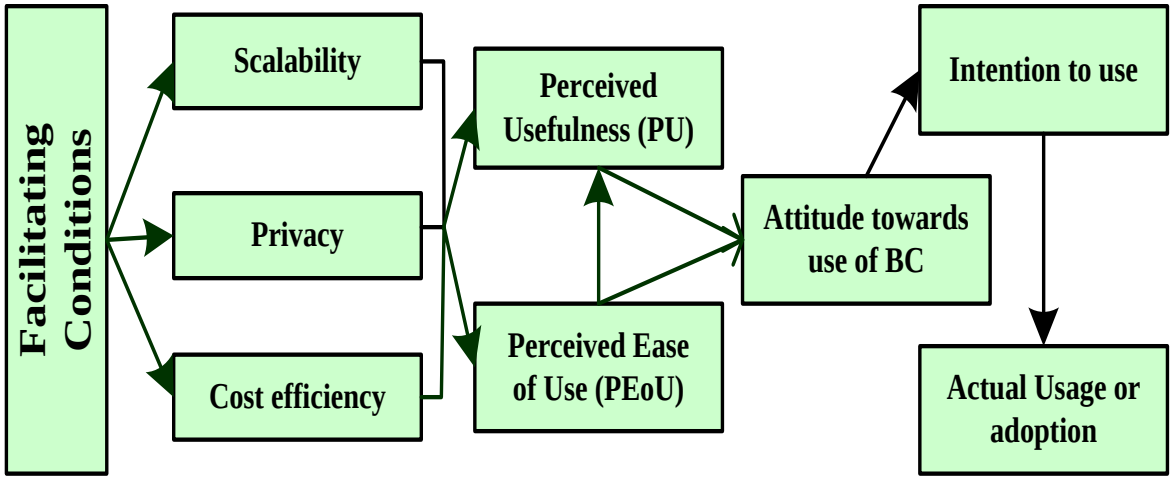


Figure 5.1 Theoretical Framework Stimulus (Design Stimulus Research Theoretical Hypothesis) (Misra, Rao, Gupta 2021)

The concept of perceiving a system's simplicity in usability is referred to as perceived ease of use, as outlined by both Dholakia and Dholakia (2004) and Davis (1989). It has been established that perceived ease of use significantly influences how people utilise technology and that it works to lessen their cognitive strain (Steelman 2017). When a system is perceived as easy to use, individuals are more inclined to engage with it. Consequently, perceived utility and perceived ease of use are closely intertwined, as a system's perceived value increases when it is perceived as easier to use. Thus, perceived usefulness is defined as 'the extent to which an individual believes that utilizing a particular technology would enhance their effectiveness at work' (Davis, 1989). Gong et al. (2004) describe perceived usefulness as the user's 'subjective probability that employing a given application system will elevate their expectations.' The primary determinant influencing the behavioural intention to use an information system is perceived utility (Venkatesh and Davis, 2000). According to Davis, Bagozzi, and Warshaw

(1989), perceived ease of use is posited as a precursor to perceived usefulness. The findings of earlier studies similarly demonstrated the importance of perceived usability on perceived usefulness (Davis, 1989; Wang, 2003; Kleijnen, 2004). According to Chen and Chen (2008), two specific behavioural beliefs, namely perceived utility and perceived ease of use, play pivotal roles as predictors of user acceptance. These beliefs act as mediators between external influences and intention, as established by prior research (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Mathieson, 1991; Adams, 1992). It is widely recognized that perceived utility significantly shapes adopters' intentions to embrace innovation. Numerous studies have consistently identified perceived usefulness as the primary predictor of information technology usage (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989; Venkatesh & Morris, 2000; Gefen, 2003). Therefore,

H1: Scalability while using blockchain positively affects perceived usefulness of BT.

The scalability of blockchain networks refers to the platform's capability to accommodate a growing volume of transactions and an expanding number of nodes within the network.

Perceived Usefulness (PU) refers to how much people think blockchain technology would be helpful for the green bond markets*. (Davis et al. 1989).*

Table 5.1: The matrix below summarizes the effect of independent variables (S_i, i = 1,2, …, 8) on the dependent ones (PU_i, i = 1,2,…,9). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

	PU1	PU2	PU3	PU4	PU5	PU6	PU7	PU8	PU9	PU10
S1	S+	S-	S+	S+	NS	S+	S+	S-	NS	NS
S2	S+	S+	NS	S+	S+	S+	S+	S+	S+	S+
S3	NS	S+	S+	S-	NS	S-	NS	S-	S-	S-
S4	S+	S-	S+	S-	NS	S+	NS	S+	NS	S+
S5	NS	S-	S+	S+	S+	NS	S+	S-	S+	S+
S6	NS	S+	NS	S-	NS	S-	S+	S+	S+	NS
S7	S-	S+	NS	S+	NS	S+	S-	S+	S+	NS
S8	S+	NS	NS	S-	S+	S+	NS	S+	S-	NS

PU1 is affected positively by S1, S2, S4 and S8. Thus, for investors DLT is likely to increase efficiency and improve access to finance for populations that do not have access to traditional financial system due to fast performance of smart contracts improves the scalability limitation of Blockchain and encourages the coordination among the stakeholders. Applying Smart Blockchain contracts providing the green bond trading for fast trade settlement. The decentralized governance approach facilitated by Distributed Ledger Technology (DLT) systems like Blockchain (BC) enables scalability of operations that transcend institutional constraints.

The scalability of transaction execution time (S7) is influenced by the performance of smart contracts, which may suffer as transaction volumes increase. This can lead to slower, costlier, and less sustainable systems, particularly for use cases such as payments. It indicates there is a need to spread awareness and also the technology should get upgraded with the use of better smart contract which could increase its speed and facilitate its adoption. S3 (applying Smart Blockchain contracts providing the green bond trading for fast trade settlement.), S5 (The immutability inherent in Blockchain presents fresh prospects for analytics, querying, and enhancing overall business processes.) and S6 (through the tokenization, by the intermediary elimination the cost can be reduced) have no effect on PU1.

PU2 is influenced emphatically by S2, S3, S6 and S7. Hence, tokenization offers higher openness for clients with way better offices in terms of trade of tokens due to applying Savvy Blockchain contracts giving the green bond exchanging for quick exchange settlement and unchanging records of exchanges makes a difference in lesser chances of botches. This opens entryways for diverse financial specialists and cuts down the least speculation period and amount.

On the other hand, S1, S4 and S5 contrarily influence PU2.Tokenization of blockchains is likely to be influenced contrarily since of quick execution of savvy contracts moves forward the versatility impediment of Blockchain, Conveyed Record Technology (DLT) framework of Blockchain (BC) innovation empowered decentralized administration approach empowers a versatility of operation past the limitations of institutionally-oriented. Permanence in Blockchain offers modern openings in analytics, inquiry, and by and large trade processes. S8 (Shrewd Blockchain contracts empowers the coordination among the partners) have no impact on PU2.

PU3 is affected positively by S1, S3, S4 and S5. On the other hand, S2, S6, S7 and S8 have no effect on PU3. Thus, Blockchain tokenization provides transparency of transaction to the investors due to applying Smart Blockchain contracts providing the green bond trading for fast trade settlement., by the intermediary elimination and the time consumption scalability for executing a transaction will be controlled and encourages the coordination among the stakeholders.

S2 (Applying Smart Blockchain contracts providing the green bond trading for fast trade settlement), S6 (Through the tokenization, by the intermediary elimination the cost can be reduced), S7 (The time consumption scalability for executing a transaction will be controlled by smart contract fast performance) and S8 (Smart Blockchain contracts encourages the coordination among the stakeholders) have no effect on PU3.

PU4 is influenced emphatically by S1, S2, S5 and S7. In this way, the capacity of an organization to deliver a total and unquestionable history of a value-based record makes the reviewing prepare simple and productive due to applying Keen Blockchain contracts the quick execution, and quick exchange settlement of exchanges too by tokenization, middle person end and the taken a toll can be reduced.

On the other hand, S3, S4, S6 and S8 adversely influence PU4. Unchanging records of exchanges offer assistance in lesser chances of botches. the capacity of an organization to create a total and unquestionable history of a value-based record makes the reviewing handle simple, Conveyed Record Innovation (DLT) framework of Blockchain (BC) innovation empowered decentralized administration approach empowers a adaptability of operation past the limitations of organizations arranged. Through the tokenization, by the middle person disposal the fetched can be diminished. Shrewd Blockchain contracts empowers the coordination among the stakeholders.

PU5 is influenced emphatically by S2, S5 and S8. In this way, Unchanging nature takes the backing up and reestablishing a database to recover data etc due to applying Keen Blockchain contracts giving the green bond exchanging for quick exchange settlement Keen Blockchain contracts empowers the coordination among the partners. Unchanging nature in Blockchain offers modern openings in analytics, inquiry, and in general commerce forms.

On the other hand, S1, S3, S4, S6 and S7 have no impact on PU5. Unchanging nature takes the b;acking up and reestablishing a database to recover data, but now and then quick execution of keen contracts may not be able to progress the versatility restriction of Blockchain. On the off chance that off-base information entered, at that point it would not be rectified due to permanent records of exchanges. DLT) framework of Blockchain (BC) innovation empowered decentralized administration approach empowers a adaptability of operation past the limitations of foundations arranged. Through the tokenization, by the intermediary elimination the cost can be reduced. The time consumption scalability for executing a transaction will be controlled by smart contract fast performance.

PU6 is affected positively by S1, S2, S4, S7 and S8. Blockchain can improve to conduct a task by fast performance of smart contracts improves the scalability limitation, also providing the green bond trading for fast trade settlement. The decentralized governance approach facilitated by Distributed Ledger Technology (DLT) systems like Blockchain (BC) enables scalability of operations that surpass the limitations typically associated with institutionally oriented systems. Through tokenization, by the intermediary elimination the cost can be reduced. The time consumption scalability for executing a transaction will be controlled by smart contract fast performance and encourages the coordination among the stakeholders.

On the other hand, S3 and S6 negatively affect PU6 Thus, blockchain can improve to conduct a task is affected inversely by immutable records of transactions due to which the transactions once entered cannot be modified. Also, through the tokenization, by the intermediary elimination the cost can be reduced but the manual intervention through which the mistakes can be resolved is lost. S5 has no effect on PU6. Blockchain can enhance task execution by providing features that remain unaffected by its inherent immutability. This immutability, in turn, opens up new avenues for analytics, querying, and refining overall business processes.

PU7 is positively affected by S1, S2, S5, and S6. Blockchain use can improve market performance due to fast performance of smart contracts improves the scalability limitation of Blockchain also providing the green bond trading for fast trade settlement. Immutability in Blockchain presents fresh avenues for analytics, querying, and enhancing overall business processes. Through the tokenization, by the intermediary elimination the cost can be reduced. All this improves the market performance.

On the other hand, S7 negatively affect PU7. The time consumption scalability for executing a transaction will be controlled by smart contract fast performance is negatively impacting Blockchain use can improve market performance. S3, S4 and S8 have no effect. Immutable records of transactions help in lesser chances of mistakes., The decentralized governance approach enabled by Distributed Ledger Technology (DLT) systems like Blockchain (BC) facilitates scalable operations beyond the constraints typically associated with institutionally-oriented systems. This scalability does not impede Blockchain's ability to enhance market performance.

PU8 is positively affected by S2, S4, S6, S7 and S8. Thus, Blockchain use can make it easier to do financial transactions by applying Smart Blockchain contracts providing the green bond trading for fast trade settlement, The decentralized governance approach empowered by Distributed Ledger Technology (DLT) systems like Blockchain (BC) facilitates scalable operations that surpass the limitations often found in institutionally oriented systems. Time consumption scalability for executing a transaction will be controlled by smart contract fast performance. Smart Blockchain contracts encourages the coordination among the stakeholders.

On the other hand, S1, S3 and S5 negatively affect PU8. The fast performance of smart contracts improves the scalability limitation of Blockchain Immutable records of transactions helps in lesser chances of mistakes. Immutability inherent in Blockchain opens up new opportunities in analytics, querying, and enhancing overall business processes, albeit it may pose challenges when it comes to financial transactions.

PU9 is positively affected by S2, S5, S6 and S7. Blockchain use in financial markets can increase productivity due to applying Smart Blockchain contracts providing the green bond trading for fast trade settlement, The immutability of Blockchain introduces fresh possibilities for analytics, querying, and optimizing overall business processes. Through the tokenization, by the intermediary elimination the cost can be reduced. The time consumption scalability for executing a transaction will be controlled by smart contract fast performance. On the other hand, S3 and S8 negatively affect PU9. Immutable records of transactions help in lesser chances of mistakes. Smart Blockchain contracts encourages the coordination among the stakeholders negatively affect Blockchain use in financial markets can increase productivity. S1 and S4 have no effect on PU9.

PU10 is positively affected by S1, S4 and S5. Blockchain use would enable the user to accomplish the transaction more quickly due to fast performance of smart contracts improves the scalability limitation of the decentralized governance approach facilitated by Blockchain's Distributed Ledger Technology (DLT) system enables scalable operations that transcend institutional constraints. Additionally, the immutability inherent in Blockchain creates new opportunities for analytics, querying, and enhancing overall business processes.

On the other hand, S3 negatively affect PU10. Immutable records of transactions help in lesser chances of mistakes negatively affects Blockchain use would enable the user to accomplish the transaction more quickly. S1, S6, S7 and S8 have no effect on PU10.

H2: Scalability while using blockchain positively affects perceived ease of use of BT

"S" denotes Scalability in blockchain networks, indicating the platform's capacity to handle a growing volume of transactions and an expanding number of nodes within the network. PEOU, on the other hand, refers to Perceived Ease of Use, representing the extent to which individuals perceive the ease of utilizing blockchain technology.

Table 5.2: The matrix below summarizes the effect of independent variables (S_i, i = 1,2, …, 8) on the dependent ones ($PEOU_i$, i = 1,2,…,11). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

	Peou1	Peou2	Peou 3	Peou 4	Peou 5	Peou 6	Peou 7	Peou 8	Peou 9	Peou 10	Peou 11
S 1	S+	S+	S+	S+	S+	NS	S+	S-	NS	NS	S+
S 2	S+	S+	S+	NS	S+	S+	S+	S+	S-	S+	NS
S 3	S+	S-	S-	S+	S+	NS	S+	S+	NS	NS	S-
S 4	S-	NS	S+	S-	NS	NS	NS	NS	NS	S+	S+

S5	S+	S+	S+	S+	NS	S+	NS	NS	S-	S+	S+
S6	NS	S-	S-	NS	NS	S-	S+	NS	S-	S-	S-
S7	S-	S+	NS	S+	S-	S-	S-	S-	S+	S-	S+
S8	S+	S+	S+	S+	S+	S+	NS	S+	S+	S+	S+

PEOU1 is affected positively by S1, S2, S3, S5 and S8. Thus, tokenization brings out better crowd funding opportunities that upgrade the solutions in an effective manner due to the fast performance of smart contracts improves the scalability limitation of blockchain, applying Smart blockchain contracts providing the green bond trading for fast trade settlement and encourages the coordination among the stakeholders. The permanence of transaction records reduces the likelihood of errors and opens up fresh possibilities in analytics, querying, and improving overall business processes.

Tokenization within blockchains may be impacted inversely due to the decentralized governance facilitated by Distributed Ledger Technology (DLT) systems like Blockchain (BC), which allows scalability beyond the limitations typically associated with institutionally-oriented systems. The time consumption scalability for executing a transaction will be controlled by smart contract fast performance. PEOU1 is not affected by S6, through the tokenization intermediary elimination the cost cannot be affected.

PEOU2 is influenced emphatically by S1, S2, S5, S7 and S8. Hence, Financial specialists can exit the blockchain stage where tokens speak to private company securities anytime by offering their tokens on a auxiliary advertise effectively and proficiently due to the quick execution of savvy contracts, applying shrewd blockchain contracts giving the green bond exchanging for quick exchange settlement and empowers the coordination among the partners. Unchanging offers unused openings in analytics, inquiry, and by and large commerce forms.

Immutable records of exchanges offer assistance in lesser chances of botches and tokenization, in which by the mediator disposal the fetched can be decreased are influencing conversely to Investor's exit from the blockchain stage where tokens speak to private company securities anytime by offering their tokens. PEOU2 isn't influenced by S4, through the (DLT) framework of blockchain (BC) innovation empowered decentralized administration approach Investor's exit from the blockchain stage cannot be affected.

PEOU3 is emphatically influenced by S1, S2, S4, S5 and S8. In this way, Tokenization offers higher openness for clients with way better offices in terms of trade of tokens. The quick execution of shrewd contracts progresses the adaptability impediment of Blockchain. Applying Savvy Blockchain contracts giving the green bond exchanging for quick exchange settlement. Disseminated Record Technology (DLT) framework of Blockchain (BC) innovation empowered decentralized administration approach empowers a versatility of operation past the limitations of institutionally-oriented Immutability in Blockchain offers modern openings in analytics, inquiry, and by and large commerce forms. Savvy Blockchain contracts empowers the coordination among the stakeholders. Contrarily influenced by S3 and S6. Permanent records of exchanges make a difference in lesser chances of botches. Through the tokenization, by the middle person disposal the fetched can be reduced. Not influenced by S7. The time utilization versatility for executing a exchange will be controlled by keen contract quick performance.

PEOU4 is emphatically influenced by S1, S3, S5, S7 and S8. Tokenization provides an opportunity to unite disparate parties for digital exchanges in the modern era, due to quick execution of shrewd contracts moves forward the versatility confinement of Blockchain Unchanging records of exchanges makes a difference in lesser chances of botches. Unchanging nature in Blockchain offers modern openings in analytics, inquiry, and in general commerce forms. The time utilization adaptability for executing a exchange will be controlled by keen contract quick execution. Keen Blockchain contracts empowers the coordination among the stakeholders.

Inversely influenced by S4. Dispersed Record Technology (DLT) framework of Blockchain (BC) innovation empowered decentralized administration approach empowers a versatility of operation past the imperatives of institutionally-oriented. Not influenced by S2 and S6

Applying Savvy Blockchain contracts giving the green bond exchanging for quick exchange settlement. Through the tokenization, by the mediator end the fetched can be reduced.

PEOU5 is emphatically influenced by S1, S2, S3 and S8. Tokenization enables financial institutions to convert their assets into digital cryptocurrencies that can be traded seamlessly and continuously. The quick execution of savvy contracts makes strides the adaptability confinement of Blockchain applying Savvy Blockchain contracts giving the green bond exchanging for quick exchange settlement. Unchanging records of exchanges offer assistance in lesser chances of botches. Shrewd Blockchain contracts energizes the coordination among the stakeholders.

Inversely influenced by S7. The time utilization versatility for executing a exchange will be controlled by shrewd contract quick execution. Not influenced by S4, S5 and S6. Disseminated Record Technology (DLT) framework of Blockchain (BC) innovation empowered decentralized administration approach empowers a adaptability of operation past the imperatives of institutionally-oriented. Permanence in Blockchain offers unused openings in analytics, inquiry, and generally commerce forms. Through the tokenization, by the mediator disposal the taken a toll can be reduced.

PEOU6 is significantly impacted by S2, S5, and S8. Tokenization provides merchants with an escape from storing actual credit card numbers in POS machines and other systems by employing Smart Blockchain contracts, facilitating rapid transaction settlements for green bond trading. Permanence in Blockchain offers modern openings in analytics, inquiry, and by and large trade forms. Shrewd Blockchain contracts energizes the coordination among the stakeholders.

Inversely influenced by S6 and S7. Through the tokenization, by the middle person disposal the taken a toll can be diminished. The time utilization versatility for executing a exchange will be controlled by savvy contract quick performance.

Not influenced by S1, S3 and S4. The quick execution of keen contracts moves forward the versatility restriction of Blockchain. Permanent records of exchanges make a difference in lesser chances of botches. Dispersed Record Technology (DLT) framework of Blockchain

(BC) innovation empowered decentralized administration approach empowers a versatility of operation past the imperatives of institutionally-oriented.

PEOU7 is emphatically influenced by S1, S2, S3 and S6. In this way, Tokenization in Blockchain presents liquidity within the advertise and lower down information security breaches due to quick execution of shrewd contracts makes strides the adaptability confinement of Blockchain applying Savvy Blockchain contracts giving the green bond exchanging for quick exchange settlement. Unchanging records of exchanges makes a difference in lesser chances of botches. Through the tokenization, by the mediator end the taken a toll can be reduced.

Inversely influenced by S7. The time utilization adaptability for executing a exchange will be controlled by shrewd contract quick performance.

Unaffected by S4, S5, and S8. The Distributed Ledger Technology (DLT) framework of Blockchain (BC) technology enables a decentralized governance approach, fostering operational flexibility beyond the constraints of institutionally-oriented systems. The immutability inherent in Blockchain presents new opportunities in analytics, querying, and overall business processes. Through the tokenization, by the middle person disposal the taken a toll can be reduced.

PEOU8 is emphatically influenced by S2, S3 and S8. In this way, I discover it simple to induce Blockchain to do what I need it to do due to Applying Keen Blockchain contracts giving the green bond exchanging for quick exchange settlement. Unchanging records of exchanges makes a difference in lesser chances of botches. Keen Blockchain contracts energizes the coordination among the partners.

Inversely affected by S1 and S7. The fast performance of smart contracts improves the scalability limitation of Blockchain. The time consumption scalability for executing a transaction will be controlled by smart contract fast performance.

Not affected by S4, S5 and S6. Distributed Ledger Technology (DLT) system of Blockchain (BC) technology enabled decentralized governance approach enables a scalability of operation beyond the constraints of institutionally-oriented. Immutability in Blockchain offers new

opportunities in analytics, query, and overall business processes. Through the tokenization, by the intermediary elimination the cost can be reduced.

PEOU9 is positively affected by S7 and S8. Thus, interaction with Blockchain is understandable and clear due to time consumption scalability for executing a transaction will be controlled by smart contract fast performance., Smart Blockchain contracts encourages the coordination among the stakeholders.

Inversely affected by S2, S5 and S6. Applying Smart Blockchain contracts providing the green bond trading for fast trade settlement. The immutability of Blockchain opens up fresh possibilities in analytics, querying, and optimizing overall business processes. Through the tokenization, by the intermediary elimination the cost can be reduced.

Not affected by S1, S3 and S4. The fast performance of smart contracts improves the scalability limitation of Blockchain. Immutable records of transactions help in lesser chances of mistakes. The decentralized governance approach facilitated by Distributed Ledger Technology (DLT) systems like Blockchain (BC) enables scalable operations that surpass the limitations typically associated with institutionally-oriented frameworks.

PEOU10 is positively affected by S2, S4, S5 and S8. Blockchain is flexible to interact with due to Applying Smart Blockchain contracts providing the green bond trading for fast trade settlement. The decentralized governance approach enabled by Distributed Ledger Technology (DLT) systems like Blockchain (BC) facilitates scalable operations that surpass the constraints of institutionally-oriented frameworks. Furthermore, the immutability of Blockchain presents fresh opportunities in analytics, querying, and enhancing overall business processes. Smart Blockchain contracts foster coordination among stakeholders.

Inversely affected by S6 and S7. Through the tokenization, by the intermediary elimination the cost can be reduced. The time consumption scalability for executing a transaction will be controlled by smart contract fast performance.

Not affected by S1 and S3. The fast performance of smart contracts improves the scalability limitation of Blockchain Immutable records of transactions helps in lesser chances of mistakes.

PEOU11 is positively affected by S1, S4, S5, S7 and S8. Becoming proficient in using Blockchain is facilitated by the rapid performance of smart contracts, which addresses the scalability limitations of Distributed Ledger Technology (DLT) systems like Blockchain (BC). The decentralized governance approach enabled by Blockchain's DLT system allows scalable operations that transcend the constraints typically associated with institutionally-oriented frameworks. Additionally, the immutability inherent in Blockchain creates new opportunities in analytics, querying, and enhancing overall business processes. The time consumption scalability for executing a transaction will be controlled by smart contract fast performance. Smart Blockchain contracts encourages the coordination among the stakeholders.

Inversely affected by S3 and S6. Immutable records of transactions help in lesser chances of mistakes. Through the tokenization, by the intermediary elimination the cost can be reduced. Not affected by S2. Applying Smart Blockchain contracts providing the green bond trading for fast trade settlement.

Its Security The utilize of private and open keys may be a pivotal component of security in blockchains. Deviated cryptography is utilized by blockchain frameworks to defend user-to-user exchanges. (Zhang 2019); (Zhang 2019) Secure clients are likely to be hopeful towards unused include blockchain, which confines and controls organize support, shows up to be a more- best fit when it comes to guaranteeing compliance with information protection laws. The Delaware governor propelled the "Delaware Blockchain Activity" within the Joined together States of America (USA), that's a comprehensive program to construct a legitimate and administrative setting for the creation of blockchain innovation (Anish Jaipuriar, 2020). In their study, Walczuch (2007) discovered that vulnerability has a detrimental effect on perceived value. This finding is corroborated by Godoe and Johansen (2012), who also did not find a relationship. Therefore, we hypothesize that security is expected to result in lower levels of perceived usefulness and perceived ease of use, as indicated by previous research. Thus, hypothesise:

H3: Privacy positively affects perceived usefulness of BT.

"P" refers to Privacy, where individuals can control and own their data through blockchain transactions using private and public keys. This prevents third-party intermediaries from accessing and misusing data. Owners of personal data can regulate the access of third parties

to their data when stored on the blockchain. PU stands for Perceived Usefulness, which denotes the extent to which individuals perceive the technology to be beneficial (Davis et al., 1989).

Table 5.3: The matrix below summarizes the effect of independent variables (P_i, i = 1,2, …, 11) on the dependent ones (PU_i, i = 1,2,…,10). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

	Pu1	Pu2	Pu3	Pu4	Pu5	Pu6	Pu7	Pu8	Pu9	Pu10
P1	S+	S+	S+	NS	S+	S+	S-	S+	S-	NS
P2	NS	NS	S-	NS	NS	S+	S+	S+	NS	NS
P3	S-	S+	S+	S+	NS	NS	S+	S+	S+	S+
P4	S+	S-	NS	S-	S+	S-	S+	S+	NS	S-
P5	S+	S-	NS	NS	S+	S-	S+	S-	S-	S+
P6	S-	S-	S+	S+	S-	NS	S+	S-	S+	S+
P7	S-	S-	S-	NS	S+	NS	S-	NS	S+	NS
P8	S+	S+	S+	S+	S-	S-	S-	NS	S+	S-
P9	NS	S-	S-	S-	S+	S+	S-	S-	S-	S+
P10	S+	S+	S+	S+	S+	S+	S+	S+	S+	S+
P11	S+	S+	S-	NS	S+	S+	S-	S+	S-	S+

PU1 is positively affected by P1, P4, P5, P8, P10 and P11. Thus, Blockchain (BC) Distributed Ledger Technology (DLT) has the potential to enhance efficiency and broaden access to financial services for unbanked populations, thereby including those who are currently excluded from the traditional financial system. Due to applying Smart BC contracts to post trade activities reduce counter parties and operational risks, The documents remain safe and preserved with proper encryption methods, no entity, including a system administrator, has the capability to delete a transaction. No intermediary of Blockchain tokenization reduces the settlement transaction cost of green Bond investors, The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy. Stakeholders involved in Blockchain green bond financing services are committed to prioritizing the best interests of all parties involved. Applications enabled by Blockchain for green bond financing provide users with essential feedback, instilling confidence in their transactions.

PU1 is negatively affected by P3, P6 and P7. The potential of Blockchain (BC) Distributed Ledger Technology (DLT) to enhance efficiency and broaden access to finance for unbanked populations is not impeded by the utilization of Smart Blockchain contracts in green bond trading, which is highly secure. Blockchain-based green bonds financing can be trusted by stakeholders.

PU1 is not affected by P2 and P9. Blockchain Distributed Ledger Technology helps in resolving consumer protection issues, financial integrity concerns. Blockchain-based green bonds financing can be trusted by stakeholders.

PU2 is emphatically influenced by P1, P4, P5, P8, P10 and P11. Hence, tokenization offers higher availability for clients with way better offices in terms of trade of tokens. This opens entryways for diverse financial specialists and cuts down the least speculation period and sum due to Applying Savvy BC contracts to post exchange exercises diminish counter parties and operational dangers, The archives stay secure and protected with legitimate encryption strategies, No one, not indeed a framework director, can erase a exchange., No mediator of Blockchain tokenization diminishes the settlement exchange taken a toll of green Bond financial specialists., The Blockchain-based budgetary benefit given by the guarantor is straightforward, and the benefit keeps up the security., Blockchain green bond financing benefit partners will continuously keep best interface in intellect., Blockchain empowered green bond financing benefit applications given with the fundamental criticism that produces the client certain to bargain.

PU2 is negatively affected by P1, P3, P8, P10 and P11. DLT of blockchains is likely to be affected inversely because it brings unrelated parties together and facilitates increase in crypto-currency which is not yet prevalent to a large scale in India. The response to understanding the interaction with Blockchain is understandable and clear, it negatively affects DLT probably due to lack of working knowledge and awareness about blockchain technology. This indicates there is a need to spread awareness about DLT of Blockchains to facilitate its adoption. Applying Smart BC contracts to post trade activities reduce counter parties and operational risks. Using Smart Blockchain contracts in green bond trading is highly secure. The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy. Blockchain enabled green bond financing service applications provided with the necessary feedback that makes the user confident to deal.

PU2 is not affected by P2. Tokenization offers higher openness for clients with way better offices in terms of trade of tokens. This opens entryways for distinctive financial specialists and cuts down the least venture period and sum. This can be not influenced by applying Savvy BC contracts to post exchange exercises.

PU3 is positively affected by P1, P4, P5, P8, P10 and P11. Thus, blockchain tokenization provides transparency of transaction to the investors due to applying smart BC contracts to post trade activities reduce counter parties and operational risks, the documents remain safe and preserved with proper encryption methods, Transactions cannot be deleted by anyone, including a system administrator. No intermediary of Blockchain tokenization reduces the settlement transaction cost of green Bond investors, The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy. Stakeholders involved in Blockchain green bond financing services consistently prioritize the best interests of all parties. Applications for green bond financing enabled by Blockchain provide users with essential feedback, fostering confidence in their transactions.

PU3 is negatively affected by P1, P3, P8, P10 and P11. Applying Smart BC contracts to post trade activities reduce counter parties and operational risks**,** Using Smart Blockchain contracts in green bond trading is highly secure., The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy. Stakeholders in Blockchain green bond financing services are committed to prioritizing the best interests of all parties. Blockchain-enabled green bond financing applications offer users essential feedback, instilling confidence in their transactions.

PU2 remains unaffected by P2. Tokenization provides enhanced accessibility for users, offering improved facilities for token exchange. This broadens opportunities for various investors and reduces minimum investment requirements. The period and amount are unaffected. Blockchain Distributed Ledger Technology aids in addressing consumer protection issues and financial integrity concerns.

PU4 is positively affected by P3, P6, P8 and P10. Thus, capability of blockchain to generate a comprehensive, indisputable, and transparent transactional ledger empowers organizations to streamline and expedite the auditing process without the need for intermediaries. The utilization of smart Blockchain contracts ensures high security, while documents remain

safeguarded and preserved through robust encryption methods. Additionally, transactions cannot be deleted by any entity. That makes the user confident to deal in blockchain enabled green bond financing service applications.

PU2 is negatively affected by P4 and P9. The documents remain safe and preserved with proper encryption methods, Transactions are immutable, preventing deletion by anyone, including a system administrator. Blockchain-based green bonds financing can be trusted by stakeholders.

PU4 is not affected by P1, P2, P5, P7 and P11, this ability of blockchain to generate a complete, indisputable, and transparent transactional ledger remains unaffected by Distributed Ledger Technology, aiding in resolving consumer protection issues and ensuring financial integrity. However, applying Smart BC contracts inversely impacts the ease and efficiency of the auditing process facilitated by the organization's ability to produce a comprehensive and indisputable transactional history. The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy. Stakeholders involved in Blockchain green bond financing services are committed to prioritizing the best interests of all parties. Blockchain-enabled green bond financing applications offer users essential feedback, fostering confidence in their transactions.

PU5 is positively affected by P1, P4, P5, P8, P10 and P11. Therefore, immutability eliminates the need for backing up and restoring a database to retrieve information, among other functions. Due to Applying Smart BC contracts to post trade activities reduce counter parties and operational risks, The documents remain safe and preserved with proper encryption methods, Transactions are immutable, ensuring that not even a system administrator has the authority to delete them.

No intermediary of Blockchain tokenization reduces the settlement transaction cost of green Bond investors. The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy. Stakeholders involved in Blockchain green bond financing services are committed to prioritizing the best interests of all parties. Blockchain-enabled green bond financing applications provide users with essential feedback, instilling confidence in their transactions.

PU5 is negatively affected by P1, P4, P5, P7, P9, P10 and P11. Applying Smart BC contracts to post trade activities reduce counter parties and operational risks., The documents remain safe and preserved with proper encryption methods, No one, not even a system administrator, can delete a transaction. Blockchain tokenization eliminates intermediaries, thereby reducing the settlement transaction costs for green bond investors. All stakeholders involved in green bonds can successfully ensure the privacy of Blockchain transactions. Stakeholders can trust Blockchain-based green bond financing. Stakeholders in Blockchain green bond financing services are committed to prioritizing the best interests of all parties. Blockchain-enabled green bond financing applications provide users with essential feedback, instilling confidence in their transactions.

PU5 is not affected by P2 and P3. Blockchain Distributed Ledger Technology helps in resolving consumer protection issues, financial integrity concerns. Using Smart Blockchain contracts in green bond trading is highly secure.

PU6 is positively affected by P1, P2, P9, P10 and P11. Therefore, Blockchain enhances task execution through features that assist users. Applying Smart BC contracts to post-trade activities reduces counterparty and operational risks. Blockchain Distributed Ledger Technology resolves consumer protection issues and ensures financial integrity. Stakeholders can trust Blockchain-based green bond financing. Stakeholders in Blockchain green bond financing services prioritize the best interests of all parties. Blockchain-enabled green bond financing service applications offer users essential feedback, instilling confidence in their transactions.

PU6 is negatively affected by P4, P5 and P8. The documents remain safe and preserved with proper encryption methods, transactions are immutable, ensuring that deletion is impossible even for a system administrator, No intermediary of Blockchain tokenization reduces the settlement transaction cost of green Bond investors, The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy. All these elements inversely influence Blockchain's ability to enhance task execution by providing features that assist users. Applying Smart BC contracts to post-trade activities reduces counterparty and operational risks.

PU6 is not affected by P3, P6 and P7. Using Smart Blockchain contracts in green bond trading is highly secure. The use of smart contracts also gives the parties trust, without fully having to know the other side. All stakeholders involved in green bonds can successfully ensure the privacy of Blockchain transactions.

PU7 is positively affected by P2, P3, P4, P5, P6 and P10. Thus, Blockchain use can improve market performance due to Blockchain Distributed Ledger Technology helps in resolving consumer protection issues, financial integrity concerns., Using Smart Blockchain contracts in green bond trading is highly secure., The documents remain safe and preserved with proper encryption methods, transactions cannot be deleted by anyone, not even a system administrator. The absence of intermediaries in Blockchain tokenization lowers the settlement transaction costs for green bond investors. Smart contracts instill trust between parties without necessitating full knowledge of each other. Stakeholders in Blockchain green bond financing services consistently prioritize the best interests of all parties.

PU7 is negatively affected by P1, P7, P8, and P9. Blockchain-based green bonds financing can be trusted by stakeholders. The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy. All stakeholders involved in green bonds can effectively maintain the privacy of Blockchain transactions. Applying Smart BC contracts to post trade activities reduce counter parties and operational risks.

PU8 is positively affected by P1, P2, P3, P4, P10 and P11. Thus, Blockchain use can make it easier to do financial transactions due to Blockchain Distributed Ledger Technology helps in resolving consumer protection issues, financial integrity concerns, using smart blockchain contracts in green bond trading is highly secure, In contrast to traditional centralized databases and computational platforms (whether on-premises or in the cloud), blockchains offer a neutral ground between organizations, thereby reducing certain counterparty and operational risks.

Blockchain use can make it easier to do financial transactions is negatively affected by No intermediary of Blockchain tokenization reduces the settlement transaction cost of green Bond investors. Utilizing smart contracts fosters trust between parties, eliminating the need for complete familiarity with the other side. Stakeholders can place trust in Blockchain-based green bond financing.

PU8 is negatively affected by P5, P6 and P9, tokenisation and smart contracts of blockchains are likely to be affected inversely because there is no intermediary and it usually requires extensive technical training to develop skills and a fundamental understanding of blockchain technology, so it reduces trust by stakeholders or green bond investors.

