

Utilizing blockchain & smart contract to simplify and secure daily life

By

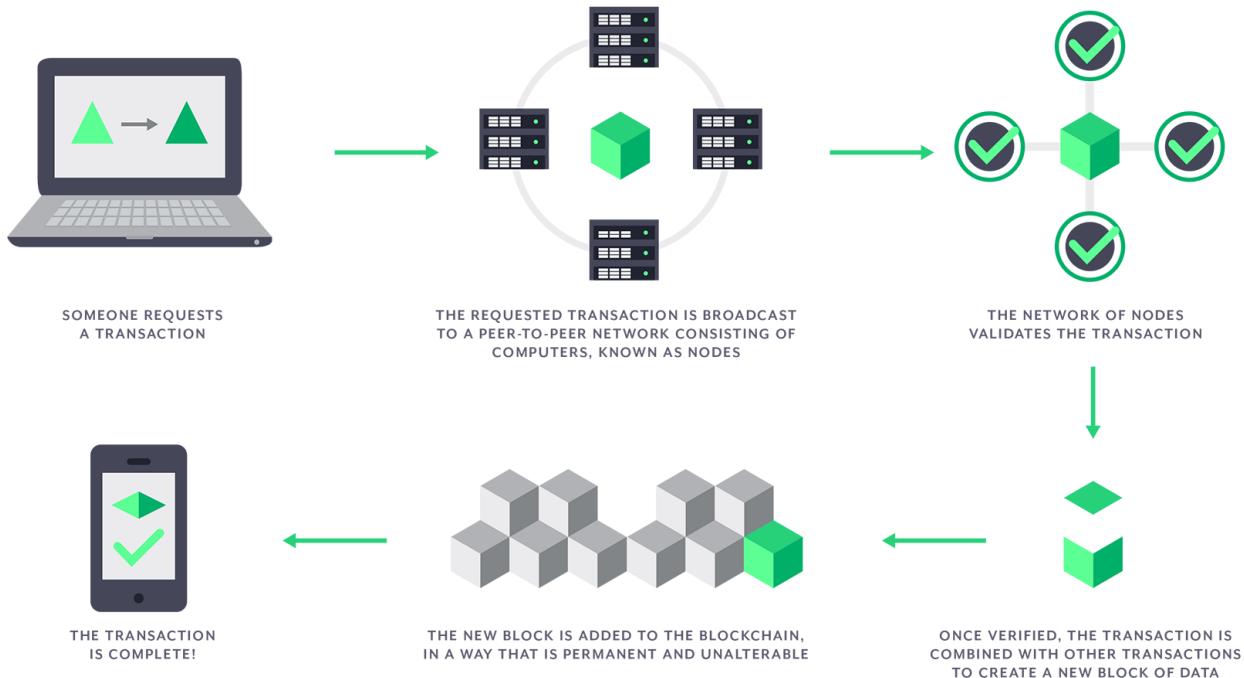
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1. Introduction



Blockchain technology has emerged as a revolutionary force with the potential to transform various industries, from finance and supply chain to healthcare and beyond. At its core, blockchain is a decentralized and distributed digital ledger that records transactions in a secure, transparent, and tamper-resistant manner. Unlike traditional centralized systems, blockchain operates on a network of interconnected nodes, where each transaction is verified and added to a shared, immutable database. [01][22]

This technology ensures trust, accountability, and data integrity, as information cannot be altered without consensus from the network participants. Initially introduced as the underlying technology for cryptocurrencies like Bitcoin, blockchain has since found numerous applications beyond digital currencies, promising to revolutionize how we conduct business, manage data, and interact in a digitally connected world. [08][09]

Smart contracts are self-executing agreements with the terms and conditions directly written into computer code. These contracts operate on blockchain networks, which are decentralized and secure digital ledgers. The concept of smart contracts was first introduced by computer scientist Nick Szabo in the 1990s, and they gained significant popularity with the emergence of blockchain technology. In a smart contract, once the predefined conditions are met, the contract automatically executes without the need for intermediaries. This process eliminates the potential for human error, ensures transparency, and reduces the need for trust between parties. [26]

Smart contracts are closely linked to blockchain technology. When a smart contract is deployed, it becomes part of the blockchain's distributed network of nodes. The blockchain records and validates every transaction and contract execution, ensuring that the contract's outcome is visible and immutable.