PU8 is not affected by P7 and P8. Blockchain use can make it easier to do financial transactions are not affected by the privacy of Blockchain transactions.

PU9 is positively affected by P3, P6, P7, P8 and P10. Thus, Blockchain use in financial markets can increase productivity due to the use of smart blockchain contracts in green bond trading that makes it **highly secure**. It gives the parties **trust**, without fully having to know the other side. The privacy of Blockchain transactions can be carried out successfully by all stakeholders of green bonds. The Blockchain-based financial service provided by the issuer is **transparent**, and the service maintains the **privacy**. Blockchain green bond financing service stakeholders will always keep best interests in mind.PU9 is negatively affected by P1, P5 and P9. Blockchain-based green bonds financing is inversely affecting the productivity in financial markets due to non- involvement of intermediary of Blockchain tokenization. Applying Smart BC contracts to post trade activities reduce counter parties and operational risks

PU9 is not affected by P2 and P4. Blockchain DLT and encryption methods are not affecting the productivity in financial markets. No one, not even a system administrator, can delete a transaction. This sometimes interrupts to continue working of the system.

PU10 is positively affected by P3, P5, P6, P9, P10 and P11. Thus, Blockchain use enable the user to accomplish the transaction **more quickly** due to no intermediary of Blockchain tokenization reduces the settlement transaction cost of green Bond investors. Smart contracts instill trust between parties, while stakeholders in Blockchain green bond financing services consistently prioritize the best interests of all involved.

PU10 is negatively affected by P4 and P8. The ability of Blockchain to expedite transactions is inversely impacted by the implementation of encryption methods, ensuring that documents remain securely preserved. Additionally, transactions cannot be deleted by anyone, including a system administrator. The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy.

Table 5.4: PU10 is not affected by P1, P2 and P7. Blockchain use would enable the user to accomplish the transaction more quickly not affected by the Blockchain DLT. Applying Smart BC contracts to post trade activities reduce counter parties and operational risks.

	Peou 1	Peou 2	Peou 3	Peou 4	Peou 5	Peou 6	Peou 7	Peou 8	Peou 9	Peou1 0	Peou1 1
P1	S+	S+	S+	S+	S+	NS	NS	S+	NS	S+	NS
P2	S-	NS	S+	S-	NS	NS	S+	S-	S-	S+	S+
P3	S+	S-	S-	S+	NS	NS	S-	NS	NS	S+	S+
P4	S+	S-	NS	NS	S+	NS	S+	S+	S-	S-	S-
P5	NS	S-	S+	S-	NS	S+	S-	NS	NS	S+	S+
P6	S+	S-	S+	NS	S+	S-	S+	S-	NS	S-	NS
P7	NS	S+	S+	S+	S+	S+	S+	S+	S+	NS	NS
P8	S+	S+	NS	S+	NS	S-	S+	S+	S+	S+	S+
P9	S+	S-	S+	S+	S+	S+	NS	S+	S+	S+	S+
P1 0	S+	S+	S+	S+	S+	S-	S+	S+	S+	S+	S+
P1 1	S+	NS	S-	S-	S-	S+	S-	NS	S-	S-	S-

H4: Privacy positively affects Perceived ease of use of BT

"P" denotes Privacy in Blockchain transactions, empowering users to manage their data using private and public keys, thereby retaining ownership. Third-party intermediaries are prohibited from misusing or accessing data. When personal data are stored on the blockchain, owners have control over third-party access. PEOU refers to Perceived Ease of Use, representing individuals' perception of the ease of utilizing blockchain technology (Davis et al., 1989).

The matrix below summarizes the effect of independent variables (P_i, i = 1,2, …, 11) on the dependent ones ($PEOU_i$, i = 1,2,…,11). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

PEOU1 is emphatically influenced by P1, P3, P4, P6, P8, P9, P10 and P11. Hence, for makers, tokenization brings out way better swarm financing openings to makers and empowers them to update their arrangements in an compelling way due to Applying Savvy BC contracts to post exchange exercises diminish counter parties and operational dangers, Utilizing Shrewd Blockchain contracts in green bond exchanging is exceedingly secure. The archives stay secure and protected with appropriate encryption strategies, No one, not indeed a framework chairman, can erase a exchange., The utilize of keen contracts moreover gives the parties believe, without completely having to know the other side. The Blockchain-based monetary benefit given by the backer is straightforward, and the benefit keeps up the security. Blockchain-based green bonds financing can be trusted by partners. Blockchain green bond financing benefit partners will continuously keep best interface in intellect. Blockchain empowered green bond financing benefit applications given with the essential input that creates the client certain to deal. Negatively influenced by P2 Blockchain Conveyed Record Innovation makes a difference in settling buyer security issues, budgetary astuteness concerns. Not influenced by P5 and P7. No middle person of Blockchain tokenization decreases the settlement exchange fetched of green Bond financial specialists The security of Blockchain exchanges can be carried out effectively by all partners of green bonds.

PEOU2 is emphatically influenced by P1, P7, P8 and P10. This approach enables speculators to exit the Blockchain platform, where tokens represent private company securities, at any time by selling their tokens on a secondary market quickly and efficiently. They no longer need to endure the inconvenience and expense of early redemption. Due to Applying Shrewd BC contracts to post exchange exercises decrease counter parties and operational dangers, The security of Blockchain exchanges can be carried out effectively by all partners of green bonds. The Blockchain-based budgetary benefit given by the guarantor is straightforward, and the benefit keeps up the protection. Blockchain green bond financing benefit partners will continuously keep best interface in mind.

Negatively influenced by P3, P4, P5, P6, and P9 Utilizing Savvy Blockchain contracts in green bond exchanging is profoundly secure. The reports stay secure and protected with legitimate encryption strategies, No one, not indeed a framework director, can erase an exchange No middle person of Blockchain tokenization diminishes the settlement exchange fetched of green Bond speculators, The utilize of savvy contracts too gives the parties believe, without

completely having to know the other side. Blockchain-based green bonds financing can be trusted by stakeholders.
Not influenced by P2 and P11. Blockchain empowered green bond financing benefit applications given with the vital criticism that creates the client certain to bargain. Blockchain Conveyed Record Innovation makes a difference in settling customer security issues, budgetary astuteness concerns.

PEOU3 is emphatically influenced by P1, P2, P5, P6, P7, P9 and P10. In this way, Tokenization offers higher openness for clients with way better offices in terms of trade of tokens due to Applying Shrewd BC contracts to post exchange exercises decrease counter parties and operational dangers, Blockchain Dispersed Record Innovation makes a difference in settling buyer security issues, money related judgment concerns No middle person of Blockchain tokenization decreases the settlement exchange taken a toll of green Bond financial specialists., The utilize of keen contracts moreover gives the parties believe, without completely having to know the other side. Blockchain-based green bonds financing can be trusted by partners. Blockchain green bond financing benefit partners will continuously keep best interface in mind. Negatively influenced by P3 and P11. Utilizing Shrewd Blockchain contracts in green bond exchanging is exceedingly secure. Blockchain empowered green bond financing benefit applications given with the vital criticism that creates the client certain to deal.

Not influenced by P4 and P8. The records stay secure and protected with legitimate encryption strategies, No one, not indeed a framework director, can erase a exchange. The Blockchain-based money related benefit given by the guarantor is straightforward, and the benefit keeps up the security.

PEOU4 is emphatically influenced by P1, P3, P7, P8, P9 and P10. Therefore, Tokenization provides an opportunity to unite disparate parties for digital trading, facilitated by the application of Smart BC contracts to post-trade activities, which reduces counterparty and operational risks, Utilizing Shrewd Blockchain contracts in green bond exchanging is profoundly secure., The protection of Blockchain exchanges can be carried out effectively by all partners of green bonds., The Blockchain-based monetary benefit given by the backer is straightforward, and the benefit keeps up the privacy.q Blockchain-based green bonds financing can be trusted by partners. Blockchain green bond financing benefit partners will continuously keep best interface in mind.

Negatively influenced by P2, P5 and P11. Blockchain empowered green bond financing benefit applications given with the vital criticism that creates the client sure to bargain. Blockchain Conveyed Record Innovation makes a difference in settling buyer security issues, monetary judgment concerns No mediator of Blockchain tokenization diminishes the settlement exchange fetched of green Bond financial specialists. Not influenced by P4 and P6. The archives stay secure and protected with legitimate encryption strategies, No one, not indeed a framework chairman, can erase a exchange. The utilize of savvy contracts moreover gives the parties believe, without completely having to know the other side.

PEOU5 is emphatically influenced by P1, P4, P6, P7, P9 and P10. Therefore, Tokenization offers financial organizations the opportunity to convert all assets into digital cryptocurrencies, enabling consistent trading. Applying Keen BC contracts to post exchange exercises diminish counter parties and operational risks.

The archives stay secure and protected with legitimate encryption strategies, No one, not indeed a framework director, can erase a exchange. The utilize of shrewd contracts too gives the parties believe, without completely having to know the other side. he security of Blockchain exchanges can be carried out effectively by all partners of green bonds. Blockchain-based green bonds financing can be trusted by partners. Blockchain green bond financing benefit partners will continuously keep best interface in intellect. Adversely influenced by P11. Blockchain empowered green bond financing benefit applications given with the vital input that produces the client certain to deal.

Not influenced by P2, P3, P5 and P8. The Blockchain-based monetary benefit given by the backer is straightforward, and the benefit keeps up the security. Blockchain Conveyed Record Innovation makes a difference in settling shopper security issues, budgetary keenness concerns Utilizing Savvy Blockchain contracts in green bond exchanging is profoundly secure. No middle person of Blockchain tokenization diminishes the settlement exchange fetched of green Bond financial specialists. The Blockchain-based money related benefit given by the guarantor is straightforward, and the benefit keeps up the privacy.

PEOU6 is emphatically influenced by P5, P7, P9 and P11. Hence, Tokenization gives shippers an elude from putting away the real credit card numbers in POS machines and other framework

due to No middle person of Blockchain tokenization decreases the settlement exchange taken a toll of green Bond speculators. The security of Blockchain exchanges can be carried out effectively by all partners of green bonds. Blockchain-based green bonds financing can be trusted by partners. Blockchain empowered green bond financing benefit applications given with the fundamental input that produces the client sure to deal. Negatively influenced by P6, P8 and P10. The utilize of shrewd contracts too gives the parties believe, without completely having to know the other side. The Blockchain-based money related benefit given by the guarantor is straightforward, and the benefit keeps up the protection. Blockchain green bond financing benefit partners will continuously keep best interface in intellect. Not influenced by P1, P2, P3 and P4. Applying Keen BC contracts to post exchange exercises diminish counter parties and operational dangers Blockchain Disseminated Record Innovation makes a difference in settling shopper assurance issues, monetary keenness concerns Utilizing Savvy Blockchain contracts in green bond exchanging is exceedingly secure. The reports stay secure and protected with legitimate encryption strategies, No one, not indeed a framework chairman, can erase a transaction.

PEOU7 is emphatically influenced by P2, P4, P6, P7, P8 and P10. In this way, Tokenization in Blockchain presents liquidity within the advertise and lower down information security breaches due to Blockchain Conveyed Record Innovation makes a difference in settling shopper assurance issues, budgetary judgment concerns. The records stay secure and protected with appropriate encryption strategies, No one, not indeed a framework director, can erase a exchange. The utilize of shrewd contracts moreover gives the parties believe, without completely having to know the other side. The security of Blockchain exchanges can be carried out effectively by all partners of green bonds. The Blockchain-based monetary benefit given by the backer is straightforward, and the benefit keeps up the security. Blockchain green bond financing benefit partners will continuously keep best interface in mind.

Negatively influenced by P3, P5 and P11 Utilizing Savvy Blockchain contracts in green bond exchanging is exceedingly secure. No middle person of Blockchain tokenization diminishes the settlement exchange taken a toll of green Bond speculators. Blockchain empowered green bond financing benefit applications given with the vital input that produces the client sure to deal.

Not influenced by P1 and P9., Blockchain-based green bonds financing can be trusted by partners., Applying Savvy BC contracts to post exchange exercises diminish counter parties and operational risks

PEOU8 is emphatically influenced by P1, P4, P7, P8, P9 and P10.Thus, I discover it simple to induce Blockchain to do what I need it to do due to Applying Shrewd BC contracts to post exchange exercises diminish counter parties and operational dangers. The reports stay secure and protected with appropriate encryption strategies, No one, not indeed a framework director, can erase a exchange. The protection of Blockchain exchanges can be carried out effectively by all partners of green bonds. The Blockchain-based budgetary benefit given by the backer is straightforward, and the benefit keeps up the security. Blockchain-based green bonds financing can be trusted by partners. Blockchain green bond financing benefit partners will continuously keep best interface in intellect. Adversely influenced by P2 and P6. Blockchain Dispersed Record Innovation makes a difference in settling shopper security issues, money related keenness concerns. The utilize of shrewd contracts moreover gives the parties believe, without completely having to know the other side. Not influenced by P3, P5 and P11.

Utilizing Savvy Blockchain contracts in green bond exchanging is profoundly secure. No mediator of Blockchain tokenization diminishes the settlement exchange fetched of green Bond financial specialists. Blockchain empowered green bond financing benefit applications given with the vital criticism that creates the client certain to deal.

PEOU9 is emphatically influenced by P7, P8, P9 and P10. Hence, interaction with Blockchain is reasonable and clear due to the security of Blockchain exchanges can be carried out effectively by all partners of green bonds. The Blockchain-based budgetary benefit given by the backer is straightforward, and the benefit keeps up the security. Blockchain-based green bonds financing can be trusted by partners. Blockchain green bond financing benefit partners will continuously keep best interface in intellect. Contrarily influenced by P2, P4 and P11, Blockchain Dispersed Record Innovation makes a difference in settling shopper security issues, monetary astuteness concerns the reports stay secure and protected with appropriate encryption strategies, No one, not indeed a framework director, can erase a exchange. Blockchain empowered green bond financing benefit applications provided with the vital input that creates the client sure to deal.

Not influenced by P1, P5 and P6. Applying Savvy BC contracts to post exchange exercises diminish counter parties and operational dangers No middle person of Blockchain tokenization decreases the settlement exchange fetched of green Bond speculators. The utilize of keen contracts moreover gives the parties believe, without completely having to know the other side. PEOU10 is positively affected by P1, P2, P3, P5, P8, P9 and P10. Thus, Blockchain is flexible to interact with due to applying Smart BC contracts to post trade activities reduce counter parties and operational risks. Blockchain Distributed Ledger Technology helps in resolving consumer protection issues, financial integrity concerns Using Smart Blockchain contracts in green bond trading is highly secure. No intermediary of Blockchain tokenization reduces the settlement transaction cost of green Bond investors. The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy. Blockchain-based green bonds financing can be trusted by stakeholders. Stakeholders involved in Blockchain green bond financing services are dedicated to prioritizing the best interests of all parties involved. Negatively affected by P4, P6 and P11. The documents remain safe and preserved with proper encryption methods, Transactions cannot be deleted by anyone, including a system administrator. Smart contracts foster trust between parties, eliminating the need for full disclosure of information about the other party. Blockchain-enabled green bond financing service applications offer users essential feedback, instilling confidence in their transactions. Privacy of Blockchain transactions can be successfully ensured by all stakeholders of green bonds.

PEOU11 is positively affected by P2, P3, P5, P8, P9 and P10.Thus, It is easy to become skilful at using Blockchain due to Blockchain Distributed Ledger Technology helps in resolving consumer protection issues, financial integrity concerns Using Smart Blockchain contracts in green bond trading is highly secure. No intermediary of Blockchain tokenization reduces the settlement transaction cost of green Bond investors. The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy. Blockchain-based green bonds financing can be trusted by stakeholders. Stakeholders in Blockchain green bond financing services are committed to consistently prioritizing the best interests of all involved.

Negatively affected by P4 and P11. The documents remain safe and preserved with proper encryption methods, Transactions cannot be deleted by anyone, not even a system administrator. Blockchain-enabled green bond financing service applications provide users with essential feedback, instilling confidence in their transactions.

Not affected by P1, P6 and P7. Applying Smart BC contracts to post trade activities reduce counter parties and operational risks The use of smart contracts also gives the parties trust, without fully having to know the other side. All stakeholders involved in green bonds can effectively ensure the privacy of Blockchain transactions.

Blockchain operates through the peer-to-peer (P2P) phenomenon and does not need authorization from a dependable third party for data tracking and storage, which lowers the cost. Cost-efficiency norms are a person's assessment of what most of the people in his life who are significant to him believe he should or should not do (Ajzen 1991). As per Choi et al. (2008), the subjective norm exerts the most significant influence on behavioural intention. It is discovered that perceived utility and behavioural intention are influenced by cost-efficiency norms (Author links open overlay panel, Muneeb Ul Hassan, 2020). (Choi et al. 2008).

PU10 is not affected by P1, P2 and P7. Blockchain use would enable the user to accomplish the transaction more quickly not affected by the Blockchain DLT. Applying Smart BC contracts to post trade activities reduce counter parties and operational risks.

H5: Cost efficiency norms positively affects the Perceived Usefulness of BT

"CE" denotes the Cost Efficiency of Blockchain. With Blockchain technologies, the necessity for third-party entities to deploy and maintain transaction record systems diminishes, potentially reducing the cost per transaction. PU refers to Perceived Usefulness, representing an individual's belief in how utilizing a particular system would enhance their job performance (Davis et al., 1989).

Table 5.5: The matrix below summarizes the effect of independent variables (CE_i, i = 1,2, …, 10) on the dependent ones (PU_i, i = 1,2,…,10). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

	CE1	CE2	CE3	CE4	CE5	CE6	CE7	CE8	CE9	CE10
PU1	S+	S-	S+	S-	S+	S+	S-	S-	S-	S-

PU2	S+	S+	S-	S+	S-	S-	S-	S+	NS	S+
PU3	NS	S+	S+	S+	S+	S+	NS	S+	S+	S+
PU4	S-	NS	NS	S-	S-	S+	S+	S+	S-	S-
PU5	S+	S+	S+	S+	NS	NS	S-	NS	S+	S+
PU6	S-	S-	S+	S+	S+	S+	S+	S-	NS	S+
PU7	NS	S+	S+	S+	S+	S+	S+	S+	S+	S+
PU8	S+	S-	S-	S+	S+	S+	S+	S+	S+	S+
PU9	NS	S+	S+	S+	S-	S-	S-	S-	S+	S-
PU10	S+	NS	S-	S-	S-	S+	S+	NS	S-	S-

CE is influenced emphatically by PU1, PU2, PU5, PU8 and PU10. Hence, Blockchain (BC) Dispersed Record Innovation (DLT) seem increment productivity and possibly progress get to to fund, tokenization offers higher availability for clients with way better offices in terms of trade of tokens. This opens entryways for diverse speculators and cuts down the least venture period and sum. due to contracts to post exchange exercises decrease counter parties and operational dangers, Blockchain Dispersed Record Innovation makes a difference in settling buyer assurance issues, money related keenness concerns Utilizing Savvy Blockchain contracts in green bond exchanging is exceedingly secure. No middle person of Blockchain tokenization diminishes the settlement exchange fetched of green Bond financial specialists. The protection of Blockchain exchanges can be carried out effectively by all partners of green bonds.

Thus, the capacity of an organization to create a total and undeniable history of a value-based record makes the reviewing handle simple and productive of blockchain conversely since (PU4 and PU6) of unchanging nature and the shrewd contract which interface the parties without completely having to know the other side. Changing keen contract forms is nearly inconceivable, any mistake within the code can be time-consuming and costly to correct. This indicates there's a have to be spread mindfulness almost utilizing of Blockchains to encourage its appropriation. PU3, PU7 and PU9 have no impact on CE1. Blockchain tokenization gives straightforwardness of exchange to the speculators and isn't influenced by the taken a toll calculate in blockchain.

CE2 is influenced emphatically by PU2, PU3, PU5, PU7 and PU9. Hence, BC DLT might lower settlement costs of green bond exchange due to Blockchain Disseminated Record

Innovation makes a difference in settling shopper security issues, monetary astuteness concerns Utilizing Shrewd Blockchain contracts in green bond exchanging is profoundly secure. No mediator of Blockchain tokenization decreases the settlement exchange fetched of green Bond speculators. The protection of Blockchain exchanges can be carried out effectively by all partners of green bonds. Blockchain-based green bonds financing can be trusted by stakeholders.

Thus, DLT of blockchains is likely to be influenced conversely since (PU1, PU6 and PU8) Blockchain-based monetary benefit given by the backer is straightforward but not at all like conventional computer program improvement, savvy contracts require designers to have trade information, it adversely influences settlement costs of green bond exchange likely due to need of working information and mindfulness almost blockchain innovation. Changing keen contract forms is nearly inconceivable, any blunder within the code can be time-consuming and costly to correct. This indicates there's a ought to spread mindfulness almost DLT of Blockchains to encourage its selection. PU4 and PU10 have no effect on CE2. Blockchain green bond financing benefit partners will continuously keep best interface in intellect isn't influenced by the fetched figure in blockchain.

CE3 is influenced emphatically by PU1, PU3, PU5, PU6, PU7 and PU9. Tokenization offers higher availability for clients with superior offices in terms of trade of tokens. This opens entryways for diverse financial specialists and cuts down the least speculation period and sum, due to applying savvy blockchain contracts that diminish counter parties and operational dangers.

No middle person of Blockchain tokenization diminishes the settlement exchange taken a toll. Blockchain-based green bonds financing can be trusted by partners.,
Tokenization offers higher availability for clients, cuts down the least speculation period and sum contrarily influenced by PU2, PU8 and PU10. in settling buyer security issues, budgetary astuteness concern, straightforwardness and the benefit keeps up the protection, since appropriation of resource tokenisation would confront a number of technology-related challenges, tokenized resources have the potential for expanded cyber hazard at times. This can be addressed by replacing sensitive data with unique identification tokens that contain all essential information about the data without compromising its security. Not influenced by PU4.

The reports stay secure and protected with legitimate encryption strategies and not influenced by tokenization.

CE4 is influenced emphatically by PU2, PU3, PU5, PU6, PU7, PU8 and PU9. For speculators, tokenization opens modern markets by bringing down the obstruction of least taken a toll for section due to settling customer assurance issues, budgetary keenness concerns by applying shrewd blockchain contracts that diminish counter parties and operational dangers. No middle person of Blockchain tokenization diminishes the settlement exchange taken a toll. Blockchain-based green bonds financing can be trusted by stakeholders.

For speculators, tokenization opens modern markets by bringing down the boundary of least fetched for passage is conversely influenced by PU1, PU4 and PU10. Tokenization of blockchains is likely to be influenced conversely since it brings higher openness for users with way better offices in terms of trade of tokens that produces clients skilful at utilizing Blockchain provides businesses with the opportunity to convert all assets into digital cryptocurrencies that can be traded seamlessly, potentially introducing vulnerability for investors. So, this demonstrates that, higher openness is sweet but there ought to be a few confirmations in between so that the security would not be challenged.

CE5 is influenced emphatically by PU1, PU3, PU6, PU7 and PU8. Investors will no longer have to endure the costly issue of early redemption, thanks to Blockchain (BC) Distributed Ledger Technology (DLT), which may increase efficiency and potentially enhance access to finance. Additionally, Blockchain tokenization provides transparency of transactions for investors. Investors encounter the expense and complexity of early redemption. Transaction fees refer to the costs linked with sending a transaction or utilizing a smart contract on a blockchain network. Users are required to pay fees while sending a transaction for two main reasons. Paying miners or validators—also referred to as nodes—for safeguarding the network is the primary justification Blockchains that use proof-of-work (PoW) feature miners that use their computational capacity to solve challenging algorithms to validate transactions. In contrast, validators on proof-of-stake (PoS) crypto algorithms stake their tokens to protect the network. In reaction to the high transaction's costs incurred when a blockchain is crowded, various protocols have been established. There are protocols, platforms, and approaches that assist users in lowering costs. Platforms on layer 2 are one of the most widely used solutions.

In response to the high transaction costs incurred when a blockchain is crowded, various solutions have been devised. Not affected by PU5.

CE6 is affected positively by PU1, PU3, PU4, PU6, PU7, PU8 and PU10. Immutability helps an organization to save time and cost due to Blockchain (BC) Distributed Ledger Technology (DLT) could increase efficiency and potentially improve access to finance. Blockchain tokenization provides transparency of transaction to the investors. The organization's capability to generate a comprehensive and indisputable transactional ledger streamlines the auditing process, making it both easy and efficient. Additionally, the utilization of Blockchain can enhance market performance. Blockchain use would enable the user to accomplish the transaction more quickly.

Immutability helps an organization to save time and cost is inversely affected by PU2, and PU9 because the permanence, indelibility, and inalterability of a blockchain ledger create a rigid structure for the data, reducing its flexibility., if any moderations are required in the data, could not be done in blockchain higher accessibility for users with enhanced facilities with regard to exchange of tokens that makes users skilful. Not affected by PU5.

CE7 is affected positively by PU4, PU6, PU7, PU8 and PU10. Blockchain technology enhances the efficiency of green bond financing and lowers costs by enabling organizations to create a comprehensive and indisputable transactional ledger, simplifying and streamlining the auditing process. Additionally, Blockchain can enhance task execution by providing features that assist users. Blockchain use can improve market performance. Blockchain use can make it easier to do financial transactions. Blockchain use would enable the user to accomplish the transaction more quickly.

Blockchain (BC) Distributed Ledger Technology (DLT) has the potential to boost efficiency and potentially enhance access to finance for unbanked populations, who are presently excluded from the traditional financial system. Tokenization enhances accessibility for users by providing improved facilities for token exchange, thereby expanding opportunities for various investors and reducing minimum investment requirements. Additionally, the immutability of Blockchain eliminates the need for backing up and restoring databases to retrieve information, among other benefits. Blockchain use in financial markets can increase productivity. Not affected by PU3.

CE8 is affected positively by PU2, PU3, PU4, PU7 and PU8. Blockchain technology streamlines transactions compared to traditional systems, reducing costs and enhancing efficiency and productivity. Tokenization improves accessibility for users, facilitating token exchange with better facilities and lowering minimum investment requirements, thereby attracting diverse investors. Additionally, Blockchain tokenization ensures transparency of transactions for investors. The organization's capability to generate a comprehensive and indisputable transactional ledger simplifies and streamlines the auditing process, making it both easy and efficient. Blockchain use can improve market performance. Blockchain use can make it easier to do financial transactions. Inversely affected by PU1, PU6 and PU9.

Blockchain (BC) Disseminated Record Innovation (DLT) might increment effectiveness and possibly move forward get to back for unbanked populaces, who are as of now exterior the conventional budgetary framework. Blockchain can progress to conduct a errand at whatever point it features a include to assist client perform it. Blockchain utilize in money related markets can increment productivity. Not influenced by PU5 and PU10.

CE9 is influenced emphatically by PU3, PU5, PU7, PU8 and PU9. Blockchain empowers smooth budgetary exchanges with less exertion, assets, mediators due to Blockchain tokenization gives straightforwardness of exchange to the speculators. Permanence takes the backing up and re-establishing a database to recover data etc. Blockchain utilize can progress advertise execution. Blockchain utilize can make it simpler to do monetary exchanges. Blockchain utilize in money related markets can increment productivity.

Inversely influenced by PU1, PU4 and PU10. Blockchain (BC) Conveyed Record Innovation (DLT) may increment effectiveness and possibly make strides get to to back for unbanked populaces, who are as of now exterior the conventional monetary framework. The capacity of an organization to deliver a total and undeniable history of a value-based record makes the auditing handle simple and effective. Blockchain utilize would empower the client to achieve the exchange more quickly. Not influenced by PU2 and PU6.

CE10 is influenced emphatically by PU2, PU3, PU5, PU6, PU7 and PU8. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less exertion due to Tokenization offers higher openness for clients with superior offices in terms of trade

of tokens. This opens entryways for distinctive speculators and cuts down the least speculation period and sum. Blockchain tokenization gives straightforwardness of exchange to the speculators. Permanence takes the backing up and re-establishing a database to recover data e Blockchain can progress to conduct a errand at whatever point it includes a highlight to assist client perform it. Blockchain utilize can move forward showcase execution. Blockchain utilize can make it simpler to do budgetary transactions Inversely influenced by PU1, PU4, PU9 and PU10. Blockchain (BC) Disseminated Record Innovation (DLT) may increment productivity and possibly progress get to back for unbanked populaces, who are right now exterior the conventional budgetary framework. The capacity of an organization to deliver a total and undeniable history of a value-based record makes the reviewing handle simple and productive. Blockchain utilize in financial markets can increment efficiency. Blockchain utilize would empower the client to achieve the exchange more rapidly.

H6: Cost efficiency norms positively affects behavioural Intention to use the BT

"CE" represents the Cost Efficiency of Blockchain. With Blockchain technologies, the necessity for third-party entities to deploy and maintain transaction record systems diminishes, potentially reducing the cost per transaction. BI refers to Blockchain Intention, representing stakeholders' inclination towards adopting blockchain technology.

Table 5.6: The matrix below summarizes the effect of independent variables CE_i, i = 1,2, …, 10) on the dependent ones (BIi = 1,2,…,12). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

	IU1	IU2	IU3	IU4	IU5	IU6	IU7	IU8	IU9	IU10	IU11	IU12
CE1	S+	S+	S-	S+	S+	S-	S+	S+	S+	NS	S-	S-
CE2	S+	S+	S+	S+	S+	S+	NS	S+	S+	S+	S+	S+
CE3	NS	NS	S+	S+	S+	NS	NS	S+	S+	S+	S+	S+
CE4	S-	S-	S+	NS	NS	NS	S-	S-	NS	S-	NS	S+
CE5	S+	NS	NS	S-	NS	NS	S+	S+	S-	S+	S+	S+
CE6	S+	S+	NS	S+	S-	S+	NS	S+	S+	S+	S+	NS
CE7	NS	S+	S-	S+	S+	NS	S+	S+	S+	S+	S+	S+
CE8	S+	S+	S+	S-	S+	S+	S+	S+	S+	S+	S-	S+

CE9	S-	S+	S+	S+	S+	NS	S+	S-	NS	S-	S+	S-
CE10	S+	S+	S+	S+	S+	S+	S-	NS	NS	NS	S+	S+

IU1 is positively affected by CE1, CE2, CE5, CE6, CE8 and CE10. Thus, stakeholders intend to use Blockchain technologies for green bond financing due to blockchain-enabled green bond financing helps easy tracking of transactions with less efforts by applying Smart BC contracts that eliminates the need for intermediaries which lower remittance costs of green bond transaction. Immutability helps an organization to save time and cost. Financial specialists won't ought to endure from the bother of early recovery which is a costly undertaking. Blockchain innovation requires less exertion for the exchange than the conventional framework which decreases fetched and increments productivity and efficiency.

IU1 is negatively affected by CE4 and CE9. Tokenization facilitates entry into new markets by reducing the minimum cost barrier, as it involves converting something of value into a digital token usable on a blockchain application. Blockchain streamlines financial transactions by minimizing effort, resources, and intermediaries. However, this inversely affects investors' intentions to use Blockchain technologies for green bond financing due to limited awareness of the technology. Therefore, social impact programs are needed to encourage individuals and groups to modify aspects of their behaviour.

IU1 isn't influenced by CE3 and CE7. Blockchain innovation increments green bond financing effectiveness and decreases fetched. Tokenization offers higher availability for clients with way better offices in terms of trade of tokens. This opens entryways for diverse financial specialists and cuts down the least venture period and amount. But this may as it was be applicable after the financial specialist knows the significance of blockchain additionally the working information on it with information of the different offices advertised by blockchain like tokenization.

IU2 is emphatically influenced by CE1, CE2, CE6, CE7, CE8, CE9 and CE10. Thus, Blockchain innovations can be utilized for other financing exchanges on the off chance that advertised, because it empowers smooth money related exchanges makes a difference simple following of exchanges with less exertion, assets, mediators due to BC DLT lower settlement costs by applying Keen BC contracts which kill the require for mediators and lower settlement

costs of green bond exchange within the exchanging of green bonds, BC unchanging nature helps an organization to spare time and fetched. BC requires less exertion for the exchange than the conventional framework that in conjunction with decrease taken a toll, moreover increments productivity and productivity.

IU2 is adversely influenced by CE4. For financial specialists, tokenization is inversely influencing the financial specialists deliberate for BC to be utilized for other financing exchanges on the off chance that advertised opens modern markets by bringing down the boundary of least fetched for entry.

IU2 isn't influenced by CE3 and CE5. Tokenization offers higher availability for clients with superior offices in terms of trade of tokens. This opens entryways for diverse speculators and cuts down the least venture period and sum. Speculators won't ought to endure from the bother of early recovery which is a costly affair.

IU3 is emphatically influenced by CE2, CE3, CE4, CE8, CE9 and CE10. In this way, blockchain can make strides to conduct a assignment due to tokenization which offers higher availability for clients with superior offices in terms of trade of tokens. This opens entryways for diverse speculators and cuts down the least speculation period and sum. For financial specialists, tokenization opens modern markets by bringing down down the boundary of least taken a toll for passage. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes taken a toll and increments proficiency and efficiency. Blockchain empowers smooth budgetary exchanges with less exertion, assets, intermediaries.

IU3 is contrarily influenced by CE1 and CE7. Blockchain can make strides to conduct a assignment is contrarily influenced by applying savvy BC contracts due to the unsolved problems of being moderate and having constrained capacity throughput. IU3 isn't affected by CE5 and CE6. Blockchain can move forward to conduct a assignment isn't influenced by immutability.

IU4 is emphatically influenced by CE1, CE2, CE3, CE6, CE7, CE9 and CE10. Hence, blockchain stage is reliable to issue securities due to smooth budgetary exchanges makes a difference simple following of exchanges with less exertion, assets, mediators due to BC DLT

lower settlement costs by applying Shrewd BC contracts which dispose of the require for middle people and lower settlement costs of green bond exchange within the exchanging of green bonds, BC unchanging nature makes a difference an organization to spare time and fetched. BC requires less exertion for the exchange than the conventional framework that in conjunction with decrease fetched, moreover increments effectiveness and productivity.

IU4 is adversely influenced by CE5 and CE8. Investors will no longer need to bear the expense and inconvenience of early redemption, a costly endeavour. Blockchain technology simplifies transactions compared to the conventional system, reducing costs and boosting efficiency and productivity.

IU4 isn't influenced by CE4, for financial specialists, tokenization opens unused markets by bringing down the obstruction of least fetched for entry.
IU5 is emphatically influenced by CE1, CE2, CE3, CE7, CE8, CE9 and CE10. Thus, utilizing Blockchain-based issue administration advertised by green bond Back backer due to applying savvy BC contracts kill the require for mediators within the exchanging of green bonds, BC DLT seem lower settlement costs of green bond exchange., Tokenization offers higher availability for clients with superior offices in terms of trade of tokens. increments green bond financing effectiveness and decreases fetched. Blockchain innovation requires less exertion for the exchange than the conventional framework which decreases taken a toll and increments productivity and efficiency. Blockchain empowers smooth budgetary exchanges with less exertion, assets, middle people. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less exertion. IU5 is contrarily influenced by CE6. Unchanging nature makes a difference an organization to spare time and cost. IU5 isn't influenced by CE4 and CE5. For financial specialists, tokenization opens modern markets by bringing down the boundary of least taken a toll for section. Financial specialists won’t need to endure from the bother of early recovery which is a costly affair IU6 is emphatically influenced by CE2, CE6, CE8 and CE10. Blockchain has numerous highlights which I proposed to utilize within the future due to BC DLT seem lower settlement costs of green bond exchange. Unchanging nature makes a difference an organization to spare time and taken a toll. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes fetched and increments effectiveness and efficiency. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less exertion. IU6 is adversely influenced by CE1. Applying Shrewd BC contracts to post exchange exercises

kill the need for mediators within the exchanging of green bond. IU6 isn't influenced by CE3, CE4, CE5, CE7 and CE9. Tokenization offers higher availability for clients with way better offices in terms of trade of tokens. This opens entryways for distinctive speculators and cuts down the least venture period and sum. For financial specialists, tokenization opens modern markets by lowering down the obstruction of least fetched for section. Speculators won't have to be endure from the bother of early recovery which is an costly undertaking. Blockchain innovation increments green bond financing productivity and diminishes taken a toll. Blockchain empowers smooth monetary exchanges with less exertion, assets, intermediaries.
IU7 is emphatically influenced by CE1, CE5, CE7, CE8 and CE9. To issue the security through Blockchain innovation due to Applying Smart BC contracts to post exchange exercises dispose of the require for mediators within the exchanging of green bonds. Speculators won't got to endure from the bother of early recovery which is a costly undertaking. Blockchain innovation increments green bond financing proficiency and diminishes taken a toll. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes fetched and increments effectiveness and efficiency. Blockchain empowers smooth monetary exchanges with less exertion, assets, intermediaries.