To maintain the integrity and security of the blockchain, many networks use a consensus mechanism known as Proof of Work (PoW). PoW involves miners competing to solve complex mathematical puzzles to validate and add new blocks to the blockchain. Once a miner solves a puzzle, they add the new block of transactions, including smart contract executions, to the chain. The rest of the network then verifies and agrees on the validity of the new block, ensuring that the blockchain remains tamper-resistant and secure. [24]

In summary, smart contracts are automated agreements that execute when predefined conditions are met. They operate on blockchain networks, which use consensus mechanisms like Proof of Work to maintain the integrity of the ledger. Smart contracts are revolutionizing various industries, providing secure, transparent, and efficient solutions to streamline processes and reduce reliance on intermediaries.

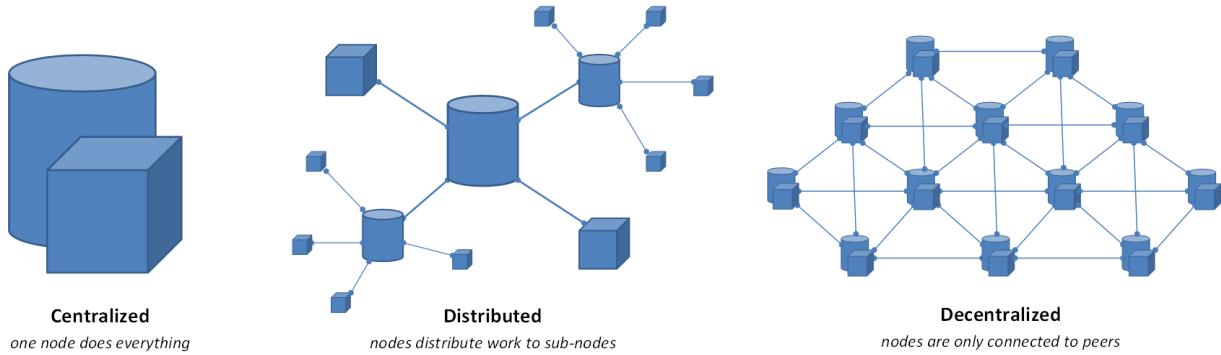
Cryptocurrency is a digital or virtual currency that uses cryptography for security and operates independently of central authorities, like governments or banks. It relies on blockchain technology to record and verify transactions. Bitcoin, the first and most famous cryptocurrency, introduced the concept of digital money and decentralization. Cryptocurrencies offer faster, cheaper, and more accessible cross-border transactions compared to traditional financial systems. [37]



Web 2.0 and Web3.0 represent distinct phases of the internet's evolution, each with its own characteristics and capabilities. Web 2.0 refers to the current stage of the internet, characterized by user-generated content, social media, and interactive web applications. In contrast, Web3.0, often referred to as the "semantic web" or "decentralized web," envisions a future internet that is more intelligent, decentralized, and interoperable, powered by emerging technologies like blockchain. [12]

Web 2.0 platforms are typically centralized, with data stored on servers owned and controlled by specific companies or entities. Users rely on these centralized platforms for data storage, content distribution, and service provision. Web3.0 aims to decentralize the internet by leveraging blockchain and other decentralized technologies. It envisions a distributed network where data and services are spread across multiple nodes, removing the need for central authorities and intermediaries. Web3.0, users have more control over their data. Through cryptographic principles and decentralized networks, users can retain ownership of their data and control access rights to it.

Blockchain technology plays a crucial role in enabling Web3.0 by providing the foundation for decentralization, trust, and security. Blockchains offer transparent and tamper-resistant data storage, smart contract execution, and consensus mechanisms that foster a decentralized and interoperable internet. While not all aspects of Web3.0 necessarily require blockchain, the technology is a key enabler for many of its core principles and functionalities. As Web3.0 continues to develop, blockchain will likely play an essential role in reshaping the future of the internet. [23]