IU7 is contrarily influenced by CE4 and CE10. For speculators, tokenization opens modern markets by bringing down the boundary of least taken a toll for section. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less effort.
is not influenced by CE2, CE3 and CE6. BC DLT might lower settlement costs of green bond exchange. Tokenization offers higher openness for clients with superior offices in terms of trade of tokens. This opens entryways for distinctive financial specialists and cuts down the least venture period and sum. Unchanging nature makes a difference an organization to spare time and fetched.

IU8 is emphatically influenced by CE1, CE2, CE3, CE5, CE6, CE7 and CE8. Hence, I expected to purchase the security issued through Blockchain innovation due to applying Keen BC contracts to post exchange exercises dispose of the require for mediators within the exchanging of green bonds, BC DLT seem lower settlement costs of green bond exchange. Tokenization offers higher availability for clients with way better offices in terms of trade of tokens. This opens entryways for diverse financial specialists and cuts down the least venture period and amount. Speculators won't got to endure from the bother of early recovery which is an costly issue. Unchanging nature makes a difference an organization to spare time and fetched.

Blockchain innovation increments green bond financing proficiency and decreases taken a toll. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes fetched and increments proficiency and productivity.

IU8 is adversely influenced by CE4 and CE9. For financial specialists, tokenization opens modern markets by bringing down the boundary of least cost for passage. Blockchain empowers smooth budgetary exchanges with less exertion, assets, mediators. IU8 isn't influenced by CE10. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less effort.

IU9 is emphatically influenced by CE1, CE2, CE3, CE6, CE7 and CE8. Utilize BC innovation for browsing the accessibility of the securities within the showcase due to applying savvy BC contracts to post exchange exercises dispose of the require for middle people within the exchanging of green bonds BC DLT may lower settlement costs of green bond exchange. Tokenization offers higher openness for clients with way better offices in terms of trade of tokens. This opens entryways for diverse speculators and cuts down the least venture period and sum, Unchanging nature makes a difference an organization to spare time and taken a toll. Blockchain innovation increments green bond financing proficiency and diminishes fetched. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes fetched and increments effectiveness and efficiency. Blockchain decreases vulnerabilities, gives solid encryption, and more successfully confirms information possession and integrity.

IU9 is adversely influenced by CE5. Speculators won’t ought to endure from the bother of early recovery which is an costly issue influences conversely Use BC innovation for browsing the accessibility of the securities within the advertise. IU9 isn't influenced by CE4, CE9 and CE10. For speculators, tokenization opens modern markets by bringing down the obstruction of least taken a toll for passage. Blockchain empowers smooth monetary exchanges with less exertion, assets, mediators. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less effort.

IU10 is emphatically influenced by CE2, CE3, CE5, CE6, CE7 and CE8. Hence, increment venture through Blockchain innovation due to BC DLT seem lower settlement costs of green bond exchange., Tokenization offers higher openness for clients with superior offices in terms

of trade of tokens. This opens entryways for diverse speculators and cuts down the least speculation period and sum. Speculators won’t got to endure from the bother of early recovery which is a costly undertaking. Unchanging nature makes a difference an organization to spare time and fetched. Blockchain innovation
increments green bond financing effectiveness and decreases fetched. Blockchain innovation requires less exertion for the exchange than the conventional framework which decreases taken a toll and increments proficiency and productivity.

IU10 is contrarily influenced by CE4 and CE9. proposed to extend my speculation through Blockchain innovation. For financial specialists, tokenization opens unused markets by bringing down down the obstruction of least fetched for section. Blockchain empowers smooth budgetary exchanges with less effort, resources, mediators. IU10 isn't influenced by CE1 and CE10. Applying Shrewd BC contracts to post trade activities kill the require for mediators within the exchanging of green bonds. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less effort.

IU11 is emphatically influenced by CE2, CE3, CE5, CE6, CE7, CE9 and CE10. In this way, Blockchain advances can moreover be utilized for other financing exchanges, due to BC DLT may lower settlement costs of green bond exchange. Tokenization offers higher availability for clients with superior offices in terms of trade of tokens, it cuts down the least venture period and sum. Unchanging nature makes a difference an organization to spare time and taken a toll. Blockchain innovation increments green bond financing productivity and diminishes taken a toll. Blockchain empowers smooth monetary exchanges with less exertion, assets, mediators. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less exertion.

IU11 is contrarily influenced by CE1 and CE8. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes taken a toll and increments effectiveness and efficiency. Applying Savvy BC contracts to post exchange exercises dispense with the require for middle people within the exchanging of green bonds. IU11 isn't influenced by CE4. For speculators, tokenization opens modern markets by bringing down the obstruction of least fetched for entry.

IU12 is emphatically influenced by CE2, CE3, CE4, CE5, CE7, CE8 and CE10. In this way, blockchain stage is reliable to issue securities due to smooth budgetary exchanges makes a difference simple following of exchanges with less exertion, assets, mediators due to BC DLT lower settlement costs by applying Keen BC contracts which dispose of the require for middle people and lower remittance costs of green bond exchange within the exchanging of green bonds, BC unchanging nature makes a difference an organization to spare time and taken a toll. BC requires less exertion for the exchange than the conventional framework that beside diminish taken a toll, too increments proficiency and efficiency. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less exertion.

IU12 is negatively affected by CE1 and CE9. blockchain platform is trustworthy to issue securities is inversely affected by applying smart BC contracts, since both parties involved in the transaction can access the contract at any time, there is a risk of exposure to hackers. They may identify vulnerabilities within the blockchain that can be exploited. Consequently, smart contracts may not be as secure as they appear. IU12 is not affected by CE6. blockchain platform is trustworthy to issue securities is not affected by immutability.

The TRA was hence advanced into the TPB by Ajzen (1987, 1991) and Ajzen and Incense (1986) by presenting an unused figure for behavioural deliberate called seen conduct control, which is based on Bandura's thought of self-efficacy. People's impressions of their capacity to carry out a particular conduct are alluded to as seen behavioural control, and on the off chance that seen behavioural control and behavioural purposeful are combined, they can be utilized to foresee conduct. With respect to the affiliation between seen conduct control and behavioural purposeful, past ponders have delivered clashing comes about (Chai and Pavlou 2004; George 2004).

H7: Perceived ease of use positively affects perceived usefulness of BT.

PEOU represents the extent to which individuals perceive the ease of using blockchain technology, while PU refers to the degree to which individuals believe in the usefulness of blockchain technology in the green bond markets (Davis et al., 1989).

Table 5.7: The matrix below summarizes the effect of independent variables ($PEOU_i$, i = 1,2, …, 11) on the dependent ones (PU_i, i = 1,2,…,9). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

	pu1	pu2	pu3	pu4	pu5	pu6	pu7	pu8	pu9
peou1	S+	NS	S+	NS	NS	S-	NS	S-	NS
peou2	S+	S+	NS	S+	NS	S+	NS	NS	S+
peou3	NS	S-	NS	NS	NS	NS	NS	NS	S+
peou4	S-	S+	NS	NS	NS	NS	NS	NS	S-
peou5	S-	S-	S+	NS	NS	NS	S+	S-	NS
peou6	NS	S+	S-	NS	S+	S+	NS	NS	NS
peou7	S+	NS	NS	S+	NS	NS	S+	NS	S+
peou8	NS	NS	NS	NS	S+	NS	NS	S+	NS
peou9	S-	NS	NS	NS	NS	S-	S-	S-	NS
peou10	NS	S+	NS	NS	NS	NS	NS	NS	S+
peou11	NS	S-	NS	NS	S-	S+	NS	NS	NS

PU1 is affected positively by PEOU1, PEOU2 and PEOU7. Thus, for investors DLT is likely to increase efficiency and improve access to finance for populations that do not have access to traditional financial system due to tokenization and giving an opportunity to quit blockchain platform. Whereas the previous brings out superior swarm financing openings for makers and empowers them to update their arrangements in an successful way additionally comes about in increasing liquidity within the advertise and bringing down information breaches, whereas the last mentioned gives the financial specialists and opportunity to exit the Blockchain stage anytime by offering their tokens in a auxiliary showcase effortlessly and proficiently without having to endure from the bother of early recovery which is an costly issue.

Thus, DLT of blockchains is likely to be affected inversely because it brings unrelated parties together and facilitates increase in crypto-currency which is not yet prevalent to a large scale in India. The response to understanding the interaction with Blockchain is understandable and clear, it negatively affects DLT probably due to lack of working knowledge and awareness about blockchain technology. This indicates there is a need to spread awareness about DLT of Blockchains to facilitate its adoption. PEOU3, PEOU6, PEOU8, PEOU10 and PEOU11 have no effect on PU1.

PU2 is affected by PEOU2, PEOU4, PEOU6 and PEOU10 positively. Investors can exit the Using a blockchain network, private companies can sell their tokens on a secondary market

quickly and simply to represent their securities at any moment. They won't have to deal with the inconvenience and expense of early redemption. Additionally, it offers a chance for strangers to come together and engage in virtual trading. It is plain and simple and spares retailers from having to store real credit card numbers in POS gadgets and other frameworks. Thus, Investors have greater access to improved token exchange facilities, which also widens the pool of potential investors and reduces the minimum investment duration and amount owed to investors.

On the other hand, PEOU3, PEOU5 and PEOU11 negatively affect PU2.Tokenization of blockchains is likely to be affected inversely because it brings higher accessibility for clients with way better offices in terms of trade of tokens that produces clients skilful at utilizing Blockchain back organizations with an opportunity to turn all the resources into digital crypto monetary standards that may well be traded consistently which could make frailty for the speculators. So, this demonstrates that, higher availability is nice but there ought to be a few confirmations in between so that the security would not be challenged. PEOU1, PEOU7, PEOU8 and PEOU9 have no effect on PU2.

PU3 is affected by PEOU1 and PEOU5 positively. Tokenization gives an opportunity to turn all resources into advanced crypto-currencies, that brings out way better swarm financing openings to makers and gives straightforwardness of exchange to the financial specialists. On the other hand, PEOU6 has a negative effect on PU3. Tokenization gives vendors an elude from putting away the real credit card numbers in POS machines and other frameworks that limits the straightforwardness exchanges to the speculators. PEOU2, PEOU3, PEOU4, PEOU7, PEOU8 have no impact on PU3.

PU4 is influenced by PEOU2 and PEOU7 emphatically impact on PU4. Tokenization in Blockchain presents liquidity within the showcase and lower down information security breaches. Moreover, Investors can exit the Employing a blockchain arrange, private companies can offer their tokens on a auxiliary showcase rapidly and essentially to represent their securities at any minute. They won't have to be bargain with the bother and cost of early recovery. This makes the reviewing handle basic and viable since it empowers a company to compile a total and obvious history of a value-based record.

PEOU1, PEOU3, PEOU4, PEOU5, PEOU6, PEOU8 have no impact on PU4.

PU5 is influenced by PEOU6 and PEOU8 emphatically, Tokenization utilization of blockchain makes a dealer an elude from putting away the genuine credit card numbers in POS machines and other frameworks, which in turn comes about the Permanence that takes the backing up and re-establishing of database to recover data etc.

On the other hand, PEOU11 contrarily influence PU5. In this way, indeed after getting to be skilful at utilizing Blockchain, the permanent information cannot be controlled as per the necessities. PEOU1, PEOU2, PEOU3, PEOU4, PEOU5, PEOU7, PEOU9 and PEOU10 have no impact on PU5.

PU6 is influenced by PEOU2, PEOU6 and PEOU11 emphatically. Blockchain can progress to conduct an errand at whatever point it encompasses a include to assist client perform it. Speculators can take off the Blockchain stage, where tokens stand in for private trade securities, at any time by rapidly and basically offering their tokens on a auxiliary showcase. They won't got to bargain with the bother and cost of early recovery. Shippers can dodge keeping real credit card numbers in POS devices and other frameworks by utilizing tokenization. Blockchain utilization may be an aptitude that can be picked very rapidly.

On the other hand, PEOU1 and PEOU9 contrarily influence PU6. The reaction to understanding the interaction with Blockchain is justifiable and clear, it adversely influences the conduct to an errand at whatever point it features a highlight to assist client perform it. likely due to lack of working knowledge and mindfulness around blockchain innovation. This shows there's a got to spread mindfulness approximately Blockchains to encourage its selection. For makers, tokenization brings out way better swarm financing openings to makers and empowers them to overhaul their arrangements in a successful way. PEOU3, PEOU4, PEOU5, PEOU7, PEOU8 and PEOU10 have no impact on PU6.

PU7 is influenced by PEOU5 and PEOU7 emphatically. Tokenization encourages an opportunity to turn all the resources into computerized crypto-currencies, moreover presents liquidity within the showcase and lower down information security breaches that can move forward advertise execution that may be traded seamlessly.

On the other hand, PEOU9 negatively influence PU7. The reaction to understanding the interaction with Blockchain is justifiable and clear, it contrarily influences the showcase

execution likely due to need of working information and mindfulness approximately blockchain innovation. This demonstrates there's an ought to spread mindfulness approximately Blockchains to encourage its appropriation. PEOU4, PEOU5 PEOU6, PEOU7, PEOU8 and PEOU10 have no impact on PU7.

PU8 is influenced by PEOU8 emphatically. It's simple to perform any assignments through Blockchain. So, in turn it utilize can make it simpler to do money related exchanges. Whereas PEOU1, PEOU5, PEOU9 have negative impact on PU8. For makers, tokenization brings out superior swarm subsidizing openings to makers and empowers them to overhaul their arrangements in a viable way. Tokenization provides financial organizations with the opportunity to convert all assets into digital cryptocurrencies that can be traded seamlessly. My engagement with Blockchain is transparent and justified.

PEOU2, PEOU3, PEOU4, PEOU6, PEOU7, PEOU10, PEOU11 have no impact on PU8.
PU9 is influenced by PEOU2, PEOU3, PEOU7, PEOU10 have emphatically. As, Tokenization offers higher openness for clients with way better offices in terms of trade of tokens. Investors can easily and efficiently exit the Blockchain platform where tokens represent private company securities by selling their tokens on a secondary market at any time. They will no longer endure the costly inconvenience of early redemption. Tokenization in Blockchain presents liquidity within the showcase and lower down information security breaches. Hence, Blockchain utilize in monetary markets can increment efficiency.

While PEOU4 contains a negative impact on PU9. Blockchains is likely to be influenced contrarily since it brings disconnected parties together and encourages increment in crypto-currency which isn't however predominant to a huge scale in India Tokenization offers the opportunity to unite disparate parties for digital trading in a connected world. PEOU1, PEOU5, PEOU6, PEOU8, PEOU9, PEOU11 have no impact on PU9.

H8: Perceived ease of use positively affects attitudes towards using the BT

PEOU represents the degree to which individuals perceive the ease of using blockchain technology, while A refers to the attitude of individuals believing in how blockchain technology propels them into a bright new era.

Table 5.8: The matrix below summarizes the effect of independent variables ($PEOU_i$, i = 1,2, …, 11) on the dependent ones (A1, i = 1,2,…,7). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

	A1	A2	A3	A4	A5	A6	A7
peou1	S+	S+	S+	S+	S+	S-	NS
peou2	NS	S-	S-	S+	S-	S+	S+
peou3	NS	S+	S+	S+	S+	S-	S-
peou4	S+	NS	S+	S+	S+	S+	S+
peou5	S-	S+	S+	S-	NS	S-	S-
peou6	S-	S-	S-	S-	S-	S+	S-
peou7	S+	S+	S+	S+	S+	S+	S+
peou8	S+	NS	S+	S+	NS	S+	S+
peou9	S+	NS	S+	S-	S+	S-	NS
peou10	S-	S+	NS	S+	S+	S+	S+
peou11	S-	NS	S+	S-	S+	S+	S-

A1 is influenced emphatically by PEOU1, PEOU4, PEOU7, PEOU8 and PEOU9. In this way, blockchain may be a clear and reasonable innovation by numerous ways or highlights of blockchain like tokenization brings out superior swarm financing openings to makers and empowers them to update their arrangements in an effective way, which too presents liquidity within the showcase and lower down information security breaches, All these reasons are sufficient for making financial specialists state of mind towards the blockchain by which they accept that Blockchain innovation bringing them into a shining unused era.

On the other hand, PEOU5, PEOU6, PEOU10 and PEOU11 contrarily influence A1. In this way, DLT of blockchains is likely to be influenced contrarily since it brings disconnected parties together and encourages increment in crypto-currency which isn't however predominant to a huge scale in India. The reaction to understanding the interaction with Blockchain is reasonable and clear, it adversely influences DLT probably due to lack of working information and mindfulness almost blockchain innovation. This shows there's an ought to spread mindfulness approximately DLT of Blockchains to encourage its appropriation. PEOU2 and PEOU3 have no impact on A1.

A2 is influenced emphatically by PEOU1, PEOU3, PEOU5, PEOU7 and PEOU11. Hence, the utilize of Blockchain is improving our standard of money related markets due to tokenization that brings superior swarm subsidizing openings to makers and empowers them to overhaul their arrangements in an successful way, it too offers higher availability for clients with way better offices in terms of trade of tokens which turn all the resources into advanced crypto-currencies that may be traded consistently which presents liquidity within the market and lower down information security breaches. In that way Blockchain is additionally adaptable to connected with.

On the other hand, PEOU2 and PEOU6 adversely influence A2. Through blockchain stage financial specialists can exit anytime by offering their tokens on a auxiliary showcase effectively, moreover it gives vendors an elude from putting away the real credit card numbers in POS machines and other systems. So, in that way, it would not be a productive strategy to hold all partners within the effective agent way within the budgetary markets which conversely impact the standard of budgetary markets. Tokenization brings irrelevant parties together which is in some cases not useful for the security and protection angle, too, it isn't simple to utilize blockchain innovation by all partner. In this way, PEOU4, PEOU8, PEOU9 and PEOU11 have no impact on A2.

A3 is influenced emphatically by PEOU1, PEOU3, PEOU4, PEOU5, PEOU7, PEOU8, PEOU9 and PEOU11. Hence, there are boundless conceivable outcomes of Blockchain innovation applications that haven’t indeed been thought of however like Financial specialists can exit the Blockchain stage where tokens speak to private company securities anytime by offering their tokens on a auxiliary advertise effectively and proficiently. It gives monetary educate the chance to change over all of their resources into openly transferable advanced cash. It increments showcase liquidity and decreases information security breaches. Blockchain is straightforward, direct, and simple to get it.

On the other hand, PEOU2 and PEOU6 adversely influence A3. Through blockchain stage speculators can exit anytime by offering their tokens on a auxiliary showcase effortlessly, too it gives vendors an elude from putting away the genuine credit card numbers in POS machines and other frameworks. So, in that way, it would not be an proficient strategy to hold all partners within the efficient agent way within the money related markets which conversely affect the standard of budgetary markets. PEOU10 has no impact on A3.

A4 is influenced emphatically by PEOU1, PEOU2, PEOU3, PEOU4, PEOU7, PEOU8 and PEOU10. In this way, working with Blockchain innovation is an enjoyable experience that permits financial specialists to exit the Employing a blockchain arrange, private companies can offer their tokens on a auxiliary advertise rapidly and essentially to speak to their securities at any minute. It gives budgetary educate the chance to change over all of their resources into unreservedly transferable computerized money. It increments showcase liquidity and diminishes information security breaches. Blockchain is simple and reasonable and clear.

On the other hand, PEOU5, PEOU6, PEOU9 and PEOU11 adversely influence A4. Working with Blockchain innovation is an agreeable involvement. Tokenization enables financial organizations to convert all assets into digital cryptocurrencies that can be traded seamlessly. Additionally, tokenization allows vendors to avoid storing actual credit card numbers in POS machines and other systems. It is simple to gotten to be skilful at utilizing Blockchain.

A5 is influenced emphatically by PEOU1, PEOU3, PEOU5, PEOU7 and PEOU10. In this way Blockchain-based financing is cheerfully worthy or makers, tokenization brings out way better swarm financing openings to makers and empowers them to overhaul their arrangements in a successful way. Tokenization offers higher availability for clients with way better offices in terms of trade of tokens. It provides financial organizations with the opportunity to convert all assets into digital cryptocurrencies that can be exchanged seamlessly. Tokenization in Blockchain presents liquidity within the advertise and lower down information security breaches. Blockchain is adaptable to associated with.

On the other hand, PEOU2 and PEOU6 contrarily influence A5. Financial specialists can exit the Blockchain stage where tokens speak to private company securities anytime by offering their tokens on a auxiliary showcase effectively and effectively. Tokenization gives dealers an elude from putting away the real credit card numbers in POS machines and other frameworks. PEOU5 and PEOU8 has no impact on A5.

A6 is influenced emphatically by PEOU2, PEOU4, PEOU6, PEOU7, PEOU8, PEOU10 and PEOU11. Financial specialists are presently getting to be environment inviting and begin contributing in green bond financing Speculators can exit the Blockchain stage where tokens speak to private company securities anytime by offering their tokens on an auxiliary showcase

effortlessly and proficiently. Tokenization offers the chance to unite unrelated parties for trading in a digital realm, while also enabling vendors to avoid storing actual credit card numbers in POS machines and other systems. Tokenization in Blockchain presents liquidity within the advertise and lower down information security breaches. I discover it simple to induce Blockchain to do what I need it to do. Blockchain is adaptable to connected with. It is simple to gotten to be capable at utilizing Blockchain. On the other hand, PEOU1, PEOU3, PEOU5 and PEOU9 adversely influence A6.

A7 is influenced emphatically by PEOU2, PEOU4, PEOU7, PEOU8, and PEOU10. Blockchain-based financing exchanges are ideal for green bond financing than the routine bond financing administration. Investors can seamlessly and efficiently exit the Blockchain platform, where tokens represent private company securities, by selling their tokens on a secondary market at any time. They no longer need to endure the costly inconvenience of early redemption. Additionally, tokenization offers the opportunity to unite unrelated parties for trading in an advanced world. Tokenization in Blockchain presents liquidity within the showcase and lower down information security breaches. I discover it simple to urge Blockchain to do what I need it to do. Blockchain is adaptable to associated with.

On the other hand, PEOU3, PEOU5, PEOU6 and PEOU11 adversely influence A7. PEOU1 and PEOU9 has no impact on A7. Blockchain tokenization gives straightforwardness of exchange to the financial specialists. Unchanging nature takes the backing up and restoring a database to recover data etc. Blockchain can move forward to conduct a errand at whatever point it features a highlight to assist client perform it. It is simple to ended up adroit at utilizing Blockchain. PEOU1 and PEOU9 has no impact on A5.

H9: Perceived usefulness positively affects attitudes towards using the BT

PU represents the extent to which individuals believe in the usefulness of blockchain technology in the green bond markets, while A refers to the attitude towards utilizing blockchain technology for green bond market operations (Davis et al., 1989).

Table 5.9: The matrix below summarizes the effect of independent variables (PU_i, i = 1,2, …, 10) on the dependent ones (A_i, i = 1,2,…,7). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

	A1	A2	A3	A4	A5	A6	A7
Pu1	S+	NS	S-	S+	S+	S+	NS
Pu2	S+	S+	S+	S+	NS	S+	S+
Pu3	S+	S+	S+	NS	S+	S+	S+
Pu4	S+	S+	S+	S+	NS	NS	S+
Pu5	NS	S+	S-	S-	NS	S+	NS
Pu6	S-	S-	S+	NS	S+	S+	S+
Pu7	S+	S+	S-	S+	S+	S+	S+
Pu8	NS	S+	S+	S+	S+	S+	S+
Pu9	S-	S-	S-	S-	S-	NS	S-
Pu10	S-	S+	S+	NS	S+	S-	NS

A1 is influenced emphatically by PU1, PU2, PU3, PU4, and PU7. In this way, Blockchain innovation bringing us into a shining unused period through Blockchain (BC) Dispersed Record Innovation (DLT), because it seems increment productivity and possibly make strides get to fund for unbanked populaces, who are as of now exterior the conventional budgetary framework. Too, Tokenization offers higher openness for clients with superior offices in terms of trade of tokens. This opens entryways for diverse financial specialists and cuts down the least speculation period and sum. Blockchain tokenization gives straightforwardness of exchange to the speculators. The capacity of an organization to create a total and unquestionable history of a value-based record makes the examining prepare simple and effective. Blockchain utilize can progress showcase performance.

On the other hand, PU6, PU9 and PU10 contrarily influence A1. Blockchain can move forward to conduct a task at whatever point it encompasses a feature to assist client perform it. Blockchain utilize would empower the client to achieve the exchange more rapidly. PU5 and PU8 have no impact on PU1.

A2 is influenced emphatically by PU2, PU3, PU4, PU5, PU7, PU8, PU10.Thus, the utilize of Blockchain is improving our standard of money related markets through tokenization by advertising higher availability for clients with way better offices in terms of trade of tokens. This opens entryways for diverse financial specialists and cuts down the least speculation period and sum. It also provides transparency of transaction to the investors that can improve market performance. Blockchain use can make it easier to do financial transactions that would enable the user to accomplish the transaction more quickly. Because of immutability, it becomes feasible to retrieve information through backing up and restoring the database.

On the other hand, PU6, PU9 adversely influence A2. Blockchain can progress to conduct an assignment at whatever point it includes to assist client perform it. Blockchain utilize would empower the client to achieve the exchange more rapidly. PU1 have no effect on A2. A3 is influenced emphatically by PU2, PU3, PU4, PU6, PU8 and PU10. As this may be said, the utilize of Blockchain is improving our standard of monetary markets through tokenization by advertising higher openness for clients with way better offices in terms of trade of tokens. This opens entryways for distinctive financial specialists and cuts down the least speculation period and sum. It too gives straightforwardness of exchange to the investors that can move forward showcase execution. Blockchain utilize can make it simpler to do money related exchanges that would empower the client to achieve the exchange more effectively. All these notices that there are boundless conceivable outcomes of Blockchain innovation applications that haven't indeed been thought of yet.

On the other hand, PU1, PU5, PU7, and PU9 adversely influence A3. Blockchain (BC) Disseminated Record Innovation (DLT) might increment productivity and possibly progress get to to fund for unbanked populaces, who are right now exterior the conventional budgetary framework. Moreover, the permanent characteristic of blockchain makes the information for all time battled which as per the necessity seem not be changed. Blockchain utilize can progress showcase execution. Blockchain utilize in money related markets can increment efficiency. PU3 has no impact on A3.

A4 is influenced emphatically by PU2, PU4, PU7 and PU10. Tokenization offers higher openness for clients with way better offices in terms of trade of tokens. This opens entryways for distinctive speculators and cuts down the least venture period and sum. The capacity of an organization to create a total and undeniable history of a value-based record makes the

reviewing handle simple and proficient. Blockchain utilize can move forward showcase execution. Blockchain utilize would empower the client to achieve the exchange more rapidly. In this way, working with Blockchain innovation is a pleasant involvement. PU3, PU 6, PU 10 have no impact on A4.

A5 is influenced emphatically by PU1, PU3, PU6, PU7, PU8 and PU10. Blockchain (BC) Conveyed Record Innovation (DLT) might increment productivity and possibly make strides get to fund for unbanked populaces, who are right now exterior the conventional money related framework. Blockchain tokenization gives straightforwardness of exchange to the speculators. Blockchain can move forward to conduct a task at whatever point it incorporates a include to assist client perform it. Blockchain utilize can make strides advertise execution. Blockchain use can make it less demanding to do money related exchanges. Blockchain utilize would empower the client to achieve the exchange more rapidly. Hence, Blockchain-based financing is joyfully acceptable.

On the other hand, PU2, PU 4 and PU10 adversely influence A5. Tokenization offers higher openness for clients with superior offices in terms of trade of tokens. This opens entryways for distinctive financial specialists and cuts down the least venture period and sum. The capacity of an organization to deliver a total and unquestionable history of a value-based record makes the reviewing prepare simple and productive. Blockchain tokenization gives straightforwardness of exchange to the speculators. Blockchain utilize would empower the client to achieve the exchange more rapidly. PU10 has no impact on A5.

A6 is influenced emphatically by PU1, PU3, PU6, PU7, PU8 and PU10. Blockchain (BC) Dispersed Record Innovation (DLT) seem increment proficiency and possibly make strides get to back for unbanked populaces, who are right now exterior the conventional money related framework. Blockchain tokenization gives straightforwardness of exchange to the speculators. Blockchain can move forward to conduct a task at whatever point it encompasses a highlight to assist client perform it. I utilize green bond financing since guarantor embraced Blockchain for it.

On the other hand, PU2, PU 4 and PU10 contrarily influence A6. Tokenization offers higher availability for clients with superior offices in terms of trade of tokens. This opens entryways for distinctive speculators and cuts down the least venture period and sum. The capacity of an

organization to deliver a total and unquestionable history of a transactional record makes the reviewing prepare simple and effective. Blockchain utilize would empower the client to achieve the exchange more rapidly. I utilize green bond financing since guarantor received Blockchain for it. PU10 has no impact on A6.

A7 is influenced emphatically by PU1, PU3, 6, PU7, PU8 and PU10. Blockchain (BC) Dispersed Record Innovation (DLT) seem increment productivity and possibly progress get to back for unbanked populaces, who are right now exterior the conventional financial system. Blockchain tokenization gives straightforwardness of exchange to the financial specialists. Blockchain can progress to conduct a assignment at whatever point it contains a highlight to assist client perform it. Blockchain utilize can move forward showcase execution. Blockchain utilize can make it less demanding to do budgetary exchanges. Blockchain utilize would enable the client to achieve the exchange more rapidly. Blockchain-based financing transactions are preferable for green bond financing than the conventional bond financing management.

On the other hand, PU2, PU 4 and PU10 contrarily influence A7. Tokenization offers higher openness for clients with superior offices in terms of trade of tokens. This opens entryways for distinctive financial specialists and cuts down the least speculation period and sum. The capacity of an organization to deliver a total and unquestionable history of a value-based record makes the reviewing handle simple and effective. Blockchain utilize would empower the client to achieve the exchange more rapidly. Blockchain-based financing exchanges are ideal for green bond financing than the customary bond financing administration. PU10 has no impact on A5.

A complex substance, Demeanor is thought to have cognitive, passionate, and conative components. The passionate angle of the idea was all that was by and large captured by Demeanor evaluation procedures (Ajzen and Fishbein 2005). The concept of attitude, as defined by Fishbein and Ajzen (1975), is widely acknowledged in research. According to this definition, attitude refers to "an individual's positive or negative feelings (evaluative influence) towards performing the target behaviour" (Davis, Bagozzi, and Warshaw 1989; Moon and Kim 2001; Venkatesh et al. 2003). In other words, states of mind are habitually seen as comprehensive enthusiastic appraisals (Ajzen and Fishbein 1980). The mental penchant known as the Demeanor is subordinate on the level of support or disapproval (Eagly and Chaiken 1993). State of mind, as defined by Ajzen (1991), refers to the extent to which an individual

holds a favourable or unfavourable sentiment or evaluation of the action in question. An individual's in general positive reaction (such as like, getting a charge out of, bliss, and joy) to utilizing innovation is alluded to as their state of mind towards client appropriation of innovation (Davis 1989; Taylor and Todd 1995).

H10: Attitude positively affects behavioural Intention to use the BT

A represents the attitude of individuals towards the use and adoption of blockchain technology in green bond markets, while IU refers to the intention to use blockchain technology.

Table 5.10: The matrix below summarizes the effect of independent variables (A_i, i = 1,2, …, 10) on the dependent ones (IU_i, i = 1,2,7). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

	IU1	IU2	IU3	IU4	IU5	IU6	IU7	IU8	IU9	IU10	IU11	IU12
A1	S+	NS	NS	S+	S-	S-	S-	S+	S+	S+	S+	S-
A2	S+	NS	S+	S+	S+	NS	NS	NS	S+	S+	S-	S-
A3	S-	S+	S+	S+	S+	S+	NS	S+	S-	S+	NS	S+
A4	S+	S+	S+	S+	S+	S+	S+	S+	S+	S-	NS	S+
A5	S+	S-	S-	S-	S-	S-	S-	S+	S+	NS	S+	S+
A6	NS	S+	S+	S+	S+	S+	S+	NS	S+	S+	S+	S+
A7	S+	S+	S+	S+	S+	S+	S+	S+	S+	S+	S+	S+

IU1 is affected positively by A1, A2, A4, A5 and A7. Thus, blockchain platform providing investors a bright new era which is enhancing the standard of financial markets. It is an enjoyable experience working with blockchain technology and is happily acceptable by the investors. As it is technology-based platform so, preferable for sustainable fund raising through green bonds.

On the other hand, A3 negatively affect IU1. There are unlimited possibilities of Blockchain technology applications that haven’t even been thought of yet and users are not even clear about

its applicability which negatively impacts the behaviour of stakeholders for using Blockchain technologies for green bond financing. A6 have no effect on IU1.

IU2 is affected positively by A2, A3, A4, A6 and A7. Thus, to utilize Blockchain technologies for other financial transactions if offered and improve access to finance for populations that do not have access to traditional financial system due to the use of Blockchain is enhancing our standard of financial markets. The potential applications of Blockchain technology are boundless, with many yet to be explored. Engaging with Blockchain technology is a rewarding experience. I opt for green bond financing due to the adoption of Blockchain by the issuer. Transactions facilitated through Blockchain-based financing are preferred for green bond financing over conventional bond management.

On the other hand, A5 contrarily influence IU. Blockchain innovations for financing and other exchanges in case advertised isn't joyfully satisfactory since partners are not exceptionally mindful almost the innovation, and it are not effortlessly got commonplace with the modern ones. A1 & A2 have no impact on IU2.

IU3 is influenced emphatically by A2, A3, A4, A6 and A7. In this way, Blockchain can move forward to conduct a task whenever it contains a highlight to assist me to perform it as utilize of Blockchain is upgrading our standard of budgetary markets. There are boundless conceivable outcomes of Blockchain innovation applications that haven’t indeed been thought of however. There are boundless conceivable outcomes of Blockchain innovation applications that haven’t indeed been thought of however. I utilize green bond financing since backer received Blockchain for it. Blockchain-based financing exchanges are ideal for green bond financing than the routine bond financing administration.

On the other hand, A5 negatively affect IU3. Blockchain-based financing is happily acceptable. Blockchain can improve to conduct a task whenever it has a feature to help me to perform it.

IU4 is affected positively by A1, A2, A3, A4, A6 and A7. Thus, more organisations can use blockchain technology to issue securities in a trustworthy manner due to the positive investor’s attitude towards using blockchain technology is bringing a bright new era. It’s enhancing standard of financial markets. Working with Blockchain technology is an enjoyable experience. The potential applications of Blockchain technology are vast and continue to evolve beyond

current imagination. On the other hand, A5 negatively affect IU4. Most of the organisations are not well aware about the working efficiency of blockchain technology so, Blockchain-based financing is happily acceptable.

IU5 is affected positively by A2, A3, A4, A6 and A7. Thus, investors prefer using Blockchain-based issue management offered by green bond Finance issuer due to it is enhancing the standard of financial markets Blockchain is an enjoyable experience. The potential applications of Blockchain technology are endless and extend beyond current imagination. On the other hand, A1, A5 have negative affect on IU5, due to less knowledge and familiarity of blockchain technology investors are not having an enjoyable experience working and using Blockchain-based issue management offered by green bond Finance issuer.

IU6 is affected positively by A3, A4, A6 and A7. Thus, Blockchain has many features which stakeholders intend to use in the future because it is an enjoyable experience due to better issue management operations adopted by Blockchain technology, thus Blockchain-based financing transactions are preferable for green bond financing. On the other hand, A1 and A5 negatively affect IU6. Blockchain-based financing is not happily acceptable as it has many features like which stakeholders not prefer to use in the future. A2 has no effect on IU6.

IU7 is affected positively by A4, A6 and A7. Therefore, stakeholders are inclined to issue securities through Blockchain technology as I opt for green bond financing because the issuer has adopted Blockchain for it. Transactions facilitated through Blockchain-based financing are preferable for green bond financing compared to conventional bond management. Working with Blockchain technology is an enjoyable experience. On the other hand, A1 and A5 negatively affect IU7. Blockchain-based financing is not happily acceptable as it has many features like which stakeholders not prefer to use in the future. A2 and A3 have no effect on IU7.

IU8 is affected positively by A1, A3, A4, A5 and A7. Thus, for investors intend to buy the security issued through Blockchain technology due to their positive attitude towards blockchain technology adoption. There are unlimited possibilities related to the use of blockchain technology and is an enjoyable experience. Blockchain-based financing is happily acceptable by the investors and they prefer Blockchain-based financing transactions. A2 and A6 have no effect on IU8.

IU9 is affected positively by A1, A2, A4, A5, A6 and A7. Hence, as an investor, my intention is to utilize Blockchain (BC) technology to browse the availability of securities in the market, primarily due to its superior data management capabilities. The most noteworthy advantage of adopting blockchain technology lies in its enhanced and secure data management, ensuring high security, efficiency, and cost-effectiveness while instilling trust expeditiously. Consequently, blockchain ensures the integrity and security of data records, eliminating the need for third-party intermediaries. So, this way it is enhancing the standard and bringing a bright new era of financial markets. It is an enjoyable experience and happily accepted by the investors. Thus, Blockchain-based financing transactions are preferable for green bond financing. On the other hand, A3 negatively affect IU9. The potential applications of Blockchain technology are boundless, with many innovations yet to be imagined.

IU10 is affected positively by A1, A2, A3, A6 and A7. Therefore, investors aim to enhance their investment through Blockchain technology because of the abundant opportunities available for investing in blockchain and DLT, providing a chance to capitalize on the potential they offer. Investors are having a democratic investment, blockchain could enable bonds in which anyone can invest without any intermediary. So, this way it is enhancing the standard and bringing a bright new era of financial markets. It is an enjoyable experience and happily accepted by the investors. Thus, Blockchain-based financing transactions are preferable for green bond financing. On the other hand, A4 negatively affect IU10. A5 have no effect on IU10.

IU11 is affected positively by A1, A5, A6 and A7. Therefore, investors consider utilizing Blockchain technologies for other financial transactions if provided, as the investor-friendly advancements in blockchain technology indicate the public's readiness for adoption of these solutions by their investment managers. Investment management leaders leverage industry forums and blockchain consortia to gain better insights into the potential benefits of investing in blockchain industry trends. On the other hand, A2 negatively affect IU11 The use of Blockchain is enhancing our standard of financial markets. A3 and A4 have no effect on IU11.

IU12 is affected positively by A3, A4, A5, A6 and A7. Thus, investors believe that they should utilize collaborating with other organizations to provide a reliable platform is crucial in the adoption of Blockchain technologies. The increased speed in transaction processing allows firms to pursue large-scale implementations more effectively. Enhanced collaborations across

the industry regarding blockchain indicate a collective readiness and eagerness to facilitate scalable solutions.. So, this way it is enhancing the standard and bringing a bright new era of financial markets. It is an enjoyable experience and happily accepted by the investors. Thus, Blockchain-based financing transactions are preferable for green bond financing. On the other hand, A1 and A2 negatively affect IU12. Blockchain technology bringing us into a bright new era. The use of Blockchain is enhancing our standard of financial markets.

Several research studies, including those by Davis (1989), Agarwal and Prasad (1998), Venkatesh (2000), Venkatesh and Morris (2000), Gefen, Karahanna, and Straub (2003), and Guriting and OlyNdubisi (2006), establish and demonstrate the significant impact of perceived utility on behavioural intention. Consequently,

H11: Perceived usefulness positively affects behavioural Intention to use the BT

PU refers to the extent to which individuals believe in the usefulness of blockchain technology in the green bond markets (Davis et al., 1989), while IU refers to the intention to use blockchain technology.

Table 5.11: The matrix below summarizes the effect of independent variables (PU_i, i = 1,2, …, 10) on the dependent ones (IU_i, i = 1,2,…12). Here S+: positively significant, S- negatively significant: and NS: effect is not significant.

	IU1	IU2	IU3	IU4	IU5	IU6	IU7	IU8	IU9	IU10	IU11	IU12
PU1	S+	S+	S+	S-	NS	NS	NS	S+	NS	S-	S+	S+
PU2	NS	S+	S+	NS	S+	S+	S+	S+	S+	S+	S+	S+
PU3	S+	S+	S+	S+	S+	S+	S+	S+	S+	S+	S+	S+
PU4	S+	S+	S+	S+	S+	S+	S+	S+	S+	S+	S+	S-
PU5	S+	S+	S-	NS	S-	S-	NS	S+	NS	S-	S-	S+
PU6	NS	NS	S+	S+	S+	S+	S+	S-	S+	S+	NS	S+
PU7	NS	S+	S-	NS	S-	S+	S-	S+	S+	S+	S+	S+
PU8	NS	S-	NS	NS	S+	S+	S+	NS	S+	NS	S-	S-
PU9	S-	NS	NS	S-	S-	S-	S+	S-	S-	S-	S+	S+
PU10	NS	NS	S+	S-	S-	NS	S-	S-	S-	NS	S-	S-

IU1 is affected positively by PU1, PU3, PU4, PU5. Thus, investors intend to use Blockchain technologies for green bond financing due to DLT which is likely to increase efficiency and improve access to finance for populations that do not have access to traditional financial system. Blockchain tokenization ensures transparency of transactions for investors. The organization's capability to create a comprehensive and indisputable transaction ledger streamlines and enhances the auditing process. Immutability facilitates the backing up and restoration of databases for retrieving information, among other benefits.

On the other hand, PU9 negatively affect IU1. Blockchain use in financial markets can increase productivity, it negatively affects due to lack of working knowledge and awareness about blockchain technology. This indicates there is a need to spread awareness about Blockchains to facilitate its adoption. PU2, PU6, PU7, PU8 have no effect on IU1.

IU2 is affected positively by PU1, PU2, PU3, PU4, PU5 and PU7. Blockchain technologies can also be used for other financing transactions due to DLT which is likely to increase efficiency and improve access to finance for populations that do not have access to traditional financial system. Tokenization provides users with enhanced accessibility, offering improved facilities for token exchange. This opens entryways for diverse financial specialists and cuts down the least venture period and sum, it too gives straightforwardness of exchange to the speculators.

On the other and, PU8 contrarily influence IU2. Blockchain utilize can make it simpler to do budgetary exchanges. It contrarily influences Blockchain for other financing exchanges in the event that advertised due to need of information, mindfulness and partners traditionalist attitude for not embracing modern innovations for the money related exchanges. PU6, PU9, PU10 have no impact on IU2.

IU3 is influenced emphatically by PU1, PU2, PU3, PU4, PU5, PU6, PU10. Blockchain can make strides to conduct a errand at whatever point it features a highlight to perform it due to Blockchain innovations can too be utilized for other financing transactions due to DLT which is likely to extend productivity and move forward get to to back for populaces that don't have get to to conventional budgetary framework. Tokenization offers higher openness for clients with way better offices in terms of trade of tokens. This opens entryways for distinctive financial specialists and cuts down the least speculation period and sum, it too gives transparency of exchange to the speculators. Blockchain can move forward to conduct a task whenever it contains a include to assist client perform it and empower the client to achieve the exchange more rapidly.

On the other hand, PU5 and PU7 negatively affect IU3. While Blockchain has the potential to enhance task performance with its feature-rich capabilities, its immutable nature can pose challenges and negative impacts. Blockchain is an permanent database, and you cannot control information that's as of now within the blockchain. Unchanging nature can as it were existed in case arrange hubs are dispersed. A blockchain arrange is defenceless in the event that one substance possesses at slightest half the hubs. Another consideration is that once information is recorded, it cannot be erased. When utilizing a blockchain-based digital platform, users are unable to delete their records. PU8 and PU9 do not influence IU3.

IU4 is influenced emphatically by PU3, PU4, PU6. Blockchain innovations with more organizations to offer such a stage to issue securities in a dependable way due to Blockchain tokenization gives straightforwardness of exchange to the financial specialists. The capacity of an organization to deliver a total and unquestionable history of a value-based record makes the inspecting handle simple and effective.

On the other hand, PU1, PU9 and PU10 negatively affect IU4. The utilization of Blockchain (BC) Distributed Ledger Technology (DLT) has the potential to enhance efficiency and expand

access to finance for unbanked populations, who are presently excluded from the conventional financial system. Furthermore, integrating blockchain technology into financial markets can boost productivity. Blockchain use would enable the user to accomplish the transaction more quickly. All these negatively affects organizations to offer such a platform to issue securities in a trustworthy manner. PU2, PU5, PU7, PU8 have no effect on IU4.

IU5 is affected positively by PU2, PU3, PU4, PU6 and PU8. Investors wants to continue using Blockchain-based issue management offered by Green bond Finance issuer due to Tokenization offers higher accessibility for users with better facilities in terms of exchange of tokens. This opens doors for different investors and cuts down the minimum investment period and amount. provides transparency of transaction to the investors also provides transparency of transaction to the investors. The ability of an organization to produce a complete and indisputable history of a transactional ledger makes the auditing process easy and efficient. Blockchain use can make it easier to do financial transactions.

On the other hand, PU1 negatively affect IU5. Blockchain (BC) Distributed Ledger Technology (DLT) has the potential to enhance efficiency and potentially broaden access to finance for unbanked populations, who are currently excluded from the traditional financial system. However, a drawback arises when investors hesitate to persist in using Blockchain-based issue management provided by Green bond Finance issuer due to the technology's lack of interoperability. Various blockchain network types operate differently, attempting to address DLT issues in distinct ways, leading to interoperability challenges where these chains struggle to communicate effectively. This interoperability issue persists for both conventional and blockchain-based systems. Emerging blockchain technologies provide improved solutions compared to earlier versions. For example, Ethereum tackled inefficiencies by adopting a more effective blockchain technology solution, enabling automation through smart contracts. It also implemented Proof-of-Stake (PoS), which is slightly more efficient than Proof-of-Work (PoW) PU5, PU7, PU9 and PU10 have no effect on IU5.

IU6 is influenced emphatically by PU2, PU3, PU4, PU6, PU7 and PU8. Blockchain has numerous highlights which expected to utilize within the future like Tokenization which offers higher availability for clients with superior offices in terms of trade of tokens. This opens entryways for diverse financial specialists and cuts down the least venture period and sum and can move forward advertise execution by giving straightforwardness of exchange to the

financial specialist, moreover gives straightforwardness of exchange to the financial specialists. The capacity of an organization to create a total and undeniable history of a value-based record makes the inspecting prepare simple and proficient. Blockchain utilize can make it simpler to do budgetary exchanges.

On the other hand, PU5 and PU9 adversely influence IU6. Blockchain utilize in money related markets can increment efficiency like permanence takes the backing up and reestablishing a database to recover data etc. This adversely influences the investors to utilize blockchain within the future due to permanent nature of blockchain. Blockchain is an unchanging database, and you cannot control information that's as of now within the blockchain. Permanence can as it were existing in case arrange hubs are disseminated. A blockchain arrange is helpless in the event that one substance claims at slightest half the hubs. Another concern is that information once composed, cannot be eradicated. When utilizing a blockchain-based digital platform, users are unable to delete their records. PU1 and PU10 do not influence IU6.

IU7 is influenced emphatically by PU2, PU3, PU4, PU6, PU8 and PU9. financial specialists expected to issue the security through Blockchain innovation due to tokenization offers higher availability for clients with superior offices in terms of trade of tokens. This opens entryways for diverse financial specialists and cuts down the least speculation period and sum. gives straightforwardness of exchange to the speculators. It too gives straightforwardness of exchange to the speculators. The capacity of an organization to deliver a total and undeniable history of a value-based record makes the reviewing prepare simple and proficient. Blockchain utilize can make it less demanding to do monetary exchanges. Blockchain utilize in money related markets can increment efficiency. On the other hand, PU7 contrarily influence IU7. Blockchain utilize can make strides advertise execution. This adversely influences speculators to contribute within the security issued through Blockchain innovation. PU1 and PU5 have no impact on IU7.

IU8 is influenced emphatically by PU1, PU2, PU3, PU4, PU5 and PU7. Speculators expected to purchase the security issued through Blockchain innovation due to DLT which is likely to extend productivity and improve get to to back for populaces that don't have get to to conventional budgetary framework. Blockchain tokenization gives straightforwardness of exchange to the speculators. The capacity of an organization to create a total and undeniable history of a value-based record makes the reviewing handle simple and effective and

unchanging nature takes the backing up and re-establishing a database to recover data etc. On the other hand, PU9 adversely influence IU8. Blockchain utilize in money related markets can increment efficiency, it contrarily influences due to lack of working knowledge and mindfulness around blockchain innovation. This demonstrates there's a got to spread mindfulness around Blockchains to encourage its adoption.PU5 have no impact on IU8.

IU9 is influenced emphatically by PU2, PU3, PU4, PU6, PU7 and PU8. Speculators proposed to utilize BC innovation for browsing the accessibility of the securities within the showcase due to tokenization offers higher openness for clients with superior offices in terms of trade of tokens. This opens entryways for diverse financial specialists and cuts down the least speculation period and sum. gives straightforwardness of exchange to the speculators. It moreover gives straightforwardness of exchange to the financial specialists. The capacity of an organization to create a total and undeniable history of a value-based record makes the inspecting prepare simple and effective. Blockchain utilize can make it simpler to do budgetary transactions.

On the other hand, PU9 and PU10 adversely influence IU9. Blockchain utilize in monetary markets can increment efficiency, it contrarily influences due to need of working information and mindfulness approximately blockchain innovation for financial specialists to utilize BC innovation for browsing the availability of the securities within the market. This shows there's a have to be spread mindfulness almost Blockchains to encourage its adoption.PU1 and PU5 have no impact on IU9.

IU10 is influenced emphatically by PU2, PU3, PU4, PU6 and PU7. Financial specialists expected to extend speculation through Blockchain innovation due to tokenization offers higher openness for clients with superior offices in terms of trade of tokens. This opens entryways for diverse speculators and cuts down the least speculation period and sum. gives straightforwardness of exchange to the financial specialists. It too gives straightforwardness of exchange to the financial specialists. The capability of an organization to provide a comprehensive and indisputable history of a transactional ledger streamlines the auditing process, making it easy and efficient.

On other hand, PU1, PU5 and PU9 adversely influence IU10. Blockchain (BC) Dispersed Record Innovation (DLT) seem increment productivity and possibly make strides get to to fund

for unbanked populaces, who are as of now exterior the conventional money related framework. Permanence takes the backing up and re-establishing a database to recover data Blockchain utilize in money related markets can increment efficiency. All these adversely influence financial specialists to extend speculation through Blockchain innovation due to misguided judgments and need of mindfulness almost the technology. PU8 and PU10 have no impact on IU10.

IU11 is influenced emphatically by PU1, PU2, PU3, PU6, PU7 and PU9. Financial specialists think to utilize Blockchain innovations for other financing exchanges on the off chance that advertised due to DLT which is likely to extend effectiveness and improve get to fund for populaces that don't have get to conventional budgetary framework. Blockchain tokenization gives straightforwardness of exchange to the speculators. The capacity of an organization to deliver a total and undeniable history of a value-based record makes the reviewing prepare simple and proficient and unchanging nature takes the backing up and re-establishing a database to recuperate information etc.
On the other hand, PU5, PU8 and PU10 contrarily influence IU11. Blockchain utilize can make it less demanding to do budgetary exchanges. Unchanging nature takes the backing up and re-establishing a database to recover data etc. Blockchain utilize would empower the client to achieve the exchange more rapidly. All that adversely influences financial specialists to utilize Blockchain advances for other financing exchanges in the event that offered.PU6 have no impact on IU11.

IU12 is influenced emphatically by PU1, PU3, PU4, PU5. Utilizing Blockchain advances with other organizations to offer such a stage in a reliable way due to DLT which is likely to extend productivity and improve get to fund for populaces that don't have get to to conventional budgetary framework. Tokenization offers higher availability for clients with superior offices in terms of trade of tokens. This opens entryways for distinctive financial specialists and cuts down the least speculation period and sum, it too gives straightforwardness of exchange to the financial specialists. The capacity of an organization to create a total and undeniable history of a value-based record makes the reviewing prepare simple and productive and unchanging nature takes the backing up and re-establishing a database to recover data etc.

On the other hand, PU4 and PU10 contrarily influence IU1. The capacity of an organization to create a total and undeniable history of a value-based record makes the reviewing prepare

simple and productive and empower the client to achieve the exchange more rapidly. This adversely influences Utilizing Blockchain innovations with other organizations to offer such a stage in a reliable way, due to need of information and mindfulness of the users.

Scalability is characterized as "the capacity of a company to support or way better its execution in terms of benefit or productivity 'a seen need of control over innovation and a feeling of being overpowered by it' (Parasuraman and Colby 2001). Versatility is one of the foremost vital issues in blockchain and has been the centre of both industry specialists and scholarly analysts (Zhijie Ren, 2019). Companies who have are tall chance- antagonistic toward unused innovations tend to discover innovation less simple to utilize (CBI-Guide-2015). Essentially, Versatility may have a positive impact on seen value, (Parasuraman 2000; Walczuch 2007; Kuo, Liu, and Ma 2013). Inconvenience reflects the fear and tensions of clients whereas utilizing innovation. Versatility may directly affect seen convenience additionally influencing seen ease of utilize. Innovation acknowledgment can be decreased made strides upgrading versatility. In this manner,

H12: Perceived behaviour control positively affects behavioural Intention to use BT

Perceived behavioural control pertains to an individual's belief regarding the extent of control they have over a particular behaviour. However, operationally, perceived behavioural control is commonly evaluated based on the ease or difficulty associated with the behaviour. On the other hand, BI (Behavioural Intention) signifies the degree to which stakeholders are inclined towards adopting blockchain technology (BT). It serves as an indicator of an individual's preparedness to engage in a specific behaviour and is assumed to directly precede the behaviour itself (Ajzen, 2002b).

Table 5.12: The matrix below summarizes the effect of independent variables Pc_i, i = 1, …3) on the dependent ones (Iui = 1,2,…,12). Here S+: positively significant, S- negatively significant: and NS: effect is not significant

	Iu1	Iu2	Iu3	Iu4	Iu5	Iu6	Iu7	Iu8	Iu9	Iu10	Iu11	Iu12
Pc1	S+	S+	S+	S-	S+	S+	S+	S+	S+	S+	S-	S+
Pc2	S-	S+	S+	S+	S+	NS	S+	S-	NS	S-	S+	S-
Pc3	S+	S+	S+	S+	S+	S+	S-	NS	NS	NS	S+	S+

IU1 is emphatically influenced by Pc1 and Pc3. Hence, partners expected to utilize Blockchain advances for green bond financing due to blockchain-enabled green bond financing makes a difference simple following of exchanges with less endeavours by applying Savvy BC contracts that kills the require for mediators which lower settlement costs of green bond exchange. Permanence makes a difference an organization to spare time and taken a toll. Financial specialists won't need to endure from the bother of early recovery which is a costly issue. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes taken a toll and increments productivity and efficiency.

IU1 is adversely influenced by Pc2. Blockchain empowers smooth money related exchanges with less exertion, assets, mediators. This conversely influence investor's deliberate to utilize Blockchain advances for green bond financing since of less mindfulness of the innovation. Hence, there's a require of social affect programs require people and bunches to alter perspectives of their behaviour.

IU2 is emphatically influenced by Pc1, Pc2 and Pc3. Thus, Blockchain advances can be utilized for other financing exchanges on the off chance that advertised, because it empowers smooth money related exchanges makes a difference simple following of exchanges with less exertion, assets, middle people due to BC DLT lower settlement costs by applying Smart BC contracts which dispense with the require for middle people and lower settlement costs of green bond exchange within the exchanging of green bonds, BC immutability helps an organization to spare time and fetched. BC requires less exertion for the exchange than the conventional framework that along- side decrease taken a toll, moreover increments effectiveness and productivity.

IU3 is emphatically influenced by Pc1, Pc2 and Pc3. Hence, blockchain can make strides to conduct a errand due to smooth budgetary exchange requires less exertion for the exchange than the conventional framework which decreases fetched and increments productivity and efficiency. Blockchain empowers smooth budgetary exchanges with less exertion, assets, intermediaries.

IU4 is emphatically influenced by Pc2 and Pc3. In this way, blockchain stage is reliable to issue securities due to smooth money related exchanges makes a difference simple following of

exchanges with less exertion, assets, middle people due to BC DLT lower settlement costs by applying Keen BC contracts which dispose of the require for middle people and lower settlement costs of green bond exchange within the exchanging of green bonds, BC unchanging nature makes a difference an organization to spare time and taken a toll. BC requires less exertion for the exchange than the traditional framework that together with reduce cost, too increments proficiency and productivity.IU4 is contrarily influenced by Pc1. Speculators won't ought to endure from the bother of early recovery which is an costly undertaking. Blockchain innovation requires less exertion for the exchange than the conventional framework which decreases fetched and increments proficiency and productivity.

IU5 is emphatically influenced by Pc1, Pc2 and Pc3. It is best to utilize blockchain-based issue administration for issuing green bond due to smooth budgetary exchanges with less exertion, assets, middle people since of applying shrewd BC contracts dispose of the require for middle people within the exchanging of green bonds, BC DLT may lower settlement costs of green bond exchange., Tokenization offers higher openness for clients with way better offices
in terms of trade of tokens. increments green bond financing effectiveness and diminishes fetched. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes taken a toll and increments effectiveness and productivity.

IU6 is emphatically influenced by Pc1 and Pc3. Due to numerous advantageous highlights of blockchain it would be valuable for the long run prospects like BC DLT might lower settlement costs of green bond exchange, unchanging nature makes a difference an organization to spare the information with no scope of control with the information. Blockchain innovation requires less exertion for the exchange than the conventional framework which decreases fetched and increments effectiveness and efficiency. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less exertion. IU6 isn't influenced by Pu3. Blockchain-enabled green bond financing makes a difference simple following not influencing long run prospects. For following reason, financial specialists favor to utilize the conventional strategies of examination, so the attitude of speculators ought to be changed by the making them mindful approximately the superior appropriate information of blockchain innovation.

IU7 is emphatically influenced by Pc1, Pc2. It is favoured to utilize blockchain technology to issue the security through blockchain innovation due to applying savvy blockchain contracts to post exchange exercises dispense with the require for mediators within the exchanging of

green bonds. Speculators won’t have to be endure from the bother of early recovery which is a costly undertaking. Blockchain innovation increments green bond financing proficiency and diminishes fetched. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes taken a toll and increments proficiency and efficiency. Blockchain empowers smooth money related exchanges with less exertion, assets, intermediaries.

IU7 is adversely influenced by Pu3. Issuing securities through blockchain stage isn't favored by all issuers. Issuing securities could be a comprehensive handle comprise of specialized base which isn't managed by the all issuing companies.

IU8 is emphatically influenced by Pu1. Issuing companies utilizing blockchain considered to be mechanically overhauled and progressed which by applying blockchain highlights finish the exchanging exercises at lower settlement costs by utilizing DLT, tokenization etc. This creates opportunities for various investors and reduces the minimum investment period and amount. Investors no longer have to deal with the inconvenience and costs associated with early redemption. Permanence makes a difference an organization to spare time and fetched. Blockchain innovation increments green bond financing effectiveness and diminishes fetched. Blockchain innovation requires less effort for the exchange than the conventional framework which decreases taken a toll and increments effectiveness and efficiency. Hence, financial specialists will favour to contribute within the same.

IU8 is negatively affected by Pu2 For investors, Blockchain use less effort and, resources and intermediaries for those stakeholders who are habituate to use blockchain or who have the knowledge of using the technology for trading. Thus, making stakeholders aware and familiar with the use of blockchain technology would be the better. IU8 is not affected by Pu3. Blockchain-enabled green bond financing helps easy tracking of out transactions with less effort not affecting the issuers of the securities.

IU9 is emphatically influenced by Pu1. Utilize BC innovation for browsing the accessibility of the securities within the showcase due to applying keen BC contracts to post exchange exercises dispose of the need for mediators within the exchanging of green bonds BC DLT might lower settlement costs of green bond exchange. Blockchain diminishes vulnerabilities, gives solid encryption, and more effectively confirms information possession and astuteness.

IU9 isn't influenced by Pu2 and Pu3 For speculators, Blockchain empowers smooth monetary exchanges with less exertion, assets, mediators. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less exertion. But this might as it was be conceivable once the client is commonplace with the technology.

IU10 is emphatically influenced by Pc1. In this way, increment venture through Blockchain innovation due to BC DLT might lower settlement costs of green bond exchange., Tokenization offers higher availability for clients with way better offices in terms of trade of tokens. This opens entryways for distinctive financial specialists and cuts down the least speculation period and sum. Speculators won't need to endure from the bother of early recovery which is an costly issue. Permanence makes a difference an organization to spare time and taken a toll. Blockchain innovation increments green bond financing effectiveness and decreases taken a toll. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes fetched and increments proficiency and efficiency. IU10 is contrarily influenced by Pu2. Smooth money related exchanges with less exertion, assets, middle people is as it were conceivable for those partner who are commonplace to the innovation. This could be settled by making partners taught for blockchain. IU10 isn't influenced by Pu3.

IU11 is emphatically influenced by Pu2 and Pu3. In this way, Blockchain innovations can too be utilized for other financing exchanges, due to BC DLT may lower settlement costs of green bond exchange. Tokenization offers higher openness for clients with superior offices in terms of trade of tokens, it cuts down the least speculation period and sum. Permanence makes a difference an organization to spare time and fetched. Blockchain innovation increments green bond financing proficiency and decreases taken a toll. Blockchain empowers smooth money related exchanges with less exertion, assets, middle people. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less effort.

IU11 is contrarily influenced by Pu1. Blockchain innovation requires less exertion for the exchange than the conventional framework which diminishes fetched and increments proficiency and efficiency. Applying Shrewd BC contracts to post exchange exercises dispense with the need for middle people within the exchanging of green bonds

IU12 is emphatically influenced by Pu1 and Pu3. Hence, blockchain stage is dependable to issue securities due to smooth monetary exchanges makes a difference simple following of exchanges with less exertion, assets, middle people due to BC DLT lower settlement costs by applying Shrewd BC contracts which dispose of the require for middle people and lower remittance costs of green bond exchange within the exchanging of green bonds, BC unchanging nature makes a difference an organization to spare time and fetched. BC requires less exertion for the exchange than the conventional framework that beside decrease taken a toll, too increments proficiency and efficiency. Blockchain-enabled green bond financing makes a difference simple following of out exchanges with less exertion. IU12 is adversely influenced by PU2.

5.5 Chapter Summary

The application of blockchain technology in the creation of environmentally sustainable economic bonds within India. To ascertain the relevance of integrating data with this innovation, a comprehensive framework has been devised. This framework elucidates how data functions as the crucial link between different elements and the eventual incorporation of the technology. These relationships are then examined using SEM analysis and fundamental analysis to provide deeper insights into the adoption process.

Research methodology serves as a structured approach to effectively address these challenges and resolve the research problem at hand. The subsequent chapter will delve into the intricacies of the research methodology employed in this study, providing a comprehensive understanding of its design and implementation.

CHAPTER 6- DATA ANALYSIS AND INTERPRETATION

6.1 Introduction

Data analysis involves systematically applying statistical and/or logical techniques to describe, illustrate, condense, recap, and evaluate data (Owa & Bassey, 2018). It serves as the section dedicated to analysing the collected data to demonstrate the research study's objectives.

In this research the primary data was collected through the Likert scale questionnaire which has been analysed through SEM analysis for quantitative analysis by using AMOS and for framework analysis both primary and secondary data were collected. In document analysis, secondary data comprising reports, research papers, white papers, etc., was gathered, while primary data was acquired through personal interviews with experts. In qualitative research, a key pre-analysis objective is to identify and prioritize relevant information, gather that data, and organize it in a manner conducive to informed decision-making.

Following the research issues outlined in Chapter 3 and the research inquiries in Chapter 4, the study employs the following research analysis methods.

6.2 Pilot Study for Objective 1

A pilot study, as per Malmqvist et al. (2019), refers to a small-scale investigation conducted to assess research protocols, data collection tools, sample recruitment approaches, and other research methodologies in advance of a larger study. This allows researchers to gauge the accuracy of methods and the ease of replicating the research, as noted by Hertzog (2008).

The objective 1 as mentioned in the previous chapter given below again:

To study the relationship of facilitating conditions (scalability, privacy and cost efficiency limitations) with technology adoption intention of Blockchain Technology in Green Bond markets.

Prior to commencing the data collection process through a questionnaire survey for this study, a pilot study was undertaken involving 50 stakeholders including companies issuing green bonds, investors, intermediaries, and academicians. The feedback gathered from the pilot study aided in refining the questionnaire to make it more succinct, focused, and aligned with the study's objectives. Following the pilot study, the final questionnaire was formulated, comprising several sections. The initial section contained inquiries aimed at discerning the

significance of key facilitating factors such as scalability, cost efficiency, and privacy concerning stakeholders' behavioural inclinations toward blockchain adoption.

6.3 Questionnaire Survey Administration

The questionnaire was disseminated to diverse stakeholders via an online survey platform, email outreach, and participation in conferences attended by representatives from public and private companies, investors, intermediaries or service providers, and academicians. The data collection process adhered to a predefined timeframe to ensure its completion within a specified duration.

To develop a suggestive framework to overcome the scalability, privacy and cost efficiency limitations for adoption intention of Blockchain Technology in Green Bond markets.
For objective 2, qualitative method of framework analysis has been done.

6.4 Structural Equation Model- Method: Multi-Layered Regression (Multiple) Model Hypothesized Figure 5.1 Theoretical Framework Stimulus (Design Stimulus Research Theoretical Hypothesis) (Misra, Rao, Gupta 2021).

The significance level of correlation is observed to be 0.01 (2-tailed). Employing the Correlate function enables the assessment of correlations among multiple variables simultaneously, resulting in the output table presented in a matrix format (Sternberg, 2019). The subsequent table is constructed based on these correlations.

Table-6.1: Correlation matrix between the proposed TAM framework variables.

Correlations								
		Scalability	Privacy	CE	PU	PEOU	A_BI	Actual Adoption
S	Pearson Correlation	1	.717**	.692**	.457**	.479**	.526**	.446**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	177	177	177	177	177	177	177
P	Pearson Correlation	.717**	1	.717**	.586**	.558**	.535**	.478**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	177	177	177	177	177	177	177
CE	Pearson Correlation	.692**	.717**	1	.645**	.691**	.635**	.580**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	177	177	177	177	177	177	177
PU	Pearson Correlation	.457**	.586**	.645**	1	.514**	.619**	.567**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	177	177	177	177	177	177	177
PEoU	Pearson Correlation	.479**	.558**	.691**	.514**	1	.756**	.693**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	177	177	177	177	177	177	177
A_BI	Pearson Correlation	.526**	.535**	.635**	.619**	.756**	1	.776**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	177	177	177	177	177	177	177
AA	Pearson Correlation	.446**	.478**	.580**	.567**	.693**	.776**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	177	177	177	177	177	177	177
** Correlation is significant at the 0.01 level (2-tailed).								

(*S* Scalability; * P*Privacy; * CE*Cost-efficiency; *PU* Perceived Usefulness; *PeoU*Perceived Ease of Use; *A*Attitude; *BI*Behaviour Intention; *AA*Actual Adoption)

6.4.1 Steps taken for the SEM Application

- The conceptual model was formulated
- Total score for each dimension was Blockchain Technology aimed.
- The scores were rescaled by (maximum-Blockchain Technology aimed)/ (maximum-minimum)
- Path coefficients were determined using AMOS
- p-value for significance was taken as 0.05 (when $p<0.05$, the coefficients were significant)
- Hypotheses were accepted or not accepted based on the p-values (when $p<0.05$, the hypothesis formulated (the exogenous variables affect the endogenous variable) were accepted as mentioned in table below:

Table 6.2: The exogenous variables and the endogenous variables in SEM analysis

Endogenous variables	Exogenous variables	Manifest (output)
Scalability, privacy, cost efficiency	Perceived usefulness(PU), Perceived ease of use(PEOU), Behaviour Intention(BI), Attitude(A)	Actual Adoption

6.4.2 SEM Outcome by Final Path Analysis

Structural Equation Modeling (SEM) serves as a statistical method to examine and validate intricate relationships among variables (Byrne, 1998). Through path analysis, SEM produces outcomes, commonly involving several sequential steps.

Firstly, in the path analysis of Sequential Equation Modeling (SEM) employing AMOS, observed variables and latent constructs are delineated, and hypothesized relationships among variables are specified using paths. The estimation process then entails determining the model parameters that offer the best fit to the observed data.

Following this, an assessment of the estimated path coefficients (regression weights) is conducted to grasp the strength and direction of the relationships between variables. The significance of these coefficients is interpreted, and the practical implications of the findings are evaluated.

Subsequently, a final path analysis is conducted, concentrating on the significant paths within the model, based on the results obtained.

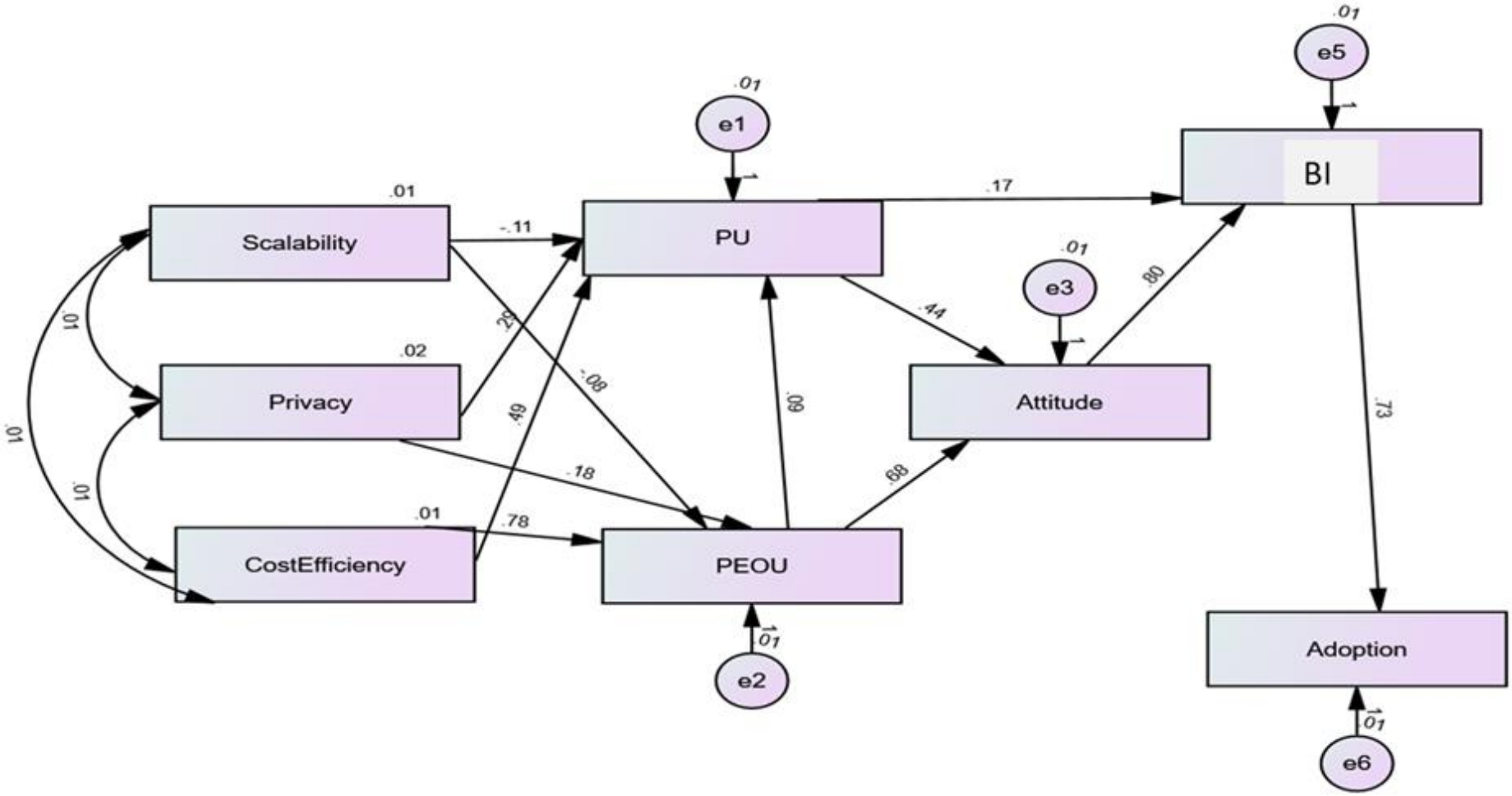


Figure 6.1-Outcome of Final Path Analysis

Figure 6.1 is explained in detail with the help of below outcome finding table. All results are analysed on the basis of the path coefficients and p values {Significant (S= $p<0.05$ are marked significant/ Not Significant (NS=$p>0.05$)}

Table 6.3: Results of SEM by Path analysis [Hypothesis testing with p values ($p<0.05$= Hypothesis significant)]

Hypothesis	Beta(β) coefficient.	Accepted(A)/ Not Accepted (NA)	P Values	Significant (S= $p<0.05$ are marked significant
H1: Scalability affects PU	-0.11	NA	0.240	NS
H2: Scalability affects PEOU	-0.08	NA	0.428	NS
H3: Privacy affects PU	0.29	A	0.001	S
H4: Privacy affects PEoU	0.18	NA	0.066	NS
H5: Cost efficiency affects PU	0.49	A	0.001	S
H6: Cost efficiency affects PEoU	0.78	A	0.000	S
H7: PU affects Attitude	0.44	A	0.000	S
H8: PEoU affects Attitude	0.89	A	0.000	S
H9: PEoU affects PU	0.09	NA	0.211	NS
H10: PU affects BI	0.17	NA	0.057	NS
H11: Attitude affects BI	0.80	A	0.000	S
H12: BI affects Adoption	0.73	A	0.000	S

6.4.3 Findings of SEM

On the basis of the above path analysis, it is found that:

Table 6.4: Findings of SEM outcome

Findings of SEM Outcome
H1: The path coefficient of path from Scalability to PU (perceived usefulness) is not significant (p=0.240> 0.05). Thus, test hypothesis i.e., Scalability affects PU is not accepted or rejected.
H2: The path coefficient of path Scalability to PEoU (Perceived ease of use) is not significant (p=0.428 >0.05); hence, Thus, test hypothesis i.e., S affects PEoU is not accepted or rejected.
H3: The path coefficient of path from Privacy to PU is significant (p=0.001< 0.05). Thus, test hypothesis i.e., P affects PU is accepted.
H4: The path coefficient of path Privacy to PU is not significant (p=0.066 > 0.05); hence, Thus, test hypothesis i.e., privacy affects PEoU is not accepted or rejected.
H5: The path coefficient of path from CE to PU is significant (p=0.001< 0.05). Thus, test hypothesis i.e., Cost efficiency affects PU is accepted.
H6: The path coefficient from Cost efficiency to PEoU is significant (p=0.000< 0.05). Hence, test hypothesis is significant and it is accepted. Thus, test hypothesis i.e., Cost efficiency affects PU is accepted.
H7: The path coefficient from PU to Attitude is path coefficient is significant (p=0.000< 0.05). Thus, test hypothesis i.e., PU affects Attitude is accepted.
H8: The path coefficient from PEoU to Attitude is significant (p=0.000< 0.05). Thus, test hypothesis i.e., PEoU affects Attitude is accepted.
H9: The path coefficient from PEoU to PU; path coefficient is PU is not significant (p=0.211 > 0.05); hence, Thus, test hypothesis i.e., PEoU affects PU is not accepted or rejected.
H10: The path coefficient from PU to BI; path coefficient is not significant (p=0.057 > 0.05); hence, Thus, test hypothesis i.e., PU affects BI is not accepted or rejected.
H11: The path coefficient from Attitude affects BI is significant (p=0.000< 0.05). Thus, test hypothesis i.e., Attitude affects BI is accepted.
H12: The path coefficient from BI to Adoption is significant (p=0.000< 0.05). Thus, test hypothesis i.e., BI affects Adoption is accepted.