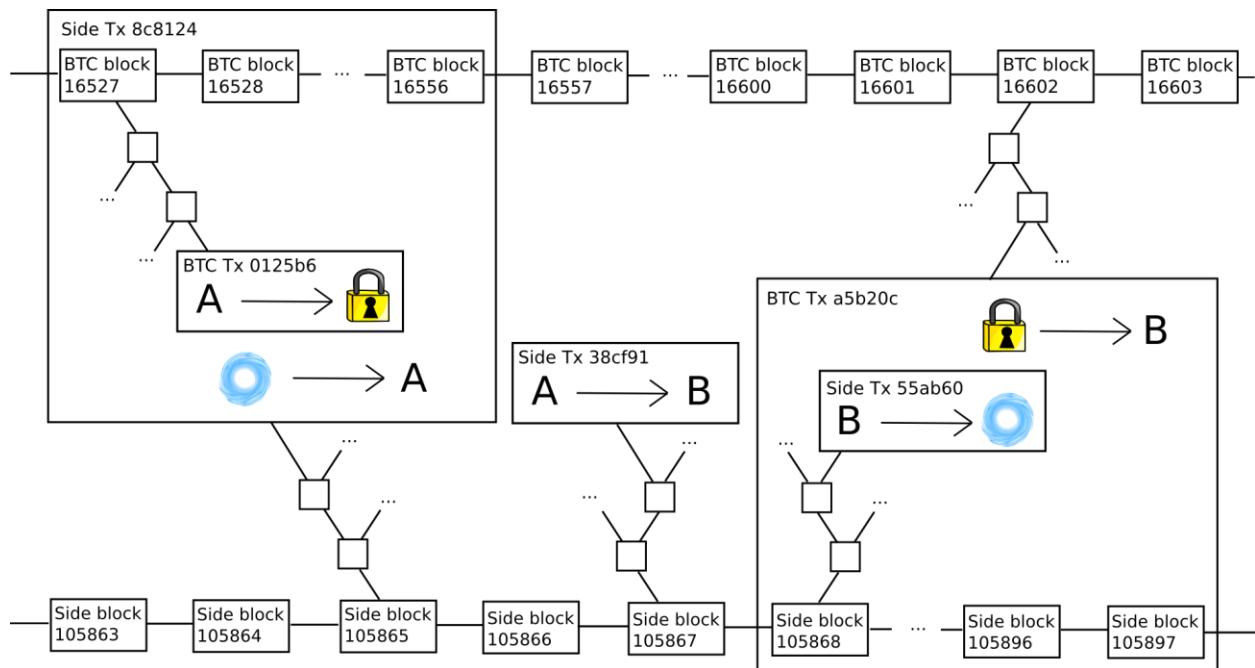


In the realm of blockchain and cryptocurrencies, the concepts of decentralization and centralization play a pivotal role in shaping the fundamental structure and operations of various systems. These two opposing models represent different approaches to governance, control, and decision-making within these emerging technologies. In a centralized system, a single authority or entity holds control over the entire network. This central entity, often an organization or a governing body, manages all the essential functions, including transaction verification, data storage, and rule enforcement. Users rely on this central authority to validate transactions and maintain the integrity of the system. Traditional financial institutions and many online platforms are prime examples of centralized systems. Banks, for instance, operate as centralized entities that oversee and process transactions, maintaining control over their customers' accounts and data.

Decentralization, on the other hand, involves distributing authority and decision-making across a network of nodes or participants. In a decentralized system, no single entity holds ultimate control over the entire network. Instead, decision-making is carried out collectively through a consensus mechanism that allows nodes to agree on the validity of transactions and the state of the system.

Blockchain technology is the epitome of decentralization. It operates on a distributed network of computers (nodes) where each node holds a copy of the entire blockchain. Transactions are validated and added to the blockchain through consensus mechanisms like Proof of Work (PoW) or Proof of Stake (PoS). This decentralized structure ensures transparency, security, and resilience, as there is no single point of failure or authority. [33]

Cryptocurrencies, such as Bitcoin and Ethereum, are prime examples of decentralized systems. They utilize blockchain technology to enable peer-to-peer transactions without the need for intermediaries like banks. Users can transfer digital assets directly to one another, and the consensus mechanism ensures the validity of these transactions without relying on a central authority. Decentralization offers several advantages, such as enhanced security, censorship resistance, and greater individual control over assets and data. It empowers users by removing intermediaries and reducing the risk of manipulation or coercion from a central entity. [35]



Proof of Work (PoW) is a consensus mechanism used in many blockchain networks, including Bitcoin. In a PoW system, miners compete to solve complex mathematical puzzles to validate and add new blocks to the blockchain. The first miner to solve the puzzle gets the right to add the block and is rewarded with cryptocurrency. PoW ensures that transactions are secure and verified by a majority of the network, making it difficult for malicious actors to alter the blockchain's history.