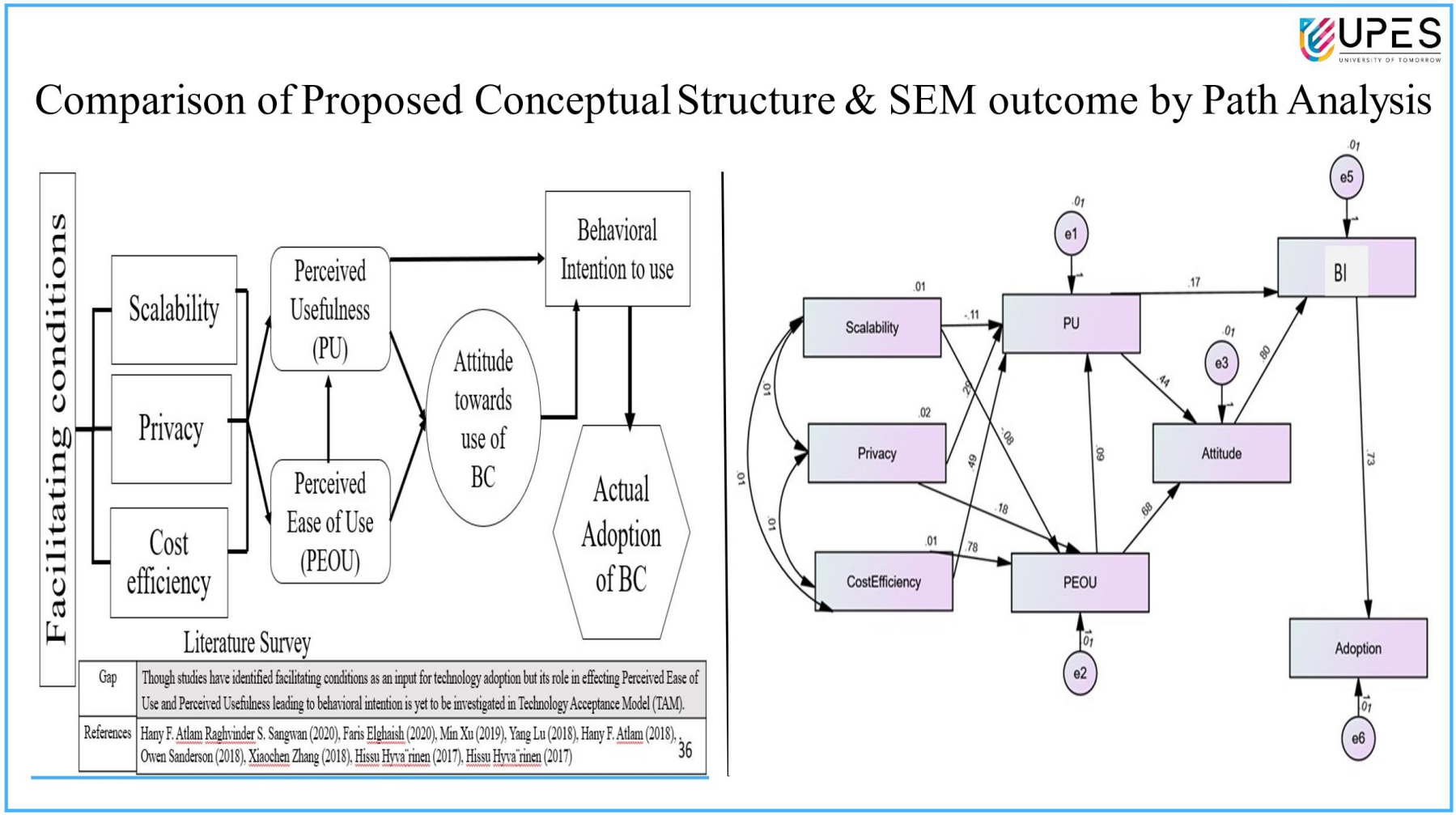


Figure 6.2: Comparison of proposed Conceptual Structure and SEM outcome by Path Analysis

6.5 Findings of objective 1

On the basis of the study as mentioned in figure 6.2, A comparison of conceptual structure and SEM outcome, it has been found that blockchain technology establishes a direct and transparent connection between service providers and users, although scalability and privacy are in struggling phase but cost efficiency is a major determinant of the PU of BCT in the green bond market.

6.6 Framework Analysis for analysing Research Objective 2

Based on the research problems mentioned in Chapter 3, and research questions in chapter 4 following research analysis methods have been used in this study for analysing the objective 2 as mentioned below:

To develop a suggestive framework to overcome the scalability, privacy and cost efficiency limitations for adoption intention of Blockchain Technology in Green Bond markets.

The proposed study aims to utilize framework analysis (FA), which offers a robust method to evaluate policies and procedures by directly engaging with the individuals they impact.

6.6.1 Complete Process for Framework Analysis

Framework analysis gives the flexibility to researchers to data analysis in both ways such as collect all data and analyse it or do analysis during the time of data collection itself. Based on the key issues and themes, the collected data will be sifted, charted and sorted, which involves the following steps:

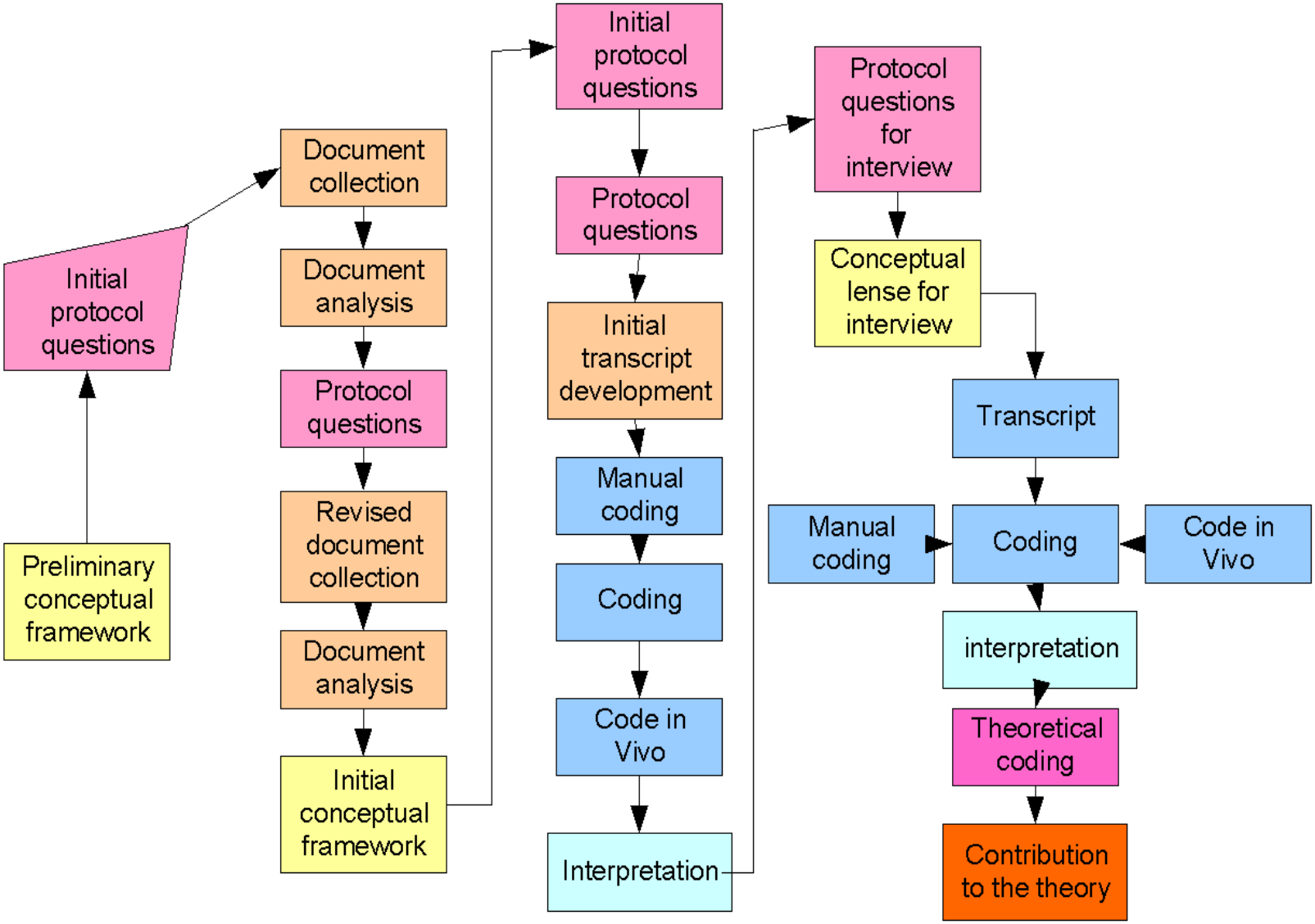


Figure 6.3: Framework analysis process adopted in this research.

Initially preliminary conceptual Lense was made on the basis emerging trends in the related area, then protocol questions were drafted for the analysis of documents searched related to the subject area of blockchain and green bonds. In these documents many whitepapers are also included like Niti Aayog-2020, Meity National Strategy etc. Again, the protocol questions were revised and further more documents were analysed. After that initial conceptual framework was developed for the purpose of showing the strategy for the purpose of adoption of Blockchain Technology for green bond markets.

The framework is created in ATLAS ti , the transcript is transferred in ATLAS ti , and a auto code has been generated by manual coding and code in Vivo, the code cleaning has been done and the outcome comes for the purpose of the adoption. Another protocol set of questions have been made for the purpose of interview analysis and afterwards a new final framework has been generated which gives the final outcome of the analysis.

6.6.2 Validity and Reliability of Qualitative research (by Grounded Theory developed by Glaser and Strauss)

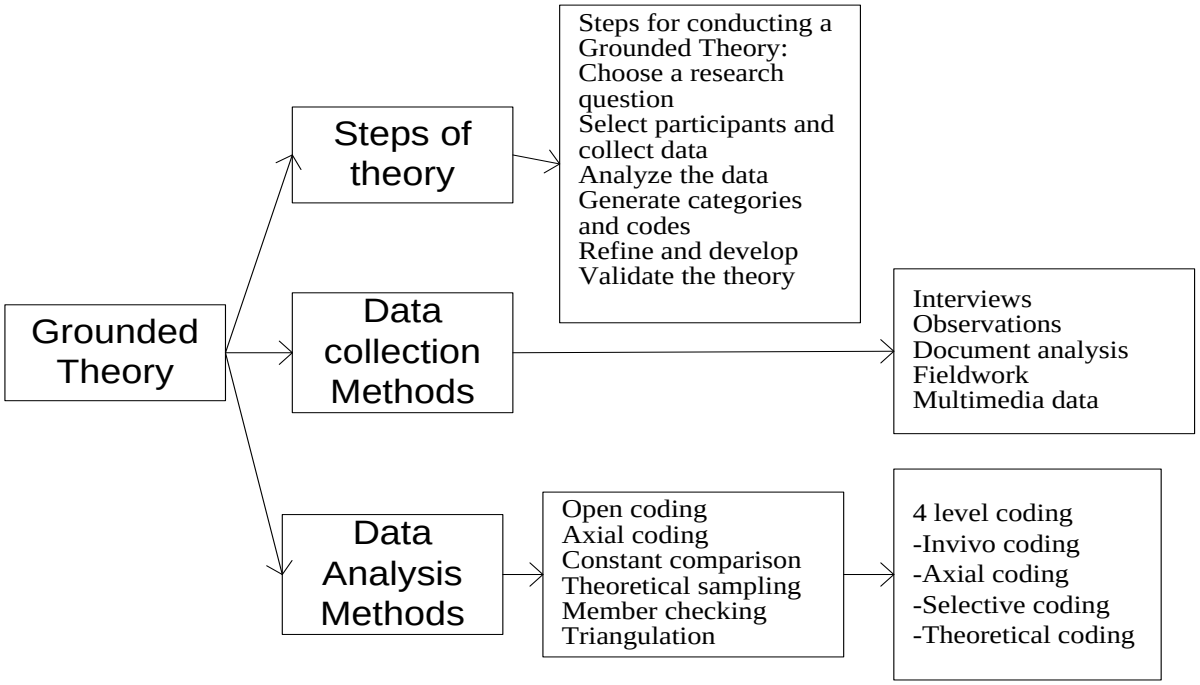


Figure 6.4: Validity and Reliability of Qualitative research (by Grounded Theory developed by Glaser and Strauss)

The validity and reliability of qualitative research were established through the application of Grounded Theory, as developed by Glaser and Strauss. Grounded theory, initially proposed by Glaser and Strauss in 1967, entails a qualitative research approach aimed at systematically

gathering and analysing data to develop theory. The study outlines the steps involved in theory development along with the methods employed for data collection. In this study, data collection has been done through methods like document analysis, observations, fieldwork, multimedia data and expert interviews. For data analysis, coding method has been used. In this study, a four-level coding process was employed, consisting of Invivo coding, Axial coding, Selective coding, and Theoretical coding. The complete process of qualitative analysis has been mentioned as below

Familiarization with the data

Familiarize yourself with your data to become more informed.

6.6.3 Framework Analysis through Document Analysis

Document analysis entails a structured process of thoroughly reviewing and assessing documents, regardless of whether they are in printed or electronic format. This method, akin to numerous other qualitative research approaches, requires a systematic examination and interpretation of data. By meticulously analysing documents, researchers aim to unveil underlying meanings, enhance comprehension, and ultimately arrive at informed conclusions.

On the basis of preliminary conceptual framework, the documents were searched and analysed for the purpose of finding out the answers of those protocol questions. After that again some revised protocol questions were designed for the purpose of further analysis of the existing documents. to develop the framework and on the basis of that initial transit was developed. Then in ATLAS ti the coding has been done.

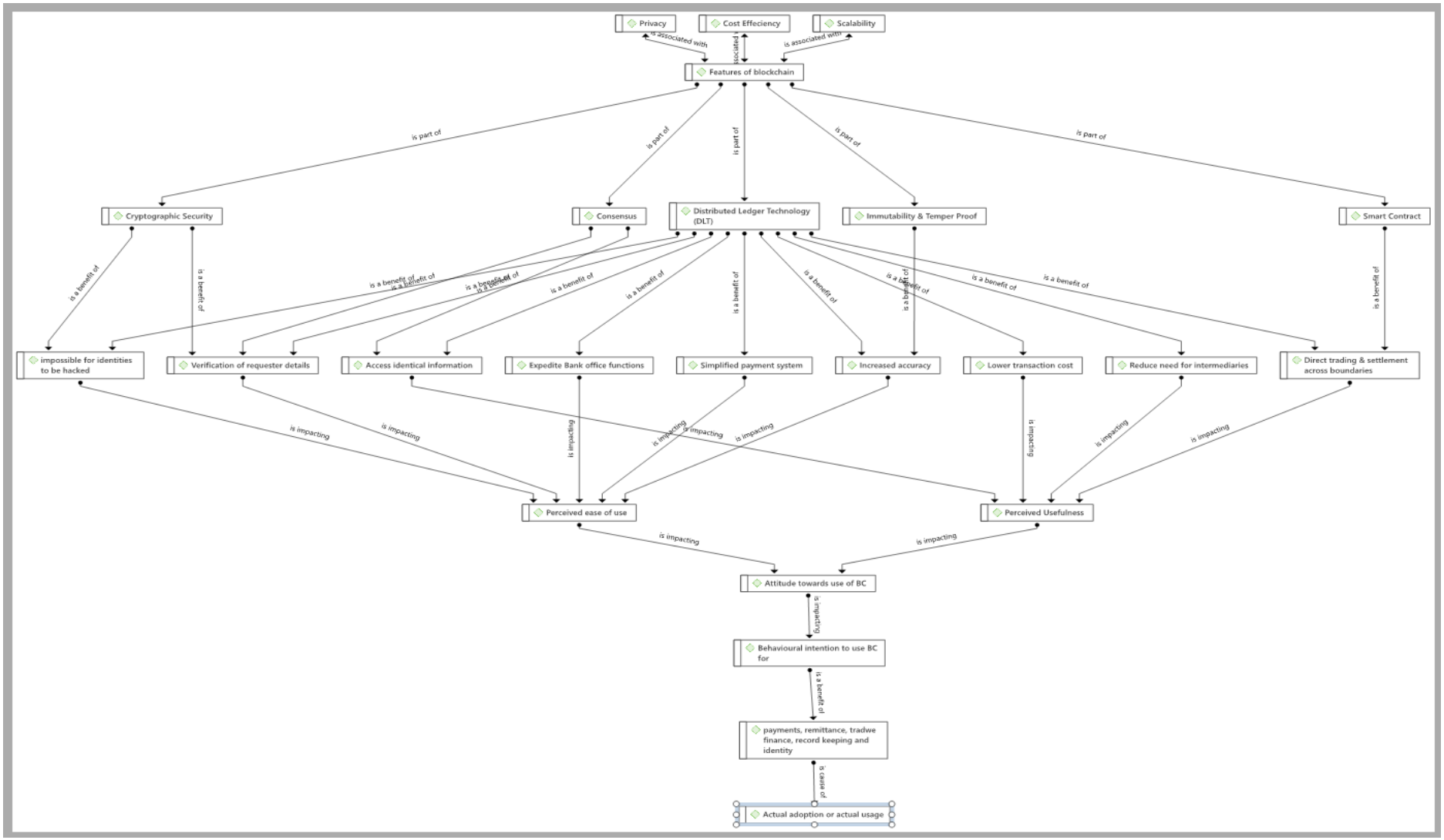


Figure 6.5: Conceptual framework for blockchain adoption in green bond market.

6.6.4 Framework Analysis through Expert Interview Analysis

One-on-one interviews are widely used as a data gathering technique in qualitative research, primarily because of their intimate and personal nature. I conducted 11 60-minute-long qualitative interviews for my research thesis and am now looking for a solid strategy to analyse the interviews and compose my thesis. Because they give personal insights and enable readers to relate to the information, interviews make excellent sources for research papers.

To begin getting to know the sources, read the interviews. Then read the information once more, this time noting any impressions. Determine which interviews are beneficial and others you might want to set aside after going over the data collection numerous times. Read the interview through several times. Every time, new ideas or questions that need to be resolved were highlighted.

Transcribe the data to facilitate working with it. Create a tidy, typed record of all your information. Type up the handwritten notes you took throughout the interviews. Additionally, write down any notes made as I was familiarising myself with the facts. The data may be quickly searched and reorganised as needed with the use of an electronic version thought of using the ATLAS ti software to speed up the analysis. ATLAS ti is useful for coding and categorising.

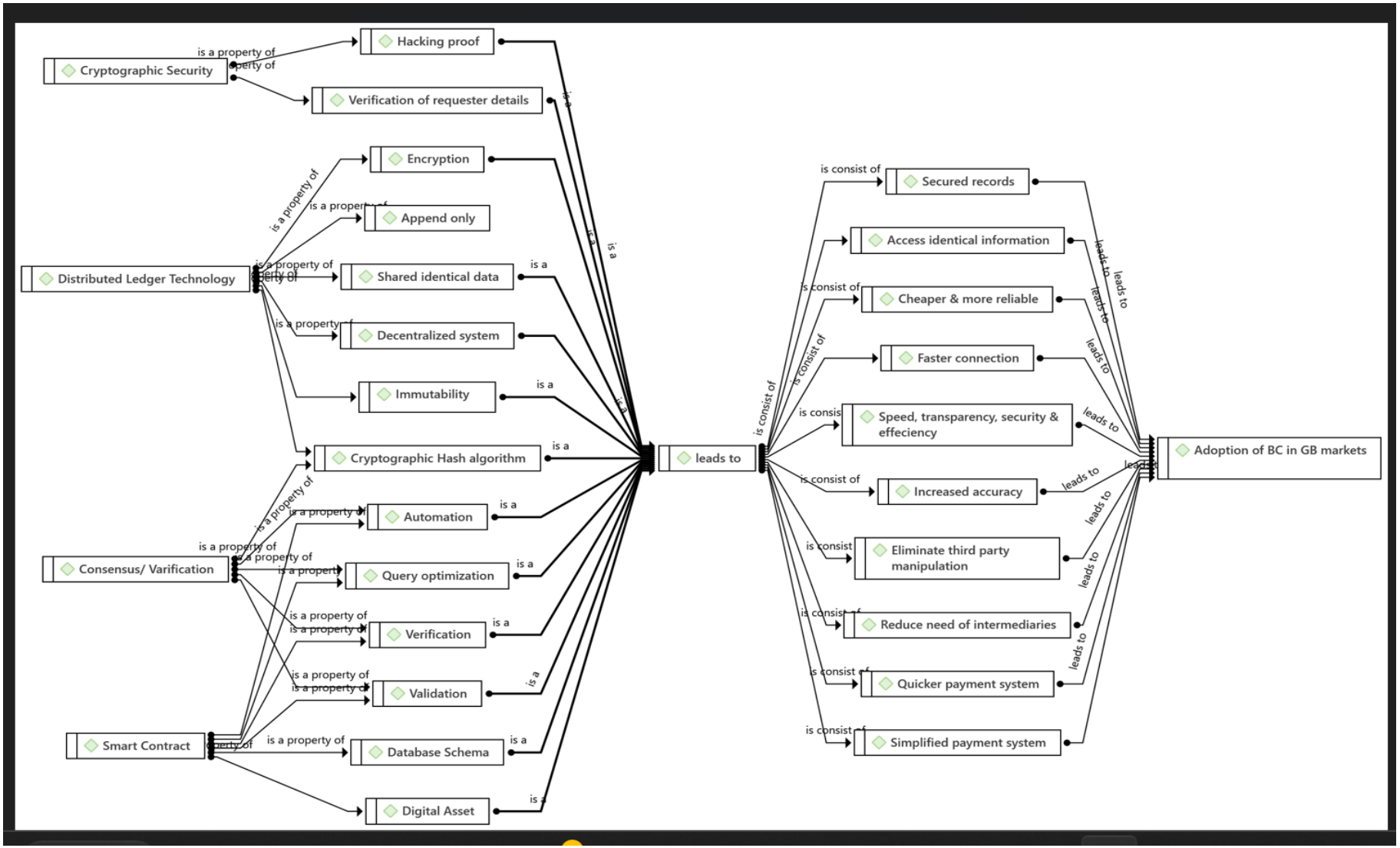


Figure 6.6: Detailed framework on the basis of Document analysis

6.6.5 Analysis of the Interviews

On the basis of various document and literature review analysis, the major three facilitating variables are found which affects the adoption of Blockchain Technology in green bond market. These are cost efficiency, privacy and scalability. Thus, the following questions were designed to analyse the individual perception regarding these themes:

Table 6.5: Semi- Structured interview questions.

Questions	Blockchain features	Benefit for blockchain adoption	Concluding comments
How smart contract will lead to better payment system in stock exchange?	Smart Contract	Reduce need for intermediaries/ Reduce cost	blockchain has proven to be a huge cost-saver and efficiency-enabler. By letting go of intermediaries, blockchain transactions lower costs, speed up processes and result in greater flexibility throughout the entire system.
Will smart contracts lead to quicker settlement in stock market transactions?		Lower transaction cost	In terms of cost, there's no exact answer on how much it cost to create a blockchain solution – this largely depends on blockchain requirements.
How identical data will impact the adoption of the technology in markets?	Decentralised data storage	Transparency in settlement process	Blockchain is ideal for delivering that information because it provides immediate, shared and completely transparent information stored on an immutable ledger that can be accessed only by permissioned network members. This impacts the trust in the investors and it also offers privacy.
How remittance process can be accessed with ease through decentralised data storage?		Manage privacy	blockchain technology entirely changes the way international payments are made. This is because blockchain offers an efficient, transparent, yet secure way to facilitate international payments. It can perform worldwide financial transactions based on a distributed network of computers. A blockchain network can track orders, payments, accounts, production and much more. The information about who did what on a given record almost always exists in distributed databases that do not synch with each other.
How Payment gateway will be simplified through which transaction cost will be reduced leading to adoption intention of Blockchain adoption?	DLT	Cost effeciency	This includes the cost of the servers and other hardware required to run the blockchain platform. The hardware costs of blockchain implementation can be significant, especially for large-scale projects. For a blockchain to function properly, it requires a network of computers, called nodes, that are constantly verifying and validating transactions
How through BC adoption, it is impossible to temper the data without leaving any proof?	Immutable and temper proof	Increased accuracy in Asset management	Blockchains can also be seen as a great asset in data protection work.
How through verification process in blockchain technology at various steps leads to safety and security of customer personal data.	Consenses Validation	Increased accuracy in Asset management	A blockchain network can track orders, payments, accounts, production and much more. The information about who did what on a given record almost always exists in distributed databases that do not synch with each other.
How individual identity created through blockchain technology will directly link other stakeholders, will lead to better information awareness about the products?	Identity/ Blocks/ Nodes	Information sharing	Blockchain solutions can help by enabling secure data sharing and claims processing. blockchain is essentially a distributed database of records or public ledger of all transactions or digital events that have been executed and shared among participating parties. Each transaction in the public ledger is verified by consensus of a majority of the participants in the system. And, once entered, information can never be erased.
How user authentication for the transaction leads to better security and less chances for identities to be hacked and data compromise and in turn leads to BC adoption?	Identity, Immutability	No chances of data compromise.	Enhanced security by encryption of data at the stage of dissemination enabling a distributed consensuswhere each and every online transaction, past and present, involving digital assets can be verified at any time in the future. It does this without compromising the privacy of the digital assets and parties involved. The distributed consensus and anonymity are two important characteristics of blockchain technology.
How the installation charges of blockchain technology is very high?	Cost effeciency	Technical view	This includes the cost of the servers and other hardware required to run the blockchain platform. The hardware costs of blockchain implementation can be significant, especially for large-scale projects. For a blockchain to function properly, it requires a network of computers, called nodes, that are constantly verifying and validating transactions

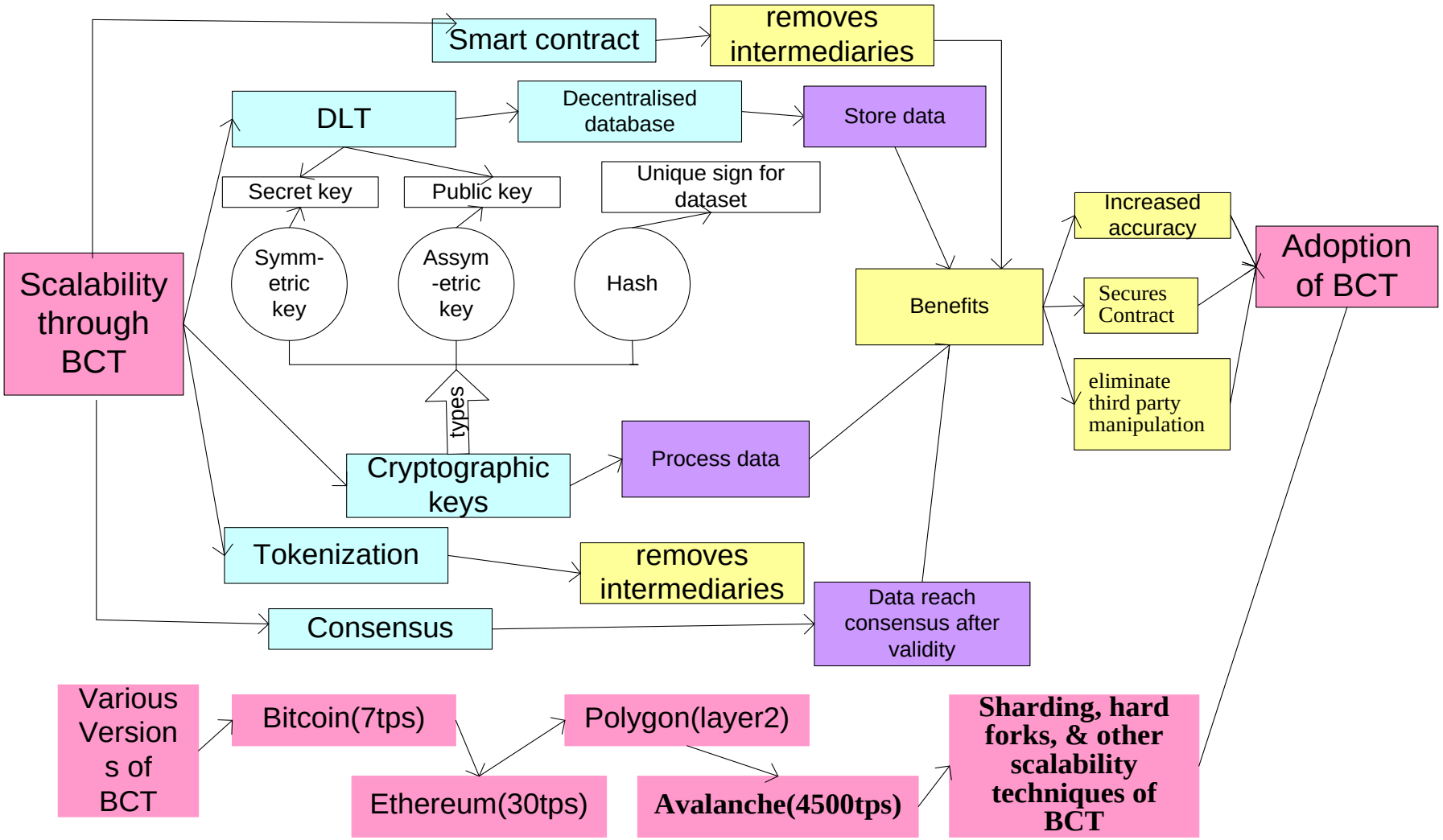


Figure 6.7: Framework for blockchain adoption in green bond markets on the basis of Scalability

On the basis of document analysis and interview analysis through the interviews with the experts, the above figure 6.5 shows the framework for the blockchain adoption in green bond markets by scalability variable. Blockchain scalability pertains to a blockchain's ability to efficiently manage a growing volume of transactions, store data effectively, and facilitate agreement among network participants. As the network expands, cryptographic keys become essential for processing data and ensuring secure consensus.

Blockchain Technology is a subset of the broader distributed ledger technology (DLT) ecosystem (Li & Kassem, 2021). The Blockchain Scalability Solution aims to enhance transaction throughput in blockchain networks by employing various scalability techniques such as sharding, hard forks, and other innovative approaches (Harshini Poojaa, & Ganesh Kumar, 2022). The previous versions like bitcoin, Ethereum were facing the limitation of scalability (Khan et al, 2021). **Polygon** blockchain is very popular as it had solved major bottlenecks of Ethereum as a **Layer2 solution** for example as mentioned by Kuntal, 2023; Chemaya, 2022; Sguanci et al, 2021. The **latest version, Avalanche**, is an open-sourced and smart contracts compatible platform created to develop decentralized applications (dApps) and enterprise blockchain protocols. "It boasts a quicker transaction processing time of 4,500 transactions per second, surpassing Ethereum's mentioned limit, as indicated by Arslanian (2022) and Gramoli, V., et al. (2023). "Sharding, as explained by Chauhan and Malviya (2018), involves dividing a larger network into smaller partitions known as 'shards,' thereby improving scalability and transaction speed. This technique ensures greater scalability by enabling transactions to be processed concurrently across different layers." This also increases the accuracy, secures contract, eliminate third party manipulation (Estevam, G., et al, 2021).

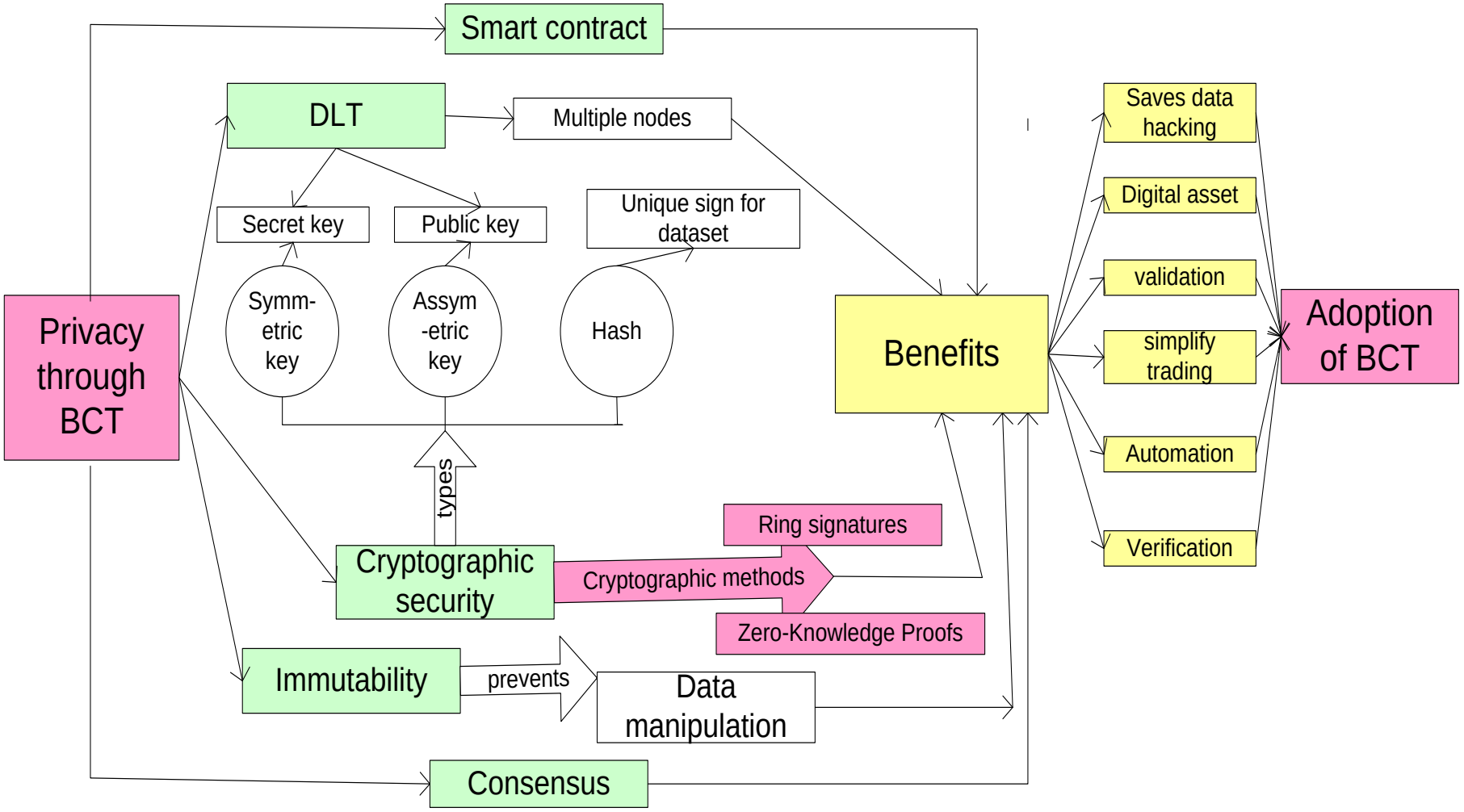


Fig. 6.8: Framework for blockchain adoption in green bond markets on the basis of Privacy

On the basis of this study, it has been found that the adoption of Blockchain Technology benefits privacy for stakeholders in green bond markets. The features of Blockchain Technology like DLT, Cryptographic security, immutability, smart contracts benefit in the operations like validation, verification, automation. Blockchain Technology also saves the data from hacking through the consensus mechanism that act as the verification standards through which each blockchain transaction gets approved. Blockchain Technology can protect data confidentiality by encrypting data, providing decentralized storage, and enabling secure, permission-based access controls.

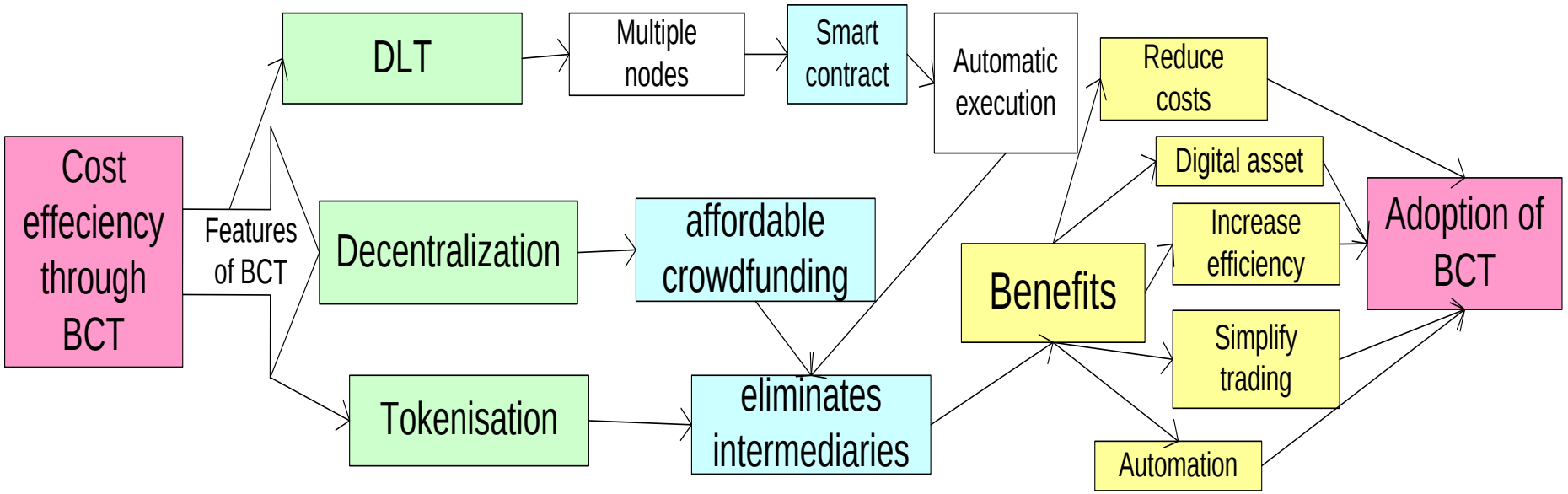


Figure 6.9: Framework for blockchain adoption in green bond markets on the basis of cost efficiency

"Figure 6.9 illustrates how automatic execution facilitated by Distributed Ledger Technology (DLT) and smart contracts in blockchain drastically reduces paperwork and errors. Blockchain technology plays a significant role in diminishing overhead and transaction costs while also diminishing or eradicating the necessity for third-party verification of transactions, as noted by Sommaruga (2021). Additionally, it reduces transaction risks and intermediary costs within crowdfunding platforms through cryptocurrency transactions, thereby enhancing data security and improving overall crowdfunding efficiency, as highlighted by Nguyen (2021). Given the sensitivity and importance of data, blockchain has the potential to revolutionize the perception and management of critical information, as discussed by Moin (2019). Consequently, Blockchain Technology emerges as a cost-effective solution."

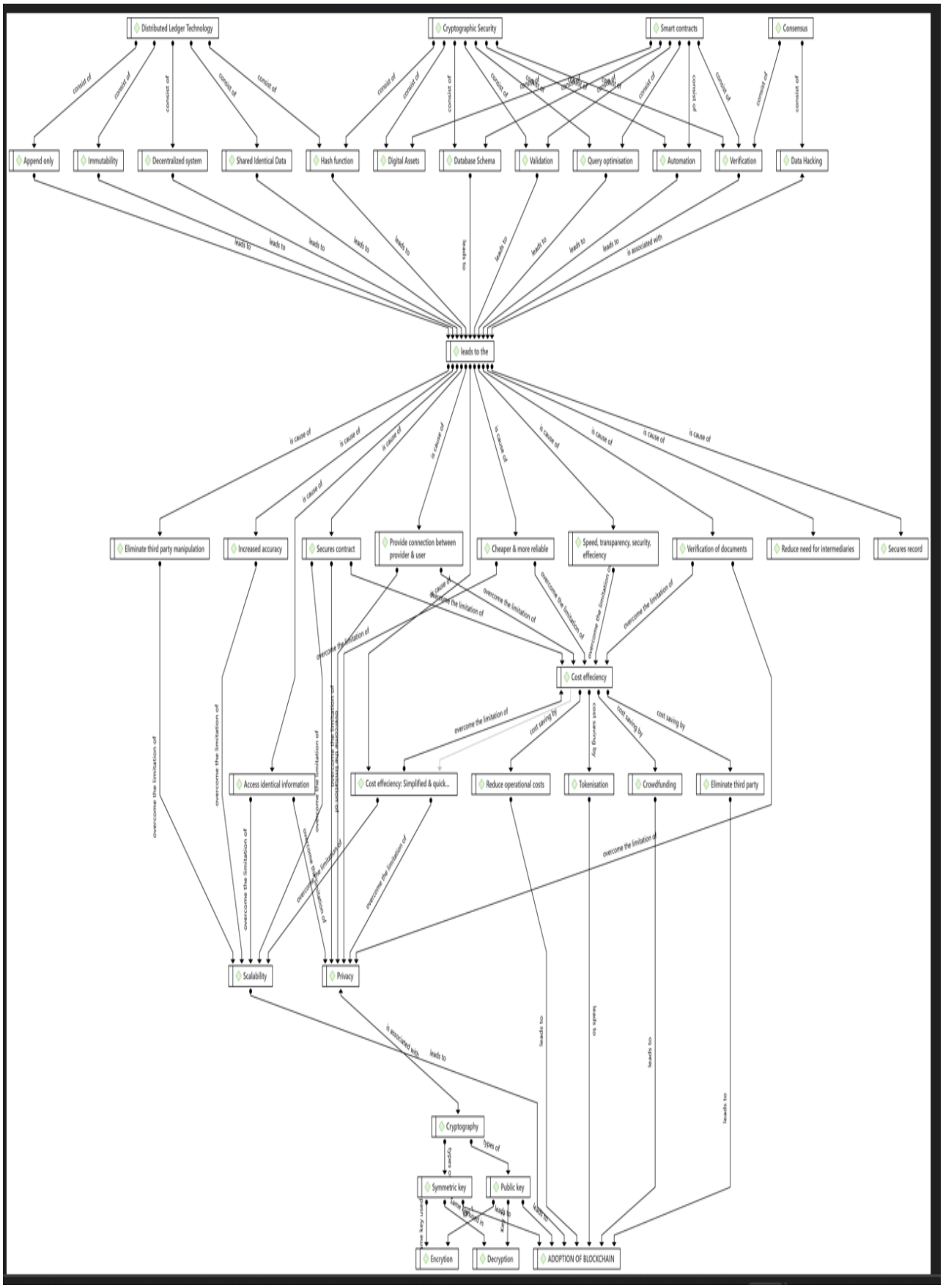


Figure 6.10: Detailed framework for blockchain adoption in green bond markets.

6.7 Findings of Qualitative Analysis

This study explores the factors that affect the adoption of Blockchain Technology through two groups, namely, the users and the experts (including developers). For the former case SEM has been used to study the effect of exogeneous variables (Scalability, Privacy and Cost Efficiency) on adoption of Blockchain Technology while for the latter framework analysis has been used. For objective1 we have found that Blockchain Technology establishes a direct and transparent connection between service providers and users. Although, users believe that scalability and privacy are in struggling phase and cost efficiency is positively affecting the adoption intention of the stakeholders.

Alongside for objective 2, we found that scalability, privacy and cost efficiency are the 3variables that support the adoption of Blockchain Technology in green bond markets, incorporating Blockchain Technology into operational areas of green bond market, through which stakeholders can potentially benefit in from increased efficiency, transparency, and trust in the market with the latest versions of blockchain (Avalanche) (Benedetti, & Rodríguez-Garnica, 2023).

6.8 Discussion

"The current research aimed to explore the factors influencing the adoption of Blockchain technology, drawing on the Technology Acceptance Model (TAM) Theory proposed by Davis (1989). According to TAM, two key determinants influencing end-users' intention to adopt a technology are Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). PU reflects users' perceptions of the system's utility or its usefulness to them, whereas PEOU pertains to the ease with which users can interact with and utilize the technology." "Blockchain technology, being relatively new and not widely adopted, is the subject of investigation in this study. The research delves into the factors influencing the adoption of Blockchain Technology among two distinct groups: users and experts, which include developers." For the former case SEM has been used to study the effect of exogenous variables (Scalability, Privacy and Cost efficiency) on adoption of Blockchain Technology while for the latter framework analysis has been used. Hypothesis for the study was created using TAM.

The three exogenous variables, namely, Scalability, Privacy and Cost efficiency, were considered essential for the adoption of Blockchain Technology through PU, PEOU, Attitude, Behavioural intention (BI). "Scalability in blockchain denotes its capability to handle transactions, data storage, and consensus as the network expands (Khan, D., et al., 2021). Privacy concerns revolve around safeguarding users' transactional data. The perceived utility of blockchain by organizations often hinges on its potential for cost reduction or operational efficiency enhancements (Choi, D., et al., 2020)."

Going by the users' perception, "Scalability (S) was found to have no significant impact on Perceived Usefulness (PU) and Perceived Ease of Use (PEOU), consistent with prior studies by Garg et al. (2021) and Choi et al. (2020). Despite its potential, Blockchain Technology has faced criticism due to scalability limitations. For instance, the Bitcoin Blockchain typically handles only 7 transactions per second (tps) with a block size constraint of 1 megabyte (Choi et al., 2020; Wilkie and Smith, 2021; Khan et al., 2021). Similarly, Ethereum blockchain, considered the next-generation blockchain, faces scalability challenges, restricting it to approximately 30 transactions per second (Vukolić, 2016; Hafid et al., 2020)."

However, experts have a different opinion and they opine that scalability will affect adoption of Blockchain Technology in its earlier version. The **Polygon** blockchain is very popular as it had solved major bottlenecks of Ethereum as a **Layer2 solution** for example as mentioned by Kuntal, 2023; Chemaya, N., 2022; Sguanci, C., et al, 2021. The **latest version, Avalanche**, is an open-sourced and smart contracts compatible platform created to develop decentralized applications (dApps) and enterprise blockchain protocols. "Arslanian, H. (2022) and Gramoli, V. et al. (2023) highlight its faster transaction processing time, boasting 4,500 transactions per second compared to Ethereum's limitations. Sharding, as described by Chauhan, A. and Malviya (2018), divides the network into smaller partitions known as 'shards,' facilitating greater scalability by enabling parallel transaction processing across different layers." This also increases the accuracy, secures contract, eliminate third party manipulation (Estevam, G., et al, 2021). Thus, the **scalability should be no more an issue for the adoption of Blockchain Technology** as mentioned by Akram, S. V., 2020; Mazlan, A. A., 2020; Khan, D., 2021 in green bond markets as also shown through the suggested model developed by framework analysis. The need of the hour is to sensitize the users about this new development.

According to the perceptions of the **user's views, privacy does not affect PU and PEOU** which is in agreement with the study of Al Shamsi, 2023. "People are inclined to invest more effort in monitoring when they perceive a threat to their privacy while engaging with new technologies or services. Consequently, privacy concerns among users diminish the ease of use and have a negative impact on their perceived usefulness of any service (Dhagarra, 2020)." "Expert opinions diverge from those of the users, aligning with similar findings from studies by Ala'a, 2023; Palos-Sanchez, 2021, which highlight privacy as a significant factor enhancing PU and PEOU. Business executives and entrepreneurs have recognized privacy as a crucial element in securities trading." Blockchain, a form of distributed ledger technology, ensures immutability by preventing any alterations to the data once it has been recorded on the blockchain (Gietzmann& Grossetti, 2021). "An essential component of blockchain privacy lies in the utilization of private and public keys (Zhang et al., 2019). Asymmetric cryptography is employed by blockchain systems to secure transactions among users (Zhai, 2019). Blockchain serves as a tamper-resistant, decentralized ledger of transactions, leveraging cryptography to safeguard its records from alteration or destruction, all without the need for a trusted central authority. Features such as hash functions, validation, and verification play a pivotal role in maintaining data privacy within Blockchain Technology (Tian et al., 2022)."

In the views of both users and experts, cost effectiveness has an impact on PU and PEOU, which is consistent with the results of Blockchain Technology aimed by Umesh, 2023 and Basiouni, 2022. If the implementation and maintenance costs are outweighed by the benefits and value gained, users are more inclined to view the technology as useful. Cost effectiveness is often tied to the overall business value derived from blockchain adoption. Blockchain drastically lowers overhead and transaction costs by drastically decreasing paperwork and errors as mentioned by Javaid et al, 2022. It also lessens or completely removes the need for intermediaries or third parties to authenticate transactions (AlBadi, 2023). The technology enhances processes, reduces transaction costs, or provides new revenue streams; thus, users are more likely to perceive it as useful for achieving business goals cost saving has a positive effect on the PU and PeoU (Wang, et al 2022) of stakeholders.

The positive impact of cost effectiveness on PU is closely related to the concept of return on investment. If the financial returns and other benefits from blockchain adoption justify the initial and ongoing costs, users are more likely to see it as a valuable and useful technology. "The accessibility of resources, including financial and human resources, impacts the ease of

use (Prastiawan, 2021). The influence of perceived usefulness, perceived ease of use, and social influence on the adoption of Blockchain Technology is mediated by the attitude toward use, as discussed in APMBA (Asia Pacific Management and Business Application), 9(3), 243-260." If the cost of training and acquiring the necessary skills is reasonable, users are more likely to find the technology easy to use. Cost-effective implementations are often smoother to integrate into existing systems and processes. This seamless integration and the cost-effectiveness of Blockchain Technology plays a role in enhancing the perceived ease of use within green bond markets (Misra, 2023).

PU affects Attitude moderately, **PEoU strongly affects Attitude**. No previous research was found that examined the relationship between perceived usefulness (PU) and attitude in the context of Blockchain Technology adoption. When users perceive a technology as useful, they are more likely to have a positive attitude toward adopting it (Zhong, 2021). In the context of blockchain adoption, studies (Albayati, 2020; Shrestha, 2021; Liu, 2021) have consistently found a positive correlation between PU and users' attitudes due to the technology features like access if identical information across all the users, direct trading and settlement across boundaries, reduce need of intermediaries, which in turn lowers the transaction cost. When considering the impact of Perceived Ease of Use (PEoU) on user attitudes, factors such as a simplified payment system, streamlined bank and office functions, and enhanced data accuracy contribute to stakeholders' perspectives on the adoption of Blockchain Technology is a new finding reported.

"Attitude significantly influences Behavioural Intention (BI) (Umesh, 2023). Perceived Ease of Use (PEoU) indirectly affects Behavioural Intention (BI) through Attitude (A), as discussed by Wang, 2022. PEoU refers to the extent to which individuals perceive that using a particular system or technology would be effortless (Gefen, 2000), while Behavioural Intention (BI) reflects an individual's readiness and willingness to engage in a specific behaviour (Coudounaris, 2017). Thus, "Attitude" serves as a mediating factor between PEoU and BI."

PEOU has a considerable indirect effect on Behavioural Intention (BI) through Attitude (Camadan, 2018). Users' perceptions of the ease of use (PEoU) of a technology influence their overall attitude toward that technology. If users find a technology easy to use, it generally fosters a positive attitude toward it (Mullins, 2021). Attitude, acts as a mediator between PEoU and Behavioural Intention. Users' attitudes shaped by their perception of ease of use then

influence their intention to behave in a certain way, specifically, their intention to use or adopt the technology (Panergayo, 2021). Therefore, the indirect effect of PEoU on Behavioural Intention occurs through the influence that PEoU has on shaping users' attitudes. A positive attitude, driven by perceived ease of use, increases the likelihood that users will have a favourable intention to use the technology (Venkatesh, 1996).

In summary, the statement suggests that the impact of Perceived Ease of Use on the Behavioural Intention of users is not direct but is mediated by the users' attitudes. The easier users perceive Blockchain Technology to be, the more positive their attitude, and in turn, the more likely they are to intend to use or adopt that technology.

At the end, BI **strongly** affects Adoption (Jalil, 2019). There are several ways in which BI strongly affects the adoption of blockchain technology. When combined with blockchain, BI can enhance decision-making by providing a transparent and immutable record of transactions (Rane, 2022). This transparency can lead to more informed decisions based on accurate and real-time data. By automating certain processes through smart contracts, organizations can streamline operations and reduce the need for intermediaries. BI plays a crucial role in understanding the data that drives the logic of these smart contracts. Related to Data Security and Privacy, Blockchain's inherent security features, such as encryption and consensus mechanisms, can be monitored and analysed using BI tools to ensure the integrity and privacy of sensitive data (Viriyasitavat, 2019). BI helps organizations identify areas for cost optimization by analyzing operational data. When combined with blockchain, these optimizations can be implemented through decentralized and efficient processes. Behavioural intention (BI) tools can analyse the performance of blockchain networks, helping organizations understand and optimize their scalability (Maddikunta, 2022). Insights from BI can guide the development and implementation of scalable solutions within blockchain networks, ensuring they meet the growing demands of the organization (Choi et al., 2020).

"Behavioural Intention (BI) holds significant importance in facilitating the successful adoption of Blockchain Technology, offering the tools and insights needed to harness the advantages of transparency, security, and efficiency inherent in blockchain (Choi, 2020)." The combination of BI and blockchain can empower organizations to make data-driven decisions and optimize their processes for enhanced performance and competitiveness (Hartley, 2022; Choi, 2020).

To summarize, Blockchain Technology encompasses several key features such as Distributed Ledger Technology (DLT), cryptographic security, smart contracts, and consensus mechanisms (Farahani, 2021; Lashkari, 2021). These components give rise to characteristics like immutability, decentralization, hash functions, and shared identical data. Cryptographic security ensures the secure handling of digital assets, validation processes, query optimization, and automated verification, resulting in benefits such as the elimination of third-party manipulation, increased accuracy, and secured data (Berdik, 2021).

Moreover, Blockchain Technology establishes a direct and transparent connection between service providers and users. The amalgamation of these advantages shapes user attitudes towards blockchain, fostering behavioural intentions to embrace the technology. Consequently, the adoption of blockchain yields numerous advantages, including heightened speed, transparency, security, and efficiency. This results in more cost-effective and reliable data and usage, as well as reduced operational costs, simplified cost efficiency, and the implementation of tokenization and crowdfunding. Ultimately, these factors contribute to the widespread adoption of Blockchain Technology in green bond markets.

CHAPTER 7- FUTURE SCOPE & CONTRIBUTION TO PRACTICE AND THEORY

7.1 Contribution to the Industry or Practice

This study contributes has the potential to contribute significantly to the practice of issuing and managing green bonds, thereby promoting sustainable finance and environmental initiatives. Here are several ways in which blockchain adoption can impact the green bond market:

Issuance and Trading Platforms:

Tokenization of Green Bonds: Blockchain can be used to tokenize green bonds, representing them as digital assets on a blockchain. This facilitates easier trading and fractional ownership of bonds.

Smart Contracts for Automation: Smart contracts can automate various processes, such as interest payments, bond issuance, and compliance checks. This reduces the need for intermediaries and streamlines the issuance and trading process.

Identity and KYC Verification:

Decentralized Identity (DID): Implementing blockchain-based decentralized identity solutions can enhance Know Your Customer (KYC) processes, ensuring the legitimacy of bondholders and reducing the risk of fraud.

Supply Chain Transparency:

Provenance Tracking: Blockchain can be used to track the environmental impact of projects funded by green bonds. This provides investors with a transparent view of how their funds are being used and ensures the authenticity of the green initiatives.

Reporting and Compliance:

Immutable Record Keeping: The immutability of blockchain ensures that once data is recorded, it cannot be altered. This feature is valuable for maintaining accurate and unchangeable records of bond issuance, payments, and compliance with green standards.

Automated Reporting: Smart contracts can automate the reporting process, ensuring that issuers comply with green standards. This reduces the administrative burden and increases the accuracy of reporting.

Settlement and Clearing:

Faster Settlement: Blockchain can reduce settlement times by enabling real-time settlement of transactions. This can improve liquidity and reduce counterparty risks.

Reduced Counterparty Risk: The use of blockchain for settlement and clearing can reduce counterparty risk by providing a transparent and tamper-proof record of transactions**.**

Investor Communication:

Transparent Communication: Blockchain can facilitate transparent and direct communication between issuers and investors. This can include real-time updates on project progress, financial performance, and other relevant information.

Regulatory Compliance:

Immutable Audit Trails: Blockchain's immutable ledger can serve as a comprehensive audit trail, aiding regulators in monitoring and enforcing compliance with green bond standards.

Tokenized Carbon Credits:

Carbon Credit Trading: Blockchain can be used to tokenize carbon credits, making it easier to trade and track the environmental impact of projects. This aligns with the goals of many green bond issuers to support sustainable projects.

By incorporating blockchain technology into these aspects of the green bond market, stakeholders can potentially benefit from increased efficiency, transparency, and trust in the market.

7.2 Contribution to the Underpinning TAM Theory (Contribution to Theoretical Base)

This study contributes to TAM theory by identifying the external construct variables and suggested the appropriate approaches related to constructs for the adoption of blockchain technology in green bond markets.

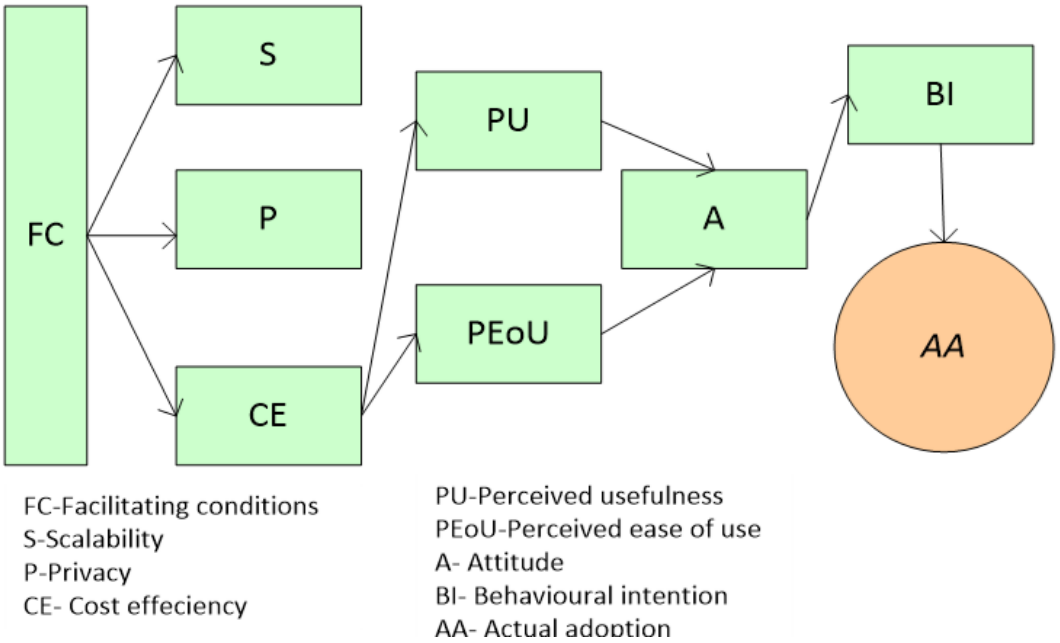


Figure 7.1- Contribution to the theoretical base of TAM theory.

Figure 7.1 shows the contribution to the TAM Model. In this the External factors are named as facilitating conditions. **Facilitating conditions denote the extent to which an individual perceives that the current organizational and technical infrastructure is capable of supporting the utilization of technology** (Chan et. al., 2010). Technology here is blockchain technology in which some variables are treated as limitations like scalability, privacy and cost efficiency on the basis of which the adoption of this technology is restricted or hurdled.

In this research, these limitations (scalability, privacy and cost efficiency) are studied on the basis of the data collected by questionnaire and analysed through SEM in AMOS software.
The above contributed model explains that the limitations studied (scalability and privacy) are not affecting the perceived usefulness (PU) and perceived ease of use (PEoU), while cost efficiency is strongly affecting the PU and PEoU for the use of blockchain technology. Means

on the basis of user's responses, it was found that blockchain technology adoption is cost efficient. When users find it useful and felt ease to use it then their attitude has also positively affected and in turn affected the behavioural intention to use the technology which strongly affects the actual adoption of the blockchain technology.

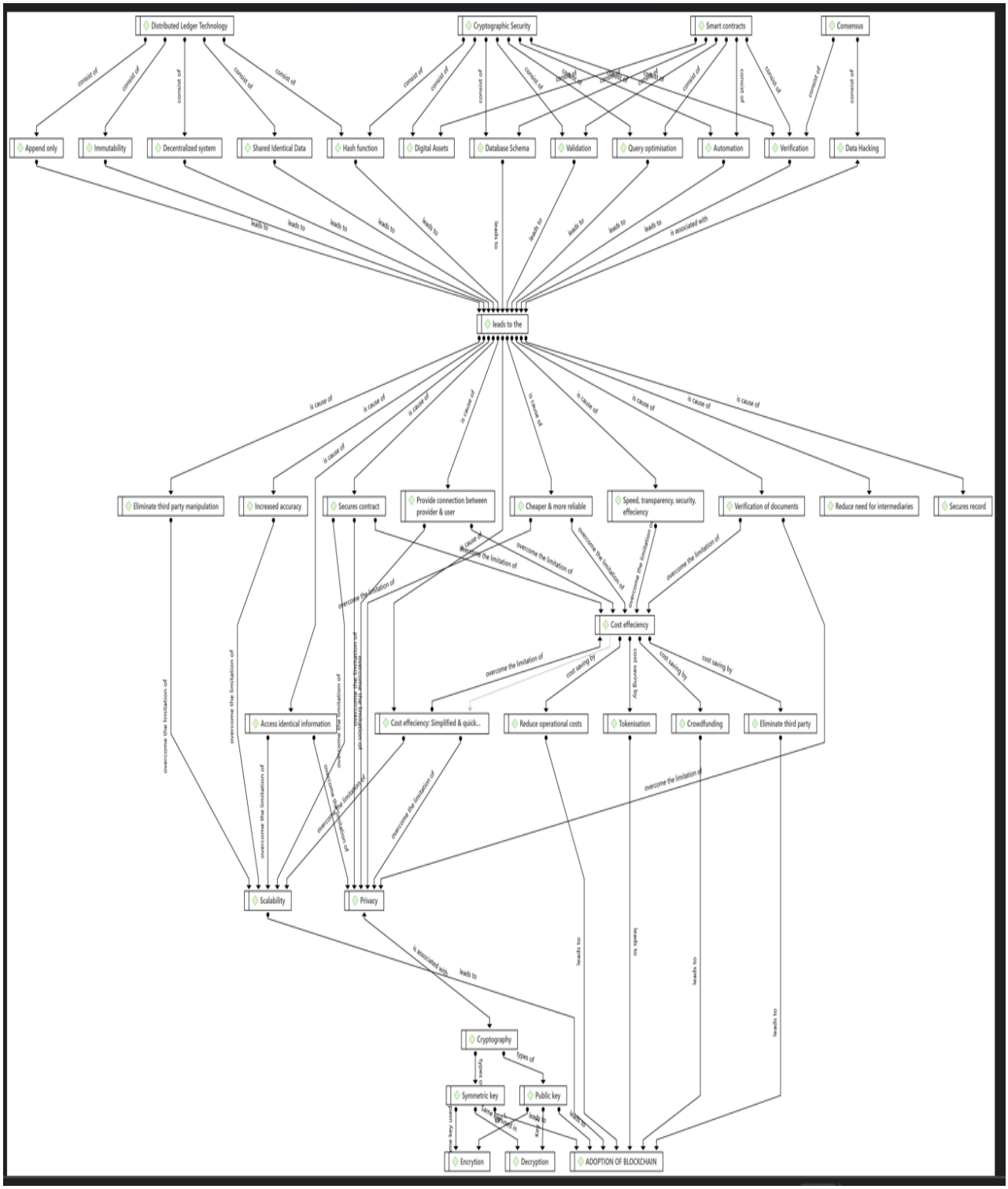


Figure 7.2 Contribution to Technology Acceptance Model (TAM) basic model of Davis, 1989.

This study contributes to Technology Acceptance Theory by identifying the construct variables and suggesting the appropriate management approach for different activities for the adoption of blockchain technology in green bond markets,

Contribution to the Society

The adoption of blockchain technology in the green bond market brings forth a multitude of benefits for various stakeholders, contributing significantly to the experiences and outcomes of users in the following ways:

Enhanced Transparency and Trust: Blockchain ensures transparent and immutable records of transactions, providing users with a clear view of the entire lifecycle of green bonds. This heightened transparency builds trust among investors, issuers, and regulators, fostering a more accountable and reliable financial ecosystem.

Direct Access to Information: Users, including investors and the general public, gain direct and real-time access to trustworthy information regarding the environmental impact of green bonds. Blockchain's decentralized nature eliminates the need for intermediaries, allowing users to independently verify and validate data, promoting a more informed decision-making process.

Increased Accessibility and Liquidity: Tokenization of green bonds on blockchain platforms enhances accessibility for a broader range of investors. This fractional ownership model allows users to invest in sustainable projects with smaller amounts, thereby democratizing access to environmentally conscious investments. Additionally, the increased liquidity of tokenized assets provides users with more flexibility in buying and selling their investments.

Automated Compliance and Efficiency: Blockchain's smart contracts automate compliance with green bond principles and environmental standards. Users benefit from streamlined processes, reduced administrative burden, and increased efficiency in monitoring and enforcing compliance, leading to a more seamless and cost-effective investment experience.

Security of Digital Assets: Cryptographic security measures within blockchain technology ensure the secure handling of digital assets associated with green bonds. Users experience

heightened security, protecting their investments from potential fraud, manipulation, or unauthorized access, thereby instilling confidence in the integrity of the financial ecosystem.

Innovative Crowdfunding Opportunities: Blockchain facilitates innovative crowdfunding mechanisms, allowing users to participate directly in funding sustainable projects. This not only empowers individual contributors to support environmental initiatives but also fosters a sense of collective impact, where users actively engage in shaping the direction of green finance.

Cost Reduction and Operational Efficiency: The adoption of blockchain in the green bond market leads to reduced operational costs through automated processes and the elimination of intermediaries. Users benefit from cost-efficient transactions, ensuring that a higher proportion of investment funds directly contribute to environmental projects.

Positive Environmental Impact: Ultimately, users contribute to a positive environmental impact through their participation in the green bond market powered by blockchain. Investments in sustainable projects supported by transparent and efficient technology enable users to align their financial activities with environmental conservation, promoting a more sustainable and responsible approach to investing.

The adoption of blockchain technology in the green bond market empowers users by offering transparency, accessibility, security, efficiency, and a direct contribution to environmentally conscious initiatives, thereby transforming the landscape of sustainable finance.

7.3 Future Scope of the Study

The future scope of research in the adoption of blockchain technology in green bond markets holds immense potential for exploring and addressing evolving challenges, emerging trends, and unlocking new opportunities. Here are key areas that could be explored in future research studies:

Long-Term Environmental Impact Assessment: Investigate the long-term environmental impact of green bond projects facilitated by blockchain. Assess the effectiveness of sustainable initiatives over time and how blockchain contributes to continuous monitoring and reporting.

Integration with Emerging Technologies: Examine the synergy between blockchain and emerging technologies like Artificial Intelligence (AI) and Internet of Things (IoT) to optimize the performance and impact of green bond initiatives. Assess the potential collaborative benefits of integrating these technologies to offer holistic and sustainable solutions.

Global Standardization and Interoperability: Research efforts can be directed towards establishing global standards for blockchain applications in green finance. Examine interoperability challenges and develop solutions to ensure seamless integration across various blockchain platforms, financial systems, and regulatory environments.

Social and Economic Impacts: Investigate the social and economic impacts of blockchain-based green bonds. Analyse how these investments influence local communities, job creation, and socioeconomic development, providing a holistic view of the broader implications beyond environmental considerations.

Regulatory Evolution and Compliance Challenges: Monitor the evolving regulatory landscape related to blockchain-based green bonds. Study the adaptation of regulatory frameworks and potential challenges faced by market participants in ensuring compliance with changing rules and standards.

Behavioural Economics in Sustainable Finance: Explore the behavioural aspects of investors and market participants in the context of blockchain-enabled green bonds. Understand how blockchain technology influences decision-making, risk perception, and investor preferences in sustainable finance.

Cybersecurity and Privacy Considerations: Conduct in-depth research on the evolving cybersecurity threats and privacy concerns associated with blockchain technology in the green bond market. Develop strategies to enhance the resilience of blockchain systems against emerging cyber threats.

Blockchain Governance Models: Investigate and propose governance models for blockchain networks in green finance. Examine decentralized governance structures and consensus mechanisms that ensure fairness, transparency, and inclusivity in decision-making processes.

Innovation in Tokenization: Explore innovative tokenization models beyond traditional securities, such as non-fungible tokens (NFTs) or unique digital assets tied to specific environmental projects. Assess the potential for expanding tokenization to diverse asset classes in sustainable finance.

Cross-Border Collaboration and Impact: Assess the potential for cross-border collaboration in blockchain-based green bond initiatives. Explore how international cooperation and partnerships can amplify the impact of sustainable projects and foster a global ecosystem for green finance.

User Experience and Adoption Barriers: Investigate user experiences and identify potential barriers to adoption, including concerns related to usability, accessibility, and the learning curve associated with blockchain technology. Develop strategies to enhance user adoption and engagement.

Policy Advocacy and Stakeholder Engagement: Research the role of policy advocacy in promoting blockchain adoption in green bond markets. Explore effective strategies for engaging diverse stakeholders, including governments, financial institutions, and environmental organizations, to create a conducive ecosystem for blockchain-enabled sustainability.

By exploring these research avenues, academics and industry professionals can advance the ongoing development and enhancement of blockchain technology within the green bond market. This fosters a more robust, transparent, and impactful sustainable finance ecosystem.