In recent years, alternative consensus mechanisms like Proof of Stake (PoS) and Delegated Proof of Stake (DPoS) have emerged to address the energy-intensive nature of PoW and offer more eco-friendly and scalable solutions. Blockchain technology, with its decentralized, transparent, and secure nature, has introduced groundbreaking innovations like cryptocurrencies and smart contracts. As the world continues to explore the potential of this technology.

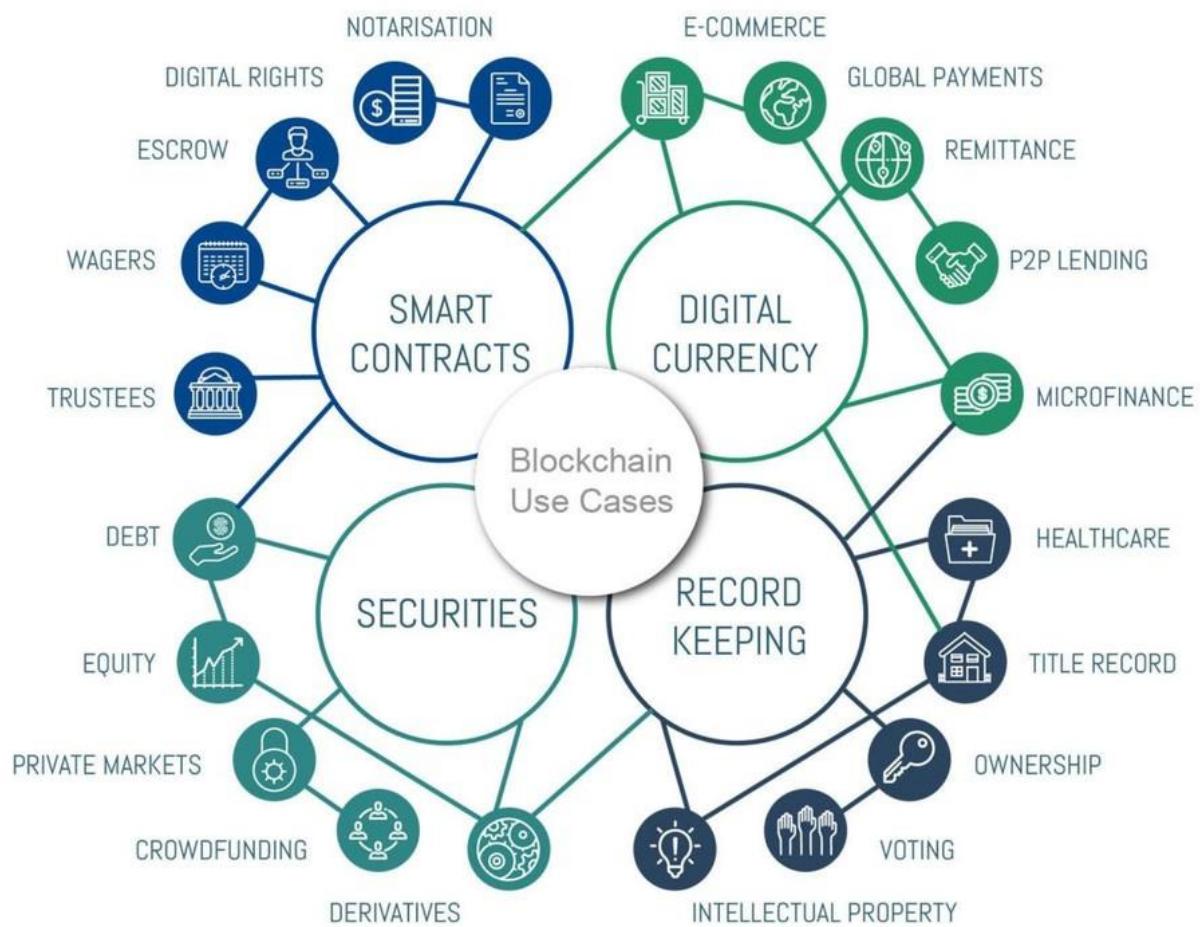
Blockchain technology, smart contracts, cryptocurrencies, decentralization, and Proof of Work are not just theoretical concepts; they have the potential to revolutionize our normal world and significantly impact our lives. [11] These innovations offer secure, transparent, and efficient solutions, simplifying processes and enhancing trust in various sectors. As these technologies continue to evolve and gain widespread adoption, they hold the promise of creating a more inclusive, secure, and decentralized world, where individuals have greater control over their data and assets. [25]