CHAPTER 8- RECOMMENDATION & CONCLUSION

8.1 Recommendations

Blockchain innovation may give the stage for solid, open and overhauled information on sustainability-linked deals.

Blockchain securities are more effective since they spare costs, time and avoid third party meddling.

Blockchain innovation offers the opportunity for more extensive bond markets, because it offers fetched sparing openings of more than 10x.

Blockchain not as it were encouraging prompt dissemination by savvy contracts, it can handle complex rules for competitive official, it decreases compromise exercises like cryptographic marks evacuate the require for anti-fraud or mistake checks and progressed settlements from 2-3 days settlement period to moment.

On the basis of the findings of the study the recommendations are suggested as mentioned in below table 8.1:

Table 8.1: Recommendations in line with the findings

FINDINGS	RECOMMENDATIONS
Privacy affects PU is accepted, suggesting a significant relationship between Privacy and PU.	It is recommended to emphasize how the privacy measures contribute to users' perceived usefulness and value for better adoption of blockchain technology in sustainable finance and other sectors of financial markets.
Cost Efficiency affects PU and PEoU, are accepted, indicating a significant impact of Cost Efficiency on both perceived usefulness and perceived ease of use.	The findings indicate that Cost Efficiency significantly affects both PU and PEoU. In financial market strategies, emphasize the cost-effective aspects of blockchain technology to enhance user perceptions of usefulness and ease of use so that the stakeholders can take the benefit of the technology.

FINDINGS	RECOMMENDATIONS
The adoption of blockchain yields numerous advantages, including heightened speed, transparency, security, and efficiency. This results in more cost-effective and reliable data and usage, as well as reduced operational costs, simplified cost efficiency	Based on the finding that the adoption of blockchain brings about heightened speed, transparency, security, and efficiency, organizations should strongly consider integrating blockchain technology into their operations. By doing so, they can unlock numerous advantages such as cost-effective and reliable data management, improved operational efficiency, and heightened security. To maximize the benefits, organizations should invest in comprehensive training programs for their personnel, ensuring they understand the intricacies of blockchain implementation. Additionally, fostering collaborations within industry networks and staying abreast of emerging blockchain developments will be crucial for organizations seeking to leverage this technology for long-term success.
Scalability impact on PEoU is not statistically significant, but on the basis of additional research through fundamental (document analysis and expert interview analysis), it has been found that the latest versions of blockchain technology are scalable like Avalanche, and which are more are efficient to understand user expectations and experiences.	The new versions are introducing new benefiting features of the technology adoption which also covers the more scalability construct. It's recommended that certain more nuances or specific features related to blockchain technology are not captured in the current analysis so further research can consider on them also.

	Supplementing the quantitative findings with qualitative insights. Conducted user interviews or surveys to gather in-depth feedback on factors such as privacy, scalability, and cost efficiency. This qualitative data has provided a richer understanding of user perceptions and preferences and the current and latest awareness also about which all stakeholders are not known. So, it is recommended to focus more on qualitative analysis for the further research.
	Continue to iterate and test different constructs and variable of blockchain technology and other technologies features based on user feedback and changing market conditions. The digital landscape is dynamic, and user preferences may evolve over time.
	Develop educational materials or campaigns that highlight the beneficial blockchain technology features. Ensuring users are aware of these benefits may enhance their overall perception, usability and satisfaction.

Research efforts should focus on conducting in-depth studies to understand the specific needs and dynamics of the green bond market. Initiating educational programs and workshops to gauge the current knowledge base and concerns of stakeholders would provide valuable insights. Collaborative research endeavours with blockchain developers, financial institutions, and regulatory bodies can help id Implementing pilot projects will serve as a crucial phase to empirically assess the feasibility, scalability, and effectiveness of blockchain solutions in real-world green bond scenarios. Research should also explore the development of smart contracts tailored to compliance with green bond principles, ensuring automated adherence to environmental standards. Furthermore, ongoing evaluation and improvement mechanisms are essential, with a focus on cybersecurity measures, transparent reporting systems, and continuous stakeholder engagement entity technical requirements, interoperability standards, and regulatory considerations.

By anchoring the adoption strategy in robust research initiatives, the green bond market can navigate the complexities and intricacies associated with integrating blockchain technology, fostering a sustainable and transparent financial ecosystem.

8.2 Conclusion

Blockchain technology is a fast-growing technology opening its wings in all directions and sectors. Thus, financial markets are also an important sector which needs the inclusion of the latest technologies like blockchain technology.

In conclusion, blockchain technology emerges as a transformative force in the realm of digital innovation. Its foundational elements, encompassing Distributed Ledger Technology (DLT), cryptographic security, smart contracts, and consensus mechanisms, engender a host of critical features such as immutability, decentralization, hash functions, and shared identical data. The robust cryptographic security measures ensure not only the safe handling of digital assets but also streamline validation processes, optimize queries, and automate verifications. This, in turn, leads to the elimination of third-party manipulation, heightened accuracy, and the establishment of secure data practices.

Beyond its technical prowess, blockchain establishes a direct and transparent nexus between service providers and users, fundamentally shaping user perceptions and attitudes towards this technology. This positive outlook, in turn, translates into behavioural intentions that drive widespread acceptance and adoption. The resultant advantages of blockchain adoption are manifold, encompassing accelerated speed, enhanced transparency, fortified security, and increased operational efficiency. This transformative impact extends to cost-effectiveness and reliability in data and usage, as well as streamlined operational costs, simplified cost efficiency, and the implementation of innovative financial mechanisms such as tokenization and crowdfunding.

The cumulative effect of these advantages positions blockchain as a catalyst for change, particularly evident in its increasing prominence within green bond markets. As organizations and stakeholders recognize and harness the potential of blockchain, its adoption is set to play a pivotal role in reshaping financial landscapes and fostering sustainable, efficient, and secure practices in the digital era.

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APPENDICES

A1. Questionnaire for SEM Analysis

Dear Respondent,

Good day!

I am a scholar of UPES (NAAC accredited 'A' grade State University), Dehradun, India. I am working on Adoption of Blockchain Technology in Green Bond Market in India. Blockchain is a new class of Information Technology that combines cryptography with distributed computing in a model in which network of computers collaborate towards maintaining a shared and secured database. The Blockchain is continuously growing list of the blocks of data linked and secured using cryptography. This makes it a trusted database. With this trust being maintained by open, secure, computer coded encryption instead of any single institution. This technology is currently used in various areas like Cryptocurrency, Banking, Supply Chain, Record keeping, Auditing and Legal area, Finance and Accounting. Also, it is currently one of the most demanded skills.

This questionnaire is for gathering information about adoption of technology in green bonds. Please spare your valuable time to fill this questionnaire. This would be a great contribution for our research. You are invited to participate in my study, kindly assist me in completing the questionnaire to enable me generate relevant and sound data for the completion of study objective. This is purely for academic purpose and we will be grateful if you circulate this questionnaire among your peer groups.

Completion of this questionnaire will take approximately 15-20 minutes. Participation in this study is completely voluntary, there is no foreseeable risk associated with this survey and your responses will be coded and kept confidential.

If you have questions at any time about the survey or the procedures, you by email at:

e-mail Id: - neeti.cm@gmail.com

Neeti Misra

Ph.D Research Scholar

QUESTIONNAIRE ON "FRAMEWORK FOR THE ADOPTION OF BLOCKCHAIN TECHNOLOGY IN GREEN BOND MARKETS IN INDIA"

Email address

Name

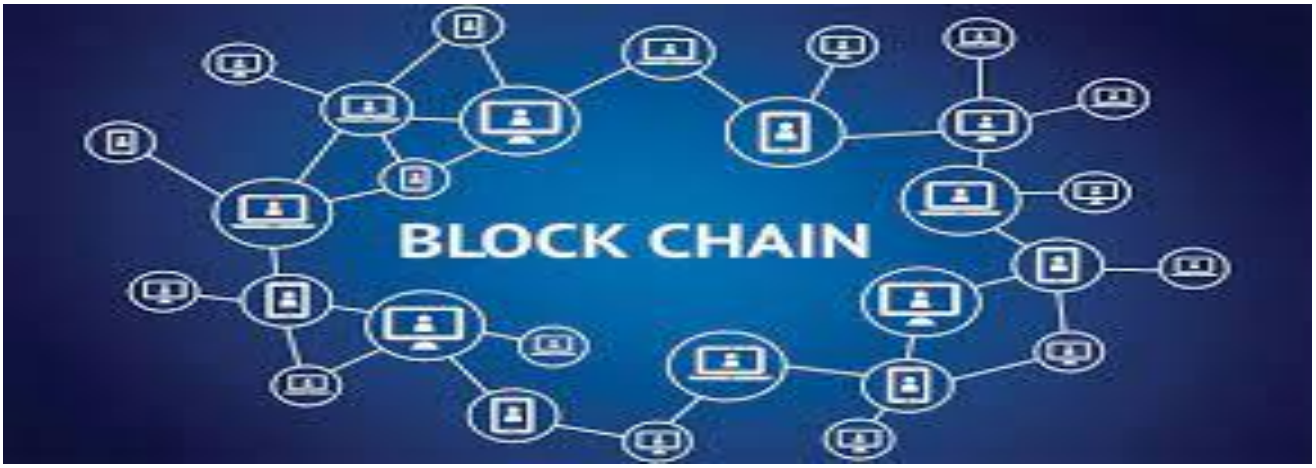
Mobile Number

City

Organization/Company's Name

Designation

Qualification



Please indicate your opinion about the Facilitating conditions and Blockchain technology (Please put mark at appropriate places)

(SA -Strongly Agree, A-Agree, N-Neutral, DA- Disagree, SDA- Strongly Disagree)

	Facilitating Conditions					
S.no	**Statement**	**SA**	**A**	**N**	**DA**	**SDA**
1	The necessary resources to use Blockchain technologies are available with green bonds issuing companies.					

2	Companies issuing Green bonds ensures the necessary knowledge to use Blockchain technologies.					

	How Scalability limitation affect the adoption of Blockchain technology?					
S.No	**Statement**	**SA**	**A**	**N**	**DA**	**SDA**
1	The fast performance of smart contracts improves the scalability limitation of Blockchain.					
2	Applying Smart BC contracts providing the green bond trading for fast trade settlement					
3	Immutable records of transactions helps in lesser chances of mistakes.					
4	DLT system of BC technology enabled decentralized governance approach enables a scalability of operation beyond the constraints of institutionally-oriented.					
5	Immutability offers new opportunities in analytics, query, and overall business processes.					
6	DLT system improves the efficiency of Blockchain which in turn improves the scalability.					
7	Through the tokenization, by the intermediary elimination the cost can be reduced.					
8	The time consumption scalability for executing a transaction will be controlled by smart contract fast performance.					
9	Smart BC contracts encourages the coordination among the stakeholders.					

	How Privacy limitation affect the adoption of Blockchain technology?					
S.no	**Statement**	**SA**	**A**	**N**	**DA**	**SDA**
1	Applying Smart BC contracts to post trade activities reduce counter parties and operational risks.					
2	Blockchain DLT helps in resolving consumer protection issues, financial integrity concerns.					
3	Using Smart BC contracts in green bond trading is highly secure.					
4	The documents remain safe and preserved with proper encryption methods, No one, not even a system administrator, can delete a transaction.					
5	No intermediary of Blockchain tokenization reduces the settlement transaction cost of green Bond investors.					
6	The use of smart contracts also gives the parties trust, without fully having to know the other side.					
7	The privacy of Blockchain transactions can be carried out successfully by all stakeholders of green bonds					
8	The Blockchain-based financial service provided by the issuer is transparent, and the service maintains the privacy.					
9	Blockchain-based green bonds financing stakeholders can be trusted.					
10	Blockchain green bond financing service stakeholders will always keep my best interests in mind.					
11	Blockchain enabled green bond financing service applications provide the necessary feedback that makes me confident to deal.					

	How Cost Efficiency limitation affect the adoption of Blockchain technology?					
S.no	**Statement**	**SA**	**A**	**N**	**DA**	**SDA**
1	Applying Smart BC contracts to post trade activities eliminate the need for intermediaries in the trading of green bonds.					
2	BC DLT could lower remittance costs of green bond transaction.					
3	Tokenization offers higher accessibility for users with better facilities in terms of exchange of tokens. This opens doors for different investors and cuts down the minimum investment period and amount.					
4	No intermediary of Blockchain tokenization reduces the settlement transaction cost of green Bond investors.					
5	For investors, tokenization opens new markets by lowering down the barrier of minimum cost for entry.					
6	Investors won't have to suffer from the hassle of early redemption which is an expensive affair.					
7	Immutability helps an organization to save time and cost.					
8	Blockchain technology helps to accomplish tasks quickly which reduces cost.					
9	Blockchain technology increases green bond financing efficiency and reduces cost					
10	Blockchain technology requires less effort for the transaction than the traditional system which reduces cost and increases efficiency and productivity.					
11	Blockchain enables smooth financial transactions with less effort, resources, intermediaries.					
12	Blockchain-enabled green bond financing helps easy tracking of out transactions with less effort.					

	PU-Userbelieve that using Blockchain technologies can improve the performance of their work.					
S.no	**Statement**	**SA**	**A**	**N**	**DA**	**SDA**
1	BC DLT could increase efficiency and potentially improve access to finance for unbanked populations, who are currently outside the traditional financial system.					
2	BC DLT could lower remittance costs of green bond transaction.					
3	Tokenization offers higher accessibility for users with better facilities in terms of exchange of tokens. This opens doors for different investors and cuts down the minimum investment period and amount.					
0 4	Blockchain tokenization provides transparency of transaction to the investors					
5	The ability of an organization to produce a complete and indisputable history of a transactional ledger makes the auditing process easy and efficient					
6	an organization can easily validate the chain's integrity at any time by re-calculating the block hashes. Once there is a discrepancy between the block data and its corresponding hash, it means the transactions are not valid.					
7	Immutability takes the backing up and restoring a database to retrieve information etc.					
8	Blockchain can improve to conduct a task whenever it has a feature to help me perform it.					
9	Blockchain use can improve market performance.					
10	Blockchain use can make it easier to do financial transactions.					

11	Blockchain use in financial markets can increase productivity.					
12	Blockchain useful in transaction process.					
13	Blockchain use would enable me to accomplish the transaction more quickly.					

	PEOU (Refers to the degree to which a person believes that using a particular system would be free of effort.)					
S.no	**Statement**	**SA**	**A**	**N**	**DA**	**SDA**
1	For creators, tokenization brings out better crowd funding opportunities to creators and enables them to upgrade their solutions in an effective manner					
2	Investors can exit the Blockchain platform where tokens represent private company securities anytime by selling their tokens on a secondary market easily and efficiently. They won't have to suffer from the hassle of early redemption which is an expensive affair.					
3	Tokenization offers higher accessibility for users with better facilities in terms of exchange of tokens.					
4	Tokenization, provides an opportunity to bring unrelated parties together to enjoy trading in a digital world					
5	Tokenization facilitates finance organizations with an opportunity to turn all the assets into digital crypto-currencies that could be exchanged seamlessly.					
6	Tokenization gives merchants an escape from storing the actual credit card numbers in POS machines and other systems.					

7	Tokenization in BC introduces liquidity in the market and lower down data security breaches.					
8	I find it easy to get Blockchain to do what I want it to do.					
9	My interaction with Blockchain is understandable and clear.					
10	Blockchain is flexible to interact with.					
11	It is easy to become skillful at using Blockchain					

	Attitude toward BC technology					
S.no	**Statement**	**SA**	**A**	**N**	**DA**	**SDA**
1	BC technology bringing us into a bright new era.					
2	The use of BC is enhancing our standard of financial markets.					
3	There are unlimited possibilities of Blockchain technology applications that haven't even been thought of yet.					
4	Working with Blockchain technology is an enjoyable experience					
5	Blockchain-based financing can be used for the green bonds happily.					
6	Green bond financing is used because issuer adopted Blockchain for it.					
7	Blockchain-based financing is preferred to use transactions for green bond financing than the conventional bond financing management.					

	Intention to Use BC technology					
S.no	**Statement**	**SA**	**A**	**N**	**DA**	**SDA**
1	I intend to use Blockchain technologies for green bond financing.					

2	I think I would use Blockchain technologies for other financing transactions if offered.					
3	Blockchain can improve to conduct a task whenever it has a feature to help me to perform it.					
4	I believe I should use Blockchain technologies with more organizations to offer such a platform to issue securities in a trustworthy manner.					
5	I want to continue using Blockchain-based issue management offered by bond Finance issuer.					
6	Blockchain has many features whichI intend to use in the future.					
7	I intend to issue the security through Blockchain technology					
8	I intend to buy the security issued through Blockchain technology					
9	I intend to use BC technology for browsing the availability of the securities in the market					
10	I intend to increase my investment through Blockchain technology.					
11	I think I would use Blockchain technologies for other financing transactions if offered					
12	I believe I should use Blockchain technologies with other organizations to offer such a platform in a trustworthy manner.					

	Actual Adoption of BC technology					
S.no	**Statement**	**SA**	**A**	**N**	**DA**	**SDA**
1	I prefer to invest in a security issued through Blockchain technology.					
2	I always try to issue the company security through Blockchain technology.					

3	I can easily find out various investment options available through Blockchain network.					
4	I can easily take the investment decision to invest through Blockchain technology.					
5	I can quickly accomplish the transaction through Blockchain technology					
6	My transactions are safe & secured which are done through Blockchain technology.					
7	Through Blockchain I can directly link with the issuing company/ investor.					
8	I prefer to invest in Blockchain based green bonds than conventional bonds.					
9	I use Blockchain technology for green bond financing happily.					
10	I invested in green bonds because they adopted Blockchain technology for it.					

Thank you for your kind cooperation, I really appreciate your time and valuable responses

A2. Questions for Semi-Structured Interview and Additional questions

Questions	Blockchain features	Benefit of blockchain adoption	Concluding comments
How smart contract will lead to better payment system in stock exchange?	Smart Contract	Reduce need for intermediaries/ Reduce cost	Blockchain has proven to be a huge cost-saver and efficiency-enabler. By letting go of intermediaries, blockchain transactions lower costs, speed up processes and result in greater flexibility throughout the entire system.
Will smart contracts lead to quicker settlement in stock market transactions?		Lower transaction cost	In terms of cost, there's no exact answer on how much it cost to create a blockchain solution – this largely depends on blockchain requirements.
How identical data will impact the adoption of the technology in markets?	Decentralised data storage	Transparency in settlement process	Blockchain is ideal for delivering that information because it provides immediate, shared and completely transparent information stored on an immutable ledger that can be accessed only by permissioned network members. This impacts the trust in the investors and it also offers privacy.
How remittance process can be accessed with ease through decentralised data storage?		Manage privacy	Blockchain technology entirely changes the way international payments are made. This is because blockchain offers an efficient, transparent, yet secure way to facilitate international payments. It can perform worldwide financial transactions based on a distributed network of computers. A blockchain network can track

			orders, payments, accounts, production and much more. The information about who did what on a given record almost always exists in distributed databases that do not synch with each other.
How Payment gateway will be simplified through which transaction cost will be reduced leading to adoption intention of Blockchain adoption?	DLT	Cost efficiency	This includes the cost of the servers and other hardware required to run the blockchain platform. The hardware costs of blockchain implementation can be significant, especially for large-scale projects. For a blockchain to function properly, it requires a network of computers, called nodes, that are constantly verifying and validating transactions
How through BC adoption, it is impossible to temper the data without leaving any proof?	Immutable and temper proof	Increased accuracy in Asset management	Blockchains can also be seen as a great asset in data protection work.
How through verification process in blockchain technology at various steps leads to safety and security of customer personal data.	Consensus Validation	Increased accuracy in Asset management	A blockchain network can track orders, payments, accounts, production and much more. The information about who did what on a given record almost always exists in distributed databases that do not synch with each other.

How individual identity created through blockchain technology will directly link other stakeholders, will lead to better information awareness about the products?	Identity/ Blocks/ Nodes	Information sharing	Blockchain solutions can help by enabling secure data sharing and claims processing. blockchain is essentially a distributed database of records or public ledger of all transactions or digital events that have been executed and shared among participating parties. Each transaction in the public ledger is verified by consensus of a majority of the participants in the system. And, once entered, information can never be erased.
How user authentication for the transaction leads to better security and less chances for identities to be hacked and data compromise and in turn leads to BC adoption?	Identity, Immutability	No chances of data compromise.	Enhanced security by encryption of data at the stage of dissemination. enabling a distributed consensuswhere each and every online transaction, past and present, involving digital assets can be verified at any time in the future. It does this without compromising the privacy of the digital assets and parties involved. The distributed consensus and anonymity are two important characteristics of blockchain technology.
Are the blockchain technology installation charges very high?	Cost efficiency	Technical view	This includes the cost of the servers and other hardware required to run the blockchain platform. The hardware costs of blockchain implementation can be significant, especially for large-scale projects. For a blockchain to function properly, it requires a network of computers, called nodes, that are constantly verifying and validating transactions

A3: Protocol questions for Document analysis

- How smart contract will lead to better payment system in stock exchange?
- "Smart contracts lead to quicker settlement in stock market transactions". This statement can be considered for blockchain adoption in stock markets?
- How identical data provided to all participant will impact the demand of the investment avenues?
- How in blockchain, the remittance process can be accessed with ease through decentralized data storage?
- How BC adoption can subsides the role of intermediaries in stock markets?
- How reduction in the role of intermediaries lowers the transaction cost in trading?
- Will Payment gateway or transaction cost be simplified through the adoption intention of Blockchain adoption?
- How verification process in blockchain technology at various steps leads to safety and security of customer personal data?
- Through BC adoption, it is impossible to temper the data without leaving any proof, How this will lead to secured record keeping?
- How individual identity created through blockchain technology will directly link other stakeholders directly will lead to better information awareness about the products and the investor data?
- How user authentication for the transaction leads to better security and less chances for identities to be hacked and data compromise and in turn leads to BC adoption?
- How identical information is shared with all participants in blockchain technology leads to expedite back office functions and interbank settlements?
- How Blockchain adoption saves the data compromise through hacking?
- How BC technology bringing us into a bright new era.
- How Proper regulations should be formulated for the adoption of BC technology in bond and security markets?
- How working with blockchain technology is an enjoyable experience?
- How Blockchain-based financing is happily acceptable by stakeholders?
- Will investors prefer green bond financing if the issuer adopt BC technology?
- How blockchain can improve to conduct a task as it has a feature to help for performing?

- How organizations using blockchain technologies offer a better platform to issue securities in a trustworthy manner?
- Why investors prefer blockchain-based issue management offered by Green bond Finance issuer?
- How BC technology is better for browsing the availability of the securities in the market?
- How using blockchain technologies is a trustworthy platform?
- Why to invest in a security issued through Blockchain technology?
- Is it possible to issue company security through blockchain?
- Why to invest through blockchain technology is preferable to take investment decision?
- Is it possible to accomplish the transaction through blockchain technology quickly?
- How transactions are safe & secured which are done through blockchain technology?
- How it is preferred to invest in blockchain based green bonds?
- How to overcome the limitation of SCALABILITY if the BC technology will be adopted in financial markets or in the bond markets?
- How to overcome the limitation of PRIVACY if the BC technology will be adopted in financial markets or in the bond markets?
- How to overcome the limitation of COST-EFFICIENCY if the BC technology will be adopted in financial markets or in the bond markets?

A4: List of Documents Analysed

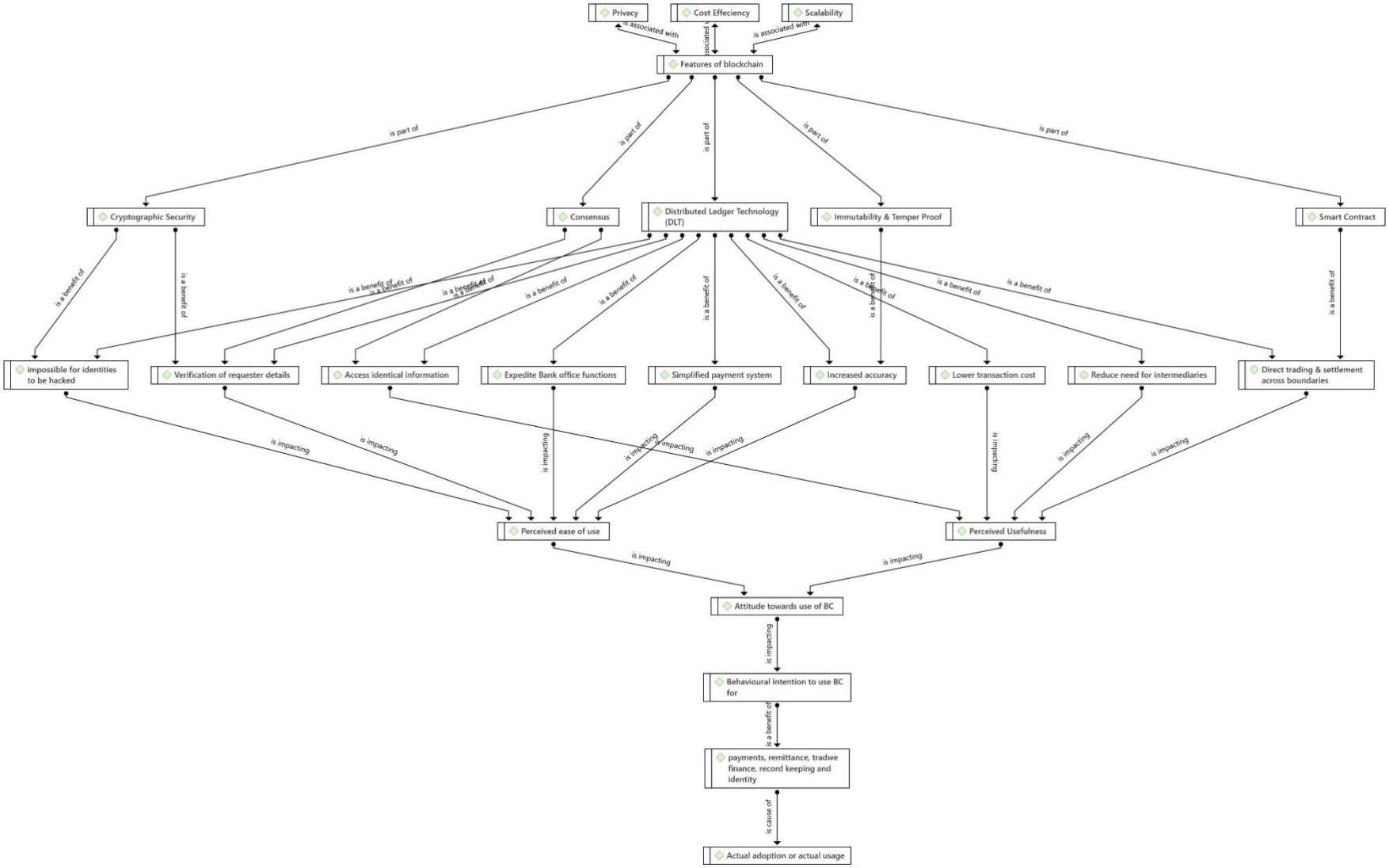
NATIONAL STRATEGY ON BLOCKCHAIN Towards Enabling Trusted Digital Platforms, MINISTRY OF ELECTRONICS & INFORMATION TECHNOLOGY, Government of India, dec. 2021	White paper, Enhancing Democracy and Strengthening Governance Using Blockchain Technologies. ATARC Blockchain Working Group,USA September 2021
National Strategy of Blockchain, Govt of India, 1 Government of India Ministry of Electronics and Information Technology (MeitY) Jan. 2021	Decentralized Finance (DeFi) Policy-Maker Toolkit WHITE PAPER, June. 2021, In collaboration with the Wharton Blockchain and Digital Asset Project , World Economic Forum
CIS Comments on the National Strategy on Blockchain, The Centre for Internet and Society, India, 15th February, 2021	Crypto.com Whitepaper, Version 1.04 - February 2022
RBIH Whitepaper: - Interoperable - DLT Platform	2019- nara-blockchain-whitepaper
Blockchain technologies and IP ecosystems, World Intellectual property Organization	2023, United Nations Conference on Trade and Development "GLOBAL REPORT ON BLOCKCHAIN AND ITS IMPLICATIONS ON TRADE FACILITATION PERFORMANCE"
Deloitte- Blockchain technology in India Opportunities and challenges	Blockchain case studies | Technology; ICAEW.com https://www.icaew.com › technical › blockchain-articles
White Paper Smart Contract Development in India Nuwebwave Technologies Pvt Ltd https://www.nuwebwave.com › white-paper-smart-con…	Binance: What Is a Cryptocurrency Whitepaper?
Social Science Resaerch Network: Status Check on Blockchain Implementations in India	
IAMAI: Blockchain Technology and its Industry Adoption	
Blockchain Technology and its Industry Adoption, Indian government has listed the Cryptocurrency and Regulation of Official Digital Currency. Bill, 2021 in Parliament.	

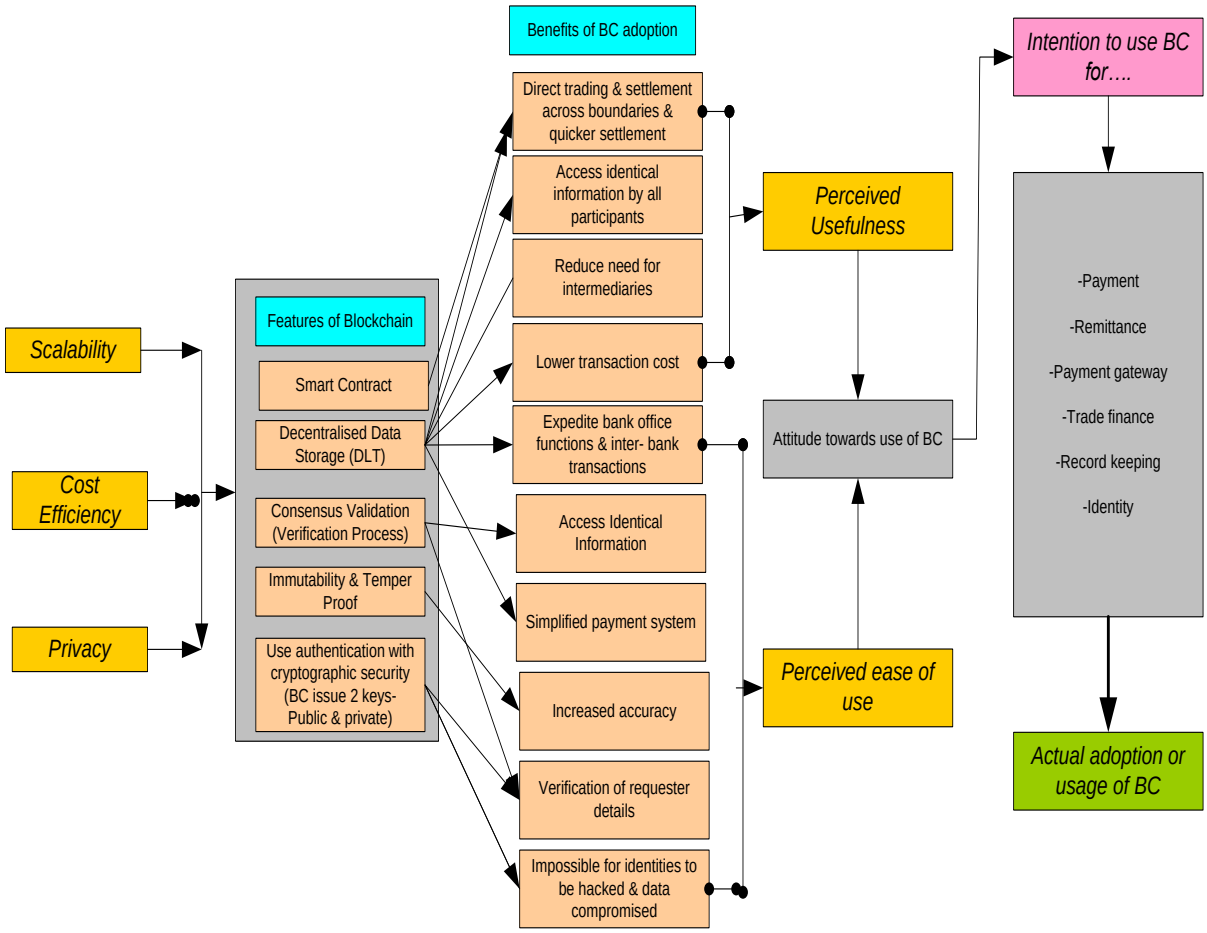
No. of documents considered -32; white paper-21; Others-11 Global-10; Indian-22

A5: Sample size & Respondent's profile

Sample Size	12 (data saturation)
List of Experts Interviewed	
Raj Kapoor Founder	Indian Blockchain Alliance & Blockchain Governance Council, G20 Speaker
Rohan Nagpal	Blockchain Architect & Lawyer, Author of Tokenization Playbook
Sandeep Shukla	Professor and Chair for Cyber Security, Computer Science and Engineering at Indian Institute of Technology, Kanpur
Michael Ogunbiyi	CMC, CCLP (President - Blockchain Supply Chain Association | Import/Export Business | Team management | Industry exchange | Biodiversity |, Corporation)
Harman Puri	Top 50 Blockchain influencer India | Blockchain consultant | Web3 Founder | Advisor | Content creator
Ganesh Kaushic. C	Transformation Advisor & Consultant using emerging technologies Blockchain, AI, IoT, and Metaverse for Media, Entertainment and Digital Innovations
Sumit Gupta	Co-founder and CEO of CoinDCX, one of India's leading cryptocurrency exchange platforms.
Balaji S. Srinivasan	an investor and tech founder. Formerly the CTO of Coinbase and General Partner at Andreessen Horowitz
Abhyudoy Das	Top crypto founders, co-founding of Ecoin and advisory roles in projects like SocialGood Token and TRC Token
Peter Smith	Co-founder and CEO of Blockchain.info, USA - A Bitcoin block explorer service and cryptocurrency wallet provider.
Changpeng Zhao	Binance's founder and chief executive officer (CEO), Changpeng Zhao, a Canadian national
Dilip Krishnaswamy	Vice-President of Reliance Jio, an Indian telecommunications company and a subsidiary of Jio Platforms, headquartered in Mumbai, Maharashtra, India.

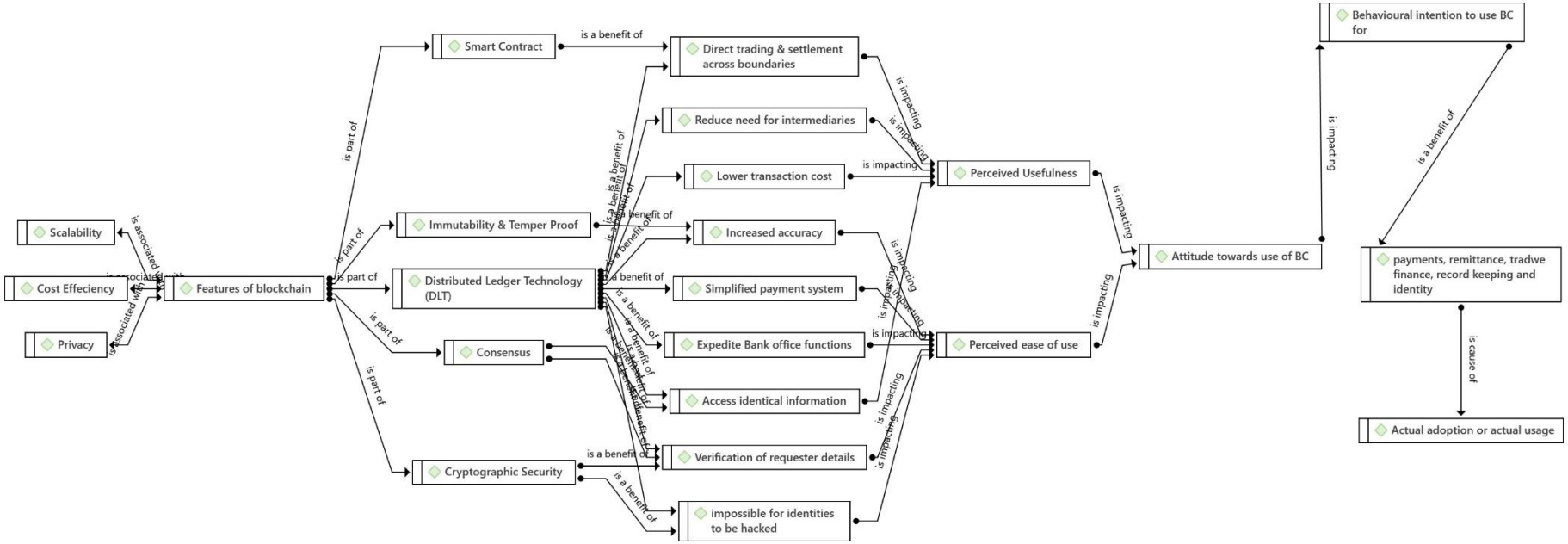
A6: Axial Coding of First Conceptual framework for blockchain adoption in green bond market.