Blockchain's decentralized and immutable nature ensures data integrity and reduces the risk of unauthorized access, enhancing security and privacy in digital interactions. Smart contracts, as self-executing agreements, automate processes and eliminate the need for intermediaries, streamlining transactions and reducing the potential for human errors or delays. In finance, blockchain-based cryptocurrencies and digital wallets offer fast and secure peer-to-peer transactions, enabling individuals to send and receive funds globally without relying on traditional financial institutions. Smart contracts can automate loan approvals, insurance claims, and payment agreements, making financial interactions more efficient and transparent.

In supply chain management, blockchain provides real-time tracking and verification of products' origins, ensuring transparency and authenticity in the supply chain. Smart contracts can automate payment settlements between suppliers and manufacturers based on predefined conditions, simplifying and securing the entire supply chain process. Moreover, blockchain-based identity management solutions empower individuals to control their personal information securely. Digital identities stored on the blockchain can eliminate the need for numerous logins and passwords, providing a single, secure authentication method across various platforms.

For voting systems, blockchain's immutability and transparency can create tamper-resistant and verifiable voting records. Smart contracts can enable secure and decentralized voting processes, enhancing the integrity of democratic elections. Furthermore, blockchain-powered healthcare systems can securely store and share patient data among healthcare providers, improving collaboration and ensuring patients' privacy.

By leveraging blockchain and smart contracts, daily life can become more streamlined, secure, and efficient, reducing reliance on intermediaries and enhancing trust in digital interactions. As these technologies continue to evolve, they hold the promise of transforming numerous industries, ultimately leading to a more secure, decentralized, and user-centric future. [38]



2. Methodology

Method 01

- ❖ This research was done using articles, blogs, interview surveys, open-ended questions. Our questionnaire form is listed below.

1. Age
2. Gender
3. Hometown / Country
4. Do you know anything about blockchain & smart contract?
5. Are you a crypto holder or trader?
6. Do you know about ethereum blockchain?
7. Do you know about solidity programming language?
8. Do you know about Proof of Work (PoW) & Proof of State (PoS)
9. Are you heard about gas fees, nodes, dApp, hash, ledger, DAO?
10. Do you like to be a blockchain developer?
11. Are you agreed with Utilizing blockchain & smart contract can helps physical works?

Ex: Online transaction security

Healthcare security

Personal & real state security

Method 02

- ❖ Check how much blockchain technology has been developed in society by joining the channel that informs people about crypto and blockchain on Instagram. Checked the tests and reports from the following channels.
 - I. Cryptocoupe
 - II. Crypto exchanges
 - III. Crypto explorer
 - IV. crypto maniacs
 - V. Cryptonary

Method 03

- ❖ Collecting data from Oxford University and crypto trading platform research.

Method 04

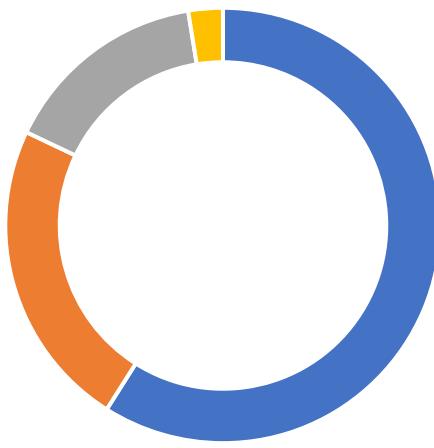
- ❖ Creating a new blockchain to online banking and business transactions for better security and asking entrepreneurs and prominent figures in Sri Lanka whether blockchain technology is helpful in everyday life or not and analysis data to reach a final conclusion.