Conceptual framework for blockchain adoption in green bond market.

A7: Axial Coding of Document Analysis Results



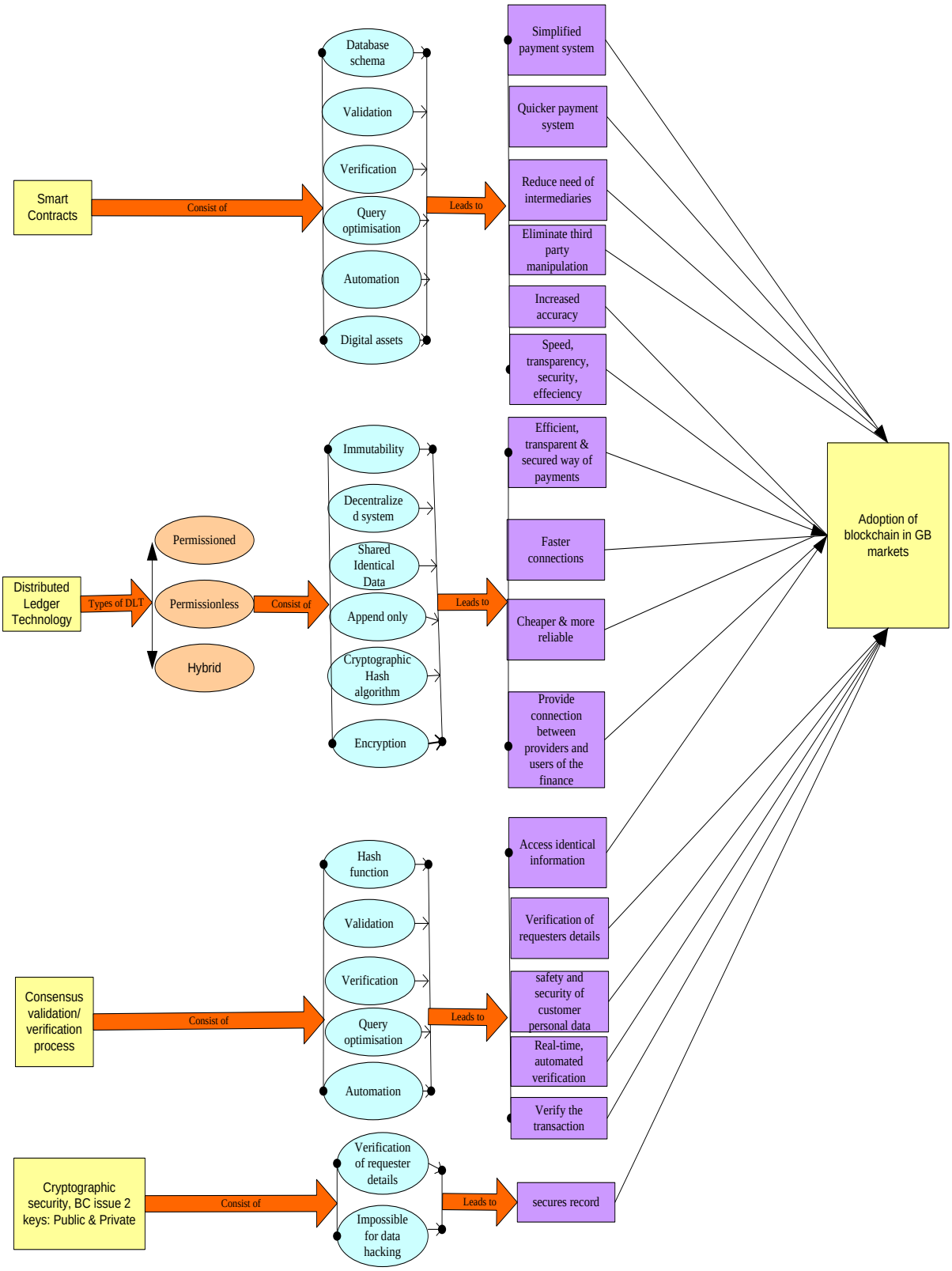
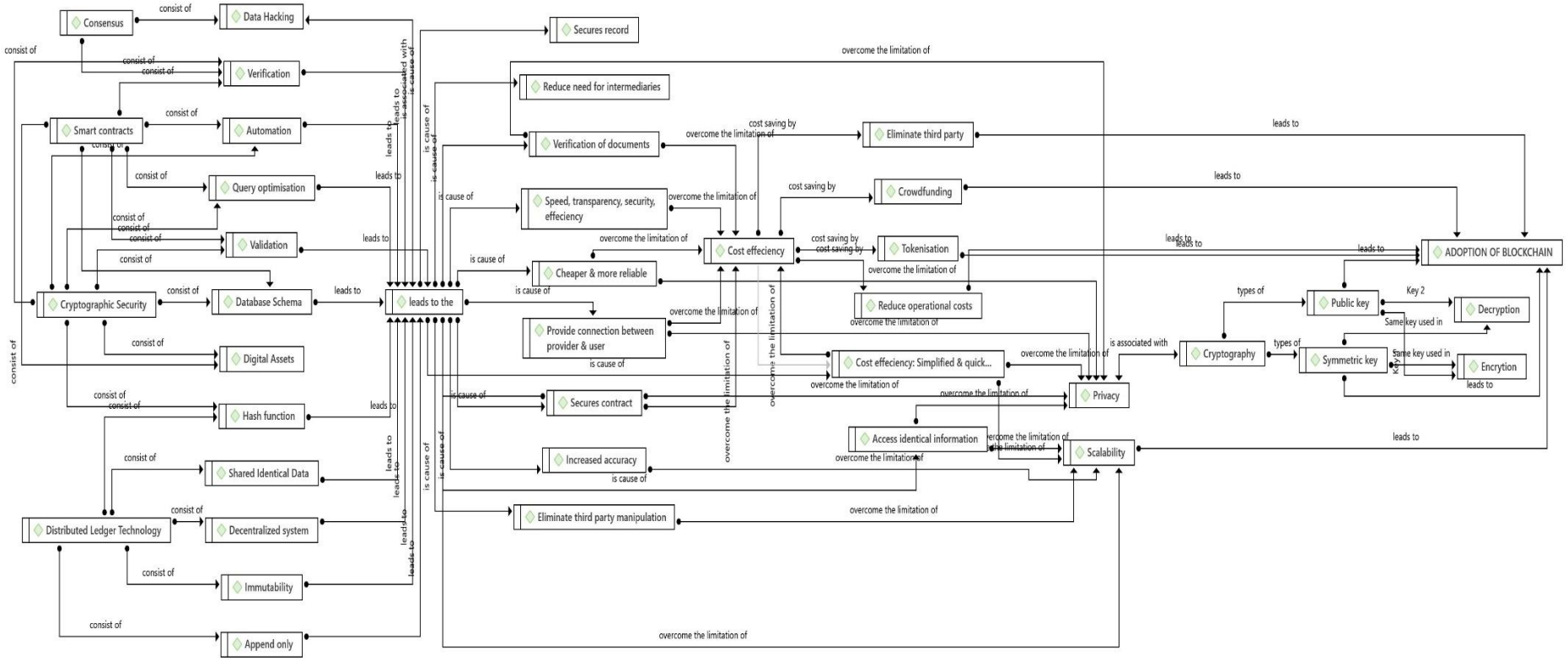
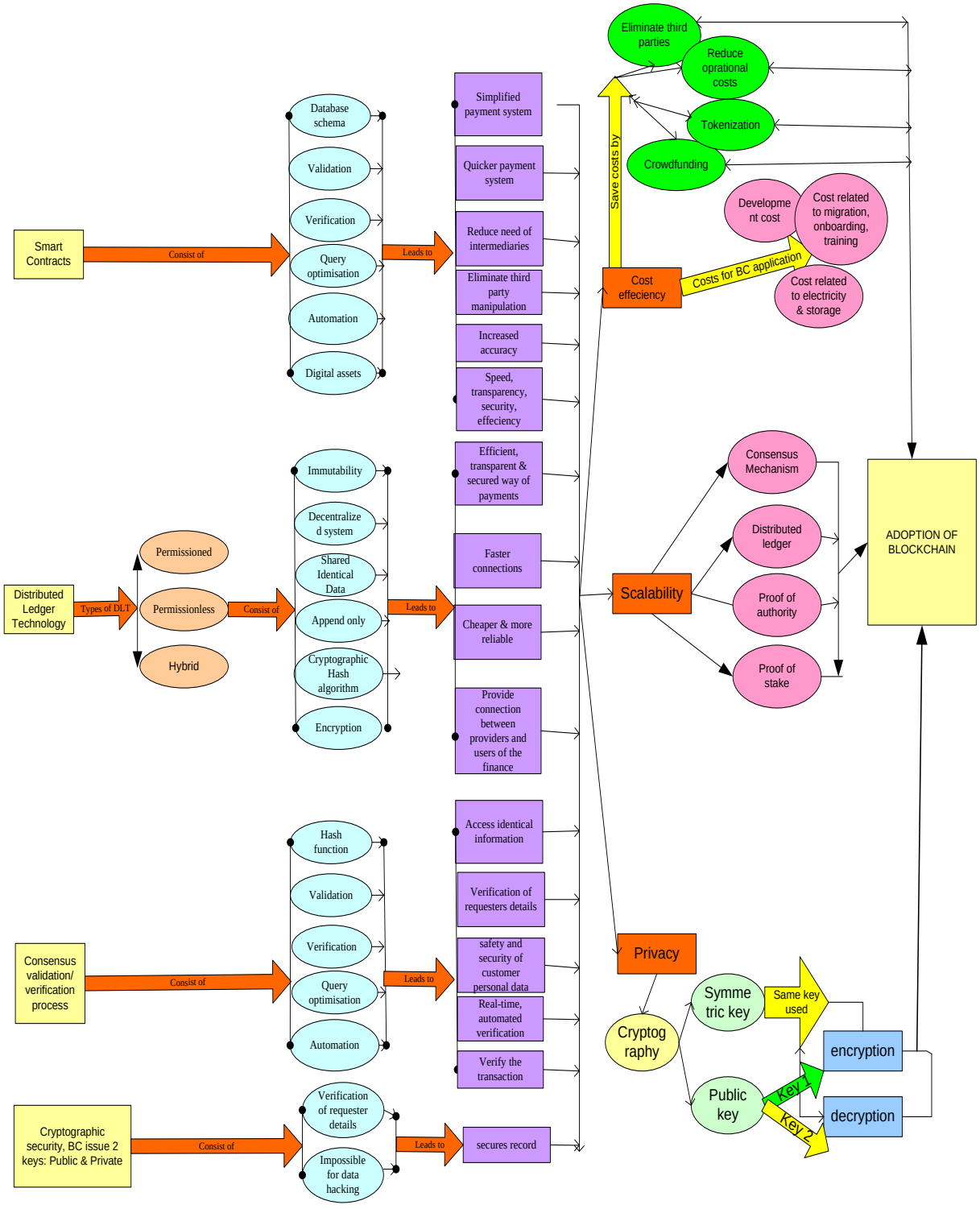


Figure: 2nd Framework after document analysis

A8: Axial Coding of Interview Results





Proposed Framework after document and interview analysis

PROFILE OF THE AUTHOR

NEETI MISRA

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Orcid Id: 0000-0003-1797-0807
Email id: neeti.cm@gmail.com

Academician, Researcher, and Financial advisor, with over 7 years of academic and 16 Years of abroad Corporate Experience. Published 21 Scopus Indexed Research Papers, 15 patents, several book chapter and book, currently working as an Assistant Professor Finance, e-MBA and Online PG Programs, leads the Fintech Club, coordinates MOOC courses, and serves as a senior member of the Research and Innovation Cell and Alumni Cell, Uttaranchal Institute of Management, Uttaranchal University, Dehradun, India. With Ph.D. in "Blockchain technology in Green and Sustainable Finance" from the University of Petroleum and Energy Studies (UPES), Dehradun Ph.D from University of Petroleum and Energy Studies (UPES).
She is an active speaker for AMFI, NCDEX, and ASSOCHAM, a resource person at numerous institutions, and a Honorable Review Board Member for several prestigious journals and conferences like Emerald Scopus Indexed Journal Management of Environmental Quality" and "International Conference on Big Data Analytics- 2022"and many other IEEE and CMT conferences. Honored with many national and international awards.
Served as Financial adviser in HSBC Bank, Abu Dhabi, Administrator in American University of Dubai, UAE and Senior Buyer in a Growmore International Trading Company, Kuwait. Senior member of National Human Rights Foundation, Dehradun.

Career Objective:

"Continuous Improvement" sums up my career objective, which is to continuously update my knowledge and competencies, thereby contributing to my organization and assessing self.

Awards and Recognitions

- Won BEST ANNUAL PERFORMER AWARD in the year 2012 by Growmore General Trading Company, Kuwait.
- Received the Appreciation and BEST MC AWARD form AMFI on 26th July, 2021 for the convener & moderator of National Webinar on "Wealth Creation through Personal Finance" organized by Association of Mutual Funds in India in association with Uttaranchal University, Dehradun.
- Honored by BEIL & Global Eminence Award 2021 by Bestow Edutrex, International for the category of BEST SCHOLAR on 31st July, 2021.

- Honored in “PANORAMA, 2021 Principal’s Conclave on NEW EDUCATION POLICY”, at Shigali Hills School, Dehradun, organized by Edutalk and Rishihood University, for participation in contribution to higher Education on 9th October, 2021.
- Won many awards from LIC of India for the BEST FINANCIAL ANALYST & PERFORMER every year since 2017.
- International Institute for Technical Teachers registered under Ministry of Micro, Small and Medium Enterprises honored as “OUTSTANDING FACULTY AWARD” in the IITT Education Awards on 27th March, 2022.
- Ministry of Corporate affairs (MCA) and Ministry of Micro, Small and Medium Entreprises (MSME) under Azadi Ka Amrat Mahotsav and ARIO NATIONAL EDUCATION EXCELLENCE AWARDS honored as “BEST EDUCATION REFORMER” of the year 2022 on 22nd May, 2022.
- Ministry of Corporate affairs (MCA) and Ministry of Micro, Small and Medium Entreprises (MSME) and Bestow Edutex International honored as “Eminent Women’s Excellence Award on 8th March, 2023.
- Performance appreciation by Uttaranchal University, 25th January 2024.

Research and Publications–

- **Honorable Review Board Member:** Emerald Scopus Indexed Journal Management of Environmental Quality” and “International Conference on Big Data Analytics- 2022”and many other IEEE and CMT conferences.

- Authored a Book titled “**Ethics of Blockchain Technology**” published November 2023 by “**Ancient Scientific Research Publication”, ISBN: 978-81-956994-8-3.**

Research, Conference Paper and Book Chapters

- Misra, N., Madhukar, G., Kumar, R., Jasim, L., Udayakumar, R., & Prakalya, S. B. (2024, May). A Framework to Extract the Data from Network Associated with Drone System for Optimising Control. In 2024 4th International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE) (pp. 1381-1385). IEEE.
- Misra, N., Gupta, S., & Rao, T. J. (2024). Fintech's role in green finance: Procuring funds for sustainable energy. International Research Journal of Multidisciplinary Scope, 5(02), 290-312.
- Pandey, M., Subramani, K., Madeswaran, A., Al-Jawahry, H. M., Sudhamalla, M., Misra, N., & Kumar, K. K. (2024, May). An Innovative Way of Trackable GDS in the Field of CC. In 2024 4th International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE) (pp. 1579-1582). IEEE.
- Misra, N., Rao, T. J., Gupta, S., & Zammit, M. L. (2024). Blockchain-based applications in insurance. In The Application of Emerging Technology and Blockchain in the Insurance Industry (pp. 219-246). River Publishers.

- Alkkhayat, A. H., Jaisudha, J., Nazira, I., Misra, N., Durgadevi, G., Kumar, R. S., & Subhash, S. G. (2024). AI-Driven Energy Trading Platforms: Market Dynamics and Challenges. In E3S Web of Conferences (Vol. 540, p. 07001). EDP Sciences.
- Misra, N., Rajan, T. S., Mehra, V., Ali, H. A., Kassem, A. A., & Manikandan, C. (2024). Wall-Climbing Robots: Optimising Adsorption and Novel Suction Techniques. In E3S Web of Conferences (Vol. 540, p. 13011). EDP Sciences.
- Misra, N., Gupta, Rao, T. J., (2023). Empowering sustainable finance: leveraging blockchain innovation for a green bond market transformation. Korea Review of International Studies, 129, 1226-4741.
- Misra, N., Gupta, S., Sidhu, K. S., Kumar, A., Anandaram, H., Rao, T. J. & Joshi, K. (2023). Role of blockchain technology integration for green bonds issuance with sustainability aspect. International Journal on Recent and Innovation Trends in Computing and Communication, 11(06), 134-142. DOI: 10.17762/ijritcc.v11i6.7300.
- Misra, N., Rao, T. J., Gupta, S., & Grima, L. (2023). Blockchain technology for the financial markets. DOI: 10.1049/PBPC060E_ch11
- Sidhu, A. S., Misra, N., Kaushik, V., Shankar, A., Joshi, K., & Singh, R. (2022, April). Analysis of Global Finance Using Web Scraping and Topic Modeling. In 2022 3rd International Conference on Intelligent Engineering and Management (ICIEM) (pp. 747-753). IEEE. DOI: 10.1109/ICIEM54221.2022.9853165
- Gehlot, A., & Misra, N. (2022, October). Privacy and Security Enabling for Healthcare Data using Lightweight Deep learning with Cryptography. In 2022 IEEE 2nd Mysore Sub Section International Conference (MysuruCon) (pp. 1-6). IEEE. DOI: 10.1109/MysuruCon55714.2022.9972472; Electronic ISBN:978-1-6654-9790-9; Print on Demand(PoD) ISBN:978-1-6654-9791-6
- Gehlot, A., & Misra, N. (2022, October). An IoT Based Smart Healthcare Medical System using Deep Learning Algorithm. In 2022 IEEE 2nd Mysore Sub Section International Conference (MysuruCon) (pp. 1-6). IEEE.
  DOI: 10.1109/MysuruCon55714.2022.9972370; Electronic ISBN: 978-1-6654-9790-9; Print on Demand (PoD) ISBN:978-1-6654-9791-6
- "A Comparative Study of Big Data Analytics Tools in Various Sectors", in International Conference on Innovative Development in Virtual and Rapid Prototyping IIDVRP-2022 on 14th -15th May, 2022, Uttaranchal University, Dehradun, India, paper presented and selected for publication in SCOPUS indexed journal.
- Misra, N., & Prashar, T. (2023, February). The Smart Bacteriological Examination and Treatment of Urinary Tract Infections in Children using Fuzzy Logic Control. In 2023 IEEE International Conference on Integrated Circuits and Communication Systems (ICICACS) (pp. 1-6). IEEE. DOI: 10.1109/ICICACS57338.2023.10099921.
- Misra, N., & Prashar, T. (2023, February). An Improved Analysis and Treatment Regimen and Modern Antibacterial Agents using AI based Deep Learning. In 2023 IEEE International Conference on Integrated Circuits and Communication Systems (ICICACS) (pp. 1-6). IEEE. DOI: 10.1109/ICICACS57338.2023.10100312.

- Josphineleela, R., Gupta, R., Misra, N., Malik, M., Somasundaram, K., & Gangodkar, D. (2023, May). Blockchain based multi-layer security network authentication system for uncertain attack in the wireless communication system. In 2023 3rd International Conference on Advance Computing and Innovative Technologies in Engineering (ICACITE) (pp. 877-881). IEEE.. DOI: 10.1109/ICACITE57410.2023.10182747.
- "The Role of Blockchain Technology to Ensure Financial Security in a Circular Economy", paper presented in " MIT-WPU School of Economics, International Conference on Circular Economy- Redefining the World and Driving towards Sustainability in partnership with Helwan University, Catholic University and The Climate Reality Project" on 18-19 May 2022 and won **Best papers award**. Co-authors- Dr. Sumeet Gupta & Dr. T. Joji Rao. Expected paper will be published in Scopus indexed Emerald journal- "Management of Environmental Quality" with a high Impact factor of 4.21.
- "Green Bond: A Blockchain Framework" paper presented in ICBDS – 2023: International Conference on Business, Digitalization, and Sustainability at UPES, Dehradun, Uttarakhand on 2nd-4th February 2023.
- Kaur, P., & Misra, N. (2019). A Methodical Review on Network Traffic Monitoring & Analysis Tools. JAC: A Journal of Composition Theory, 12, 1964.
- Social Media as a platform for propagating Health Messages, published in Feb. 2018 in Global Journal of Engineering Science and Researches, UGC approved Journal ISSN-23488034. DOI- 10.5281/zenodo.2571481, Co-writers- Diksha Panwar, Farman Ali
- Need for Digitalization of the Indian Economy and its Impact on Corporate Financial Returns, Published on May10, 2019, in Global Journal of Engineering Science and Researches, UGC approved Journal ISSN-2348-8034. DOI-10.5281/zenodo.2693925, Co-authors -Shubham Singh
- 10.5281/zenodo.2657670, Co- authors - Damini Singh, Farman Ali Analysis of DMAT A/C & Online Trading of India Bulls Ltd. In Dehradun, Published on April 30, 2019, in Global Journal of Engineering Science and Researches, UGC approved Journal ISSN-2348-8034.
- Impact of Micro-Credit on the business of small entrepreneurs of Dehradun, Published in JETIR June 2019, Volume 6, Issue 6 (ISSN-2349-5162). Web link: http://www.jetir.org/view?paper=JETIR1906063, Co- authors -Hemant Sharma, Ankit Semwal.
- Chapter "COVID Pandemic: Changing Scenario of the construction industry" Book- "Effect of COVID Pandemic: India and its Future" Published by HiMADRI Publishers, April, 2022.ISBN # 978-93-91778-09-5
- Chapter "Foreign Direct Investments and its role in Banking sector of India" Book- "Dynamics of International Finance" Published by Nova Science Publishers, Inc. (NOVA), Expected Publication by July, 2022.ISBN # 979-8-88697-011-1

Patents Published

- Patent on the Title of Invention, "A System of Basel 5 Accord for Risk Management in Banks" (Patent number: 2021105621) from Australian Government (IP Australia) on 3 November 2021.
- Patent on "A system of intelligent control unit for assisting visually impaired people" (Patent number: 202211012484) from March 2022.
- Patent on "A system of rf communication-based safety tracking gadget for the coal mine workers at the time of contingencies under the mine" (Patent number: 202211013293) from March 2022.
- Patent on "AI-assisted system to track and analyze investors' behavior at the financial advisors or brokerage office" (Patent number: 202211015538).
- Patent on "AI-assisted online interview monitor system" (Patent Number-202211015537).
- Patent on "AI- assisted hardware device for researchers to know MFP (minor forest produce) on and around community in hill areas of Uttarakand"

FDPs /Seminars/ Conferences:

- **ICSSR** sponsored two weeks Capacity building programme for young social science researchers on Ideas @ Viksit Bharat Developing Capacity and Research Network on Advanced Methods and Technologies for Excellence in Business Sustainability Research at O.P. Jindal Global Deemed to be University, Sonipat, Haryana, India from 11 to 23 July, 2024.
- University of Petroleum & Energy Studies FDP on "Tools and Techniques of Qualitative Research" From 21st July, 2022 to 25th July, 2022.
- **AICTE ATAL FDP AICTE** Training and Learning (ATAL) Academy Online Elementary FDP on "**Security in Blockchain and Cyber-Physical Systems Design**," from 17/01/2022 to 21/01/2022 at Government Engineering College, Rajkot.
- **Indian Institute of Management, Rohtak**, 7th Biennial Conference of INDAM on Tripple Bottom Line, Developing Business Resilience, Ecological Sustainability and Social Well- being in Post Pandemic World, held during 7th to 9th January, 2022.
- Webinar on "Getting Started with NLP for Enterprise Applications" on 19th February, 2022 organized by at Government Engineering College, Rajkot.
- FDP on NPTEL Online Certification Course in Cost Accounting, September-October, 2020- four weeks course from IIT, Bombay, India, Ministry of HRD.
- Annual Faculty Refreshment Program in Teaching Course in Financial Markets and Emerging Business Models & Online Refresher Course in Management, February, 2020 from ARPIT, under Ministry of HRD
- FDP on NPTEL Online Certification Course in Financial Institutions and Markets", from IIT, Kharagpur, India, Ministry of HRD.
- Participated in "National Seminar on Issues and Challenges in National Development: Gender, Economy and Environment" organised on 1st -2nd November, 2019 by Patrician College for Women, Dehradun, U.K.in collaboration

with Wild Life Institute of India (WII), India and UP Uttarakhand Economic Association (UPUEA), India.

- Participated and Presented a paper "A Methodical Review on Network Traffic Monitoring & Analysis Tools" at "**International Conference** on Information Technology and Management for the Sustainable Development, (ICITMSD-2019)", organised on 9th -10th August,2019, by Uttaranchal University, Dehradun, U.K., India and Life Way Tech India.
- Participated in **Faculty Development Programme** on "Data Analysis Techniques Using SPSS" organized from 22nd to 31st July, 2019, by Uttaranchal Institute of Management, Uttaranchal University, Dehradun, U.K., India.
- Participated in **Faculty Development Programme** on "Innovative Techniques of Magnitude of Teaching Methodology in Higher Education", organized from 16/07/2018 to 22/07/2018 by Uttaranchal University, Dehradun, U.K., India.
- Participated in **Teacher's Congruence & Faculty Development Programme** on "Various Topics of Professional Interest", organized on 16th July, 2018 by Uttaranchal University, Dehradun, U.K., India in association with The Institute of Company Secretaries of India, Dehradun Chapter under the aegis of law College Dehradun, U.K., India.
- Participated in Seminar on "Financial Planning for Young Investors", organized on 23rd February, 2013 by Dev Bhoomi Group of Institutions, Dehradun, U.K., India in association with Securities and Exchange Board of India (SEBI). Main Speaker was Mr. Santosh Parashar (Certified Financial Trainer of SEBI).
- **Webinars during COVID-19 Pandemic: Attended as the Guest Speaker in NCDEX Webinar on Stock and Derivative Commodity markets.**
- **More than 100 Webinars (National & International) attended with highly reputed organizations and institution like ASSOCHAM & NCDEX during COVID Pandemic period.**

Professional Experience:

Uttaranchal University, Dehradun, Uttarakhand, as an Assistant Professor-Finance (Uttaranchal Institute of Management) Feb. 2018 – Till Date

- **Received Letter of Appreciation for contribution in "Uttaranchal Yuva Fest, 2019".**
- **Received Certificate of Honor by the University on 3rd March, 2022 for the appreciation of work in the past for the university.**
- **Received appreciation and incentive by Uttaranchal University, 2023 for Research publications and annual performance.**
- **Received appreciation and incentive by Uttaranchal University on 25th January, 2024 for Research publications and annual performance.**

Job Responsibilities:

- **Faculty and team member of online and e-MBA and Online PG Programs.**
- **MOOC Coordinator**
- **Faculty and team member of Executive Development Program (EDP) for Tanzanian Government Officials.**

- **Head of Fintech Club** since 2019 till date, convened many activities like Money Mines, Money Quiz, Bulls and Bears, Portfolio King-Inter College and Inter-School Competition in which many renowned colleges and schools from PAN India had participated actively, many knowledge sharing Webinars with the renowned Central financial organizations like AMFI, NCDEX, ASSOCHAM Delhi chapter. Recently organized the Workshop on Financial market investments in collaboration with BSE, Mumbai.
- Involved in NAAC criteria's tasks like BOS
- Paper setter, evaluator and reviewer, Designed new courses of M.Com and Executive MBA syllabus.
- **Class coordinator**, **Student's Mentor, Guided MBA Dissertations, Delivered Bridge Courses to BBA & B.Com Students, Co-convener** of MBA and BBA final year students' summer training report presentation, C**ounselling and mentoring** to Post graduate and undergraduate students.

HSBC Bank UAE, as a Financial Adviser, Department of Wealth Management.
May 2016 – Sep. 2017
Job Responsibilities:

- Strategize various segments of financial management streams according to the financial predictions for the perspective year.
- To be aware of financial agendas of major industries, in order to understand adequate, stable & low risk Investment sectors.
- To study the changing spectrum of high-risk Industry, and to look for possibilities to gain high returns from investments in short span of time.
- To have liaison with Asset Management department and liabilities department to understand the client history with suitable advisory.

American University of Dubai, UAE, as an Administration Officer and Coordinator.
Feb 2015-April 2016
Job Responsibilities:

- Administrative tasks, Control over various departmental recruitments, arranging for interviews, trainings for staff, conducting conferences.
- Coordinating with various departments, Faculty members and students.
- Implement online customer service desk, to help customers get prompt responses and the team to understand and resolve the queries efficiently.
- Mentoring and Coaching team members for overall performance improvement.
- Evaluate Performance and Monitoring their Campaigning Activities.
- Coordination between Top Level and mid-Level management.

Growmore International Trading Company, KUWAIT. Largest Information Resource Suppliers, University syllabus books and Printers, as an Assistant Finance Manager and Senior Buyer. June 2009-July 2013.
Job Responsibilities:

- Coordination with renowned international publishers directly, like McGraw Hill US and UK, Pearson US and UK, Springer, etc.

- Visit and Adviser to Faculty of various Universities and Institutions in Kuwait and Fulfillment of syllabus requirements.
- Assisting Finance Manager in planning and preparing financial strategies of the company.
- Pricing of the product: on the basis of Bookstores Revenue, Cost of Goods Sold, Indirect Cost (Staff Salary, rent and royalties, communication Charges, Govt. Fee and Charges, Repair and Maintenance, Office supply, Printing and Stationery, Travelling Expense, Provision for Indemnity, Other Provisions (Leave Salary), Bank Charges, Director's Fee.
- Receiving Purchase Orders from the customer, Purchase: Data Segregation, Categories Hierarchy & Planning schedule.
- Inventory and Store Management: Matching customer order with company Inventory to find out the purchase requirements. Customer Care.
- Searching: Searching of New Product and its Supplies, Sending Request for Quotation, Market Analysis on the basis of previous year's sale of the product and Customer Reputation and Customer Response, Purchase Order Preparation as per the requirement, Placing of Purchase Order to Supplier, Follow up of daily communication.
- Receiving of Shipment: Shipping Documentation; Bill of lading, Airway Bill, Cargo Insurance Certificate, International Commercial Invoice, Packing List, Delivery Note, International Purchase Order, CMR Document, Certificate of Origin, Certificate of Inspection, Letter of Credit, Custom Clearance of Shipment.

SPFL SECURITIES Ltd. Dehradun, India, Stock Exchange Brokers; as a back office and DP Division Officer.
May 2006-Mar 2007
Job Responsibilities:

- DP Division task includes opening of D-MAT Accounts, punching of delivery slips etc.
- Back Office operations includes opening of all financial accounts, maintenance of Client accounts, Ledgers, daily holdings, transaction Summary, Statement of accounts and Client details, Voucher Entry, Confirmation, e-banking etc.

TAURUS EXPORTS, Gurgaon, India (Export House of Home Furnishing Products) as a Merchandiser.
Nov 2002- Feb 2003
Job Responsibilities:

- Development of new designs of the products with the help of new creative ideas, development of new designs according to client and buyer preferences.
- Dealing with foreign buyers, buying house agents (HALLMART, OTTO etc.)
- Receiving Purchase Orders, Approval of designs for final production and direction to production Manager.
- Managing all documentation, inspection and Final Shipments on date.

VEEKAY KNITWEAR (Manufacturers of quality cotton hosiery goods), Kanpur, India as a Technician Designer. Jun 2000-Oct 2002
Job Responsibilities:

- Development of new design and approval of designs for final production.
- Directing and Supervision of Production Department.

Costing of the export stock material.

QUALIFICATION:

- Pursuing **Ph.D. from University of Petroleum and Energy Studies (UPES),** Dehradun, U.K., India.
- NPTEL Online Certification Course in **Cost Accounting**, from IIT, Kharagpur, India.
- MHRD launched ARPIT (Annual Refresher Programme in Teaching) online refresher course for career advancement of faculty in **Financial Markets and Emerging Business Models, by Prof. Harsh Purohit**, Centre for Financial Planning Training and Research, National Resource Centre, Banasthali Vidyapith, India.
- MHRD launched ARPIT (Annual Refresher Programme In Teaching) online refresher course for career advancement of faculty in **Online Refresher Course in Management, by Prof. Harsh Purohit**, Centre for Financial Planning Training and Research, National Resource Centre, Banasthali Vidyapith, India.
- NPTEL Online Certification Course in **Financial Institutions and Markets**", from IIT, Kharagpur, India.
- LIC Insurance Advisor, Dehradun, India
- MBA (Finance - Major and International Marketing - Minor Subjects) from Shri Guru Ram Rai Institute of Technology and Science. Dehradun, India. 1st Division.
- M.Com. from HNB Garhwal University, Dehradun, India. 1st Division.
- B.Com. from CSJMU Kanpur University, India. 1st Division.
- Diploma in Apparel Merchandising from IIFT, Delhi, 1st Division, Topper of the Batch.
- Diploma in Textile Technology from Government Polytechnic, Allahabad, 1st Division with Honors.

ACHIEVEMENTS:

- Adjudged as the best student in MBA batch for the academic year.
- Adjudged as the best student in Apparel Merchandising Diploma.
- Won many awards in Debate, Symposium, Dance, Singing, Sports- Swimming.
- Participated in many Fashion Shows- State, National and International level.

ATTRIBUTES:

- Ability to manage multiple tasks in a pressured environment.
- Systematic Approach
- Good Communication and Team Building Skills
- Adaptive & Desire to learn
- Dedicative and Driven as a Hardworking Individual

- Ready to accept new challenges at all levels in positive manner.
- Computer Literate: Proficient in the use of WINDOWS, MS Office (Word Excel, Access, Power Point)

References:

1. **Shri Surya Kant Sharma, CA, Senior Consultant North Region AMFI, Ex DGM SEBI, India. 91-98115400974. suryakant@amfiindia.com**
2. **Professor T. Joji Rao, Professor at Jindal Global Business School, O P Jindal University,**

International References:

3. **Shailendra Srivastava, MD Growmore General Company, International Trading Company, Kuwait. 965-99651677. shailendra@growmorebooks.com**
4. **Sanjay Verma, Manager Finance & Admin., Growmore General Company, International Trading Company, Kuwait. 965-99536465. sanjay@growmorebooks.com**

Neeti Misra
(9808470881)

UPES
UNIVERSITY OF TOMORROW

PLAGIARISM CERTIFICATE

1. I **Prof. (Dr.) Sumeet Gupta (Internal Guide)** certify that the Thesis titles **"FRAMEWORK FOR ADOPTION OF BLOCKCHAIN TECHNOLOGY IN GREEN BOND MARKET IN INDIA: TAM ANALYSIS"** submitted by scholar **Ms. Neeti Misra** having **SAP ID 500073474** has been run through a Plagiarism Check Software and the Plagiarism percentage is reported to be **7%.**

2. Plagiarism Report generated by the Plagiarism Check Software attached.

Signature of Internal Guide
Prof. (Dr.) Sumeet Gupta

Signature of Scholar
Neeti Misra

Green Finance

ORIGINALITY REPORT

24/9/24

7%	5%	4%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Yi Fan, Jiquan Chen, Gabriela Shirkey, Ranjeet John, Susie R. Wu, Hogeun Park, Changliang Shao. "Applications of structural equation modeling (SEM) in ecological studies: an updated review", Ecological Processes, 2016 Publication	<1%
2	www.researchgate.net Internet Source	<1%
3	kth.diva-portal.org Internet Source	<1%
4	dr.ddn.upes.ac.in:8080 Internet Source	<1%
5	Vangelis Malamas, Thomas K. Dasaklis, Veni Arakelian, Gregory Chondrokoukis. "A blockchain framework for digitizing securities issuance: the case of green bonds", Journal of Sustainable Finance & Investment, 2023 Publication	<1%
6	Aarti Sharma, Mamtesh Nadiyan, Seema Sabharwal. "chapter 9 Integration of	<1%