3. Results

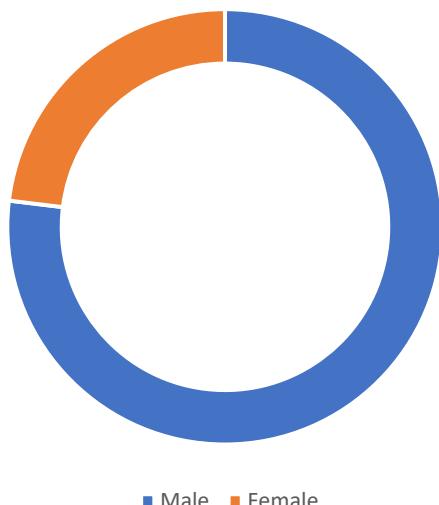
Method 01

- The information is obtained from 39 people as follows.

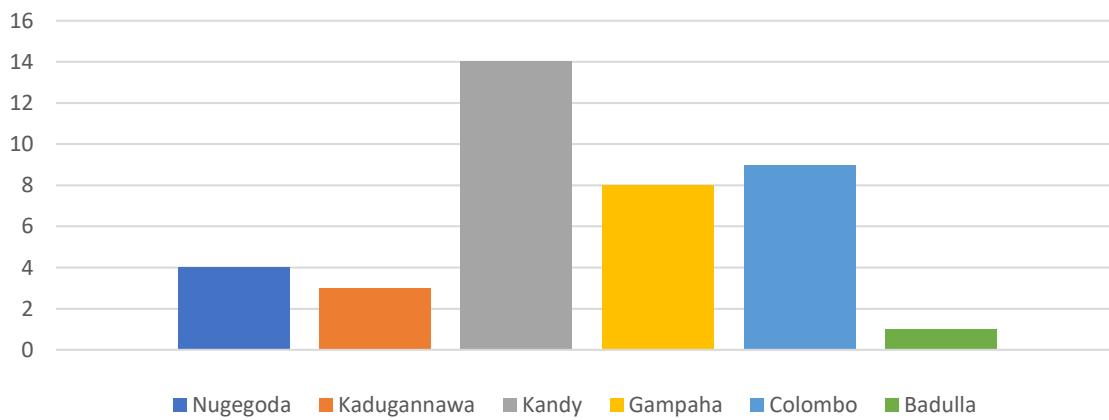
1. Age



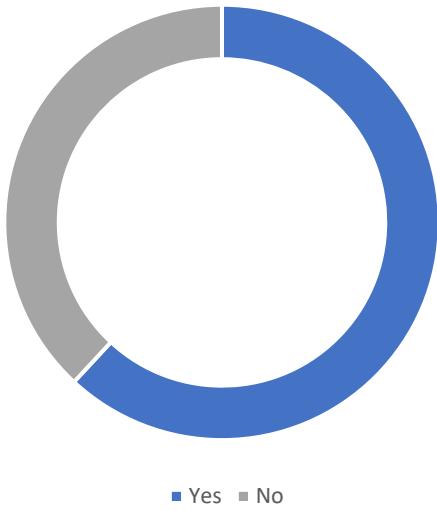
2.Gender



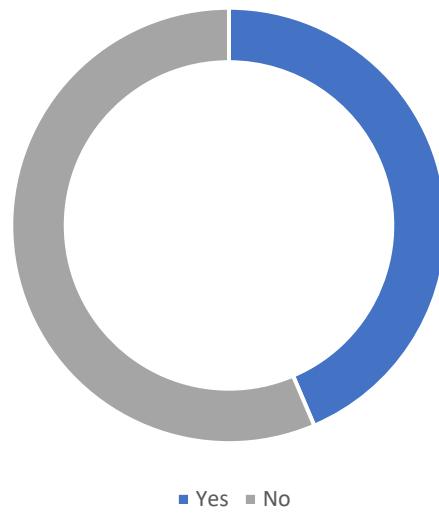
3. Hometown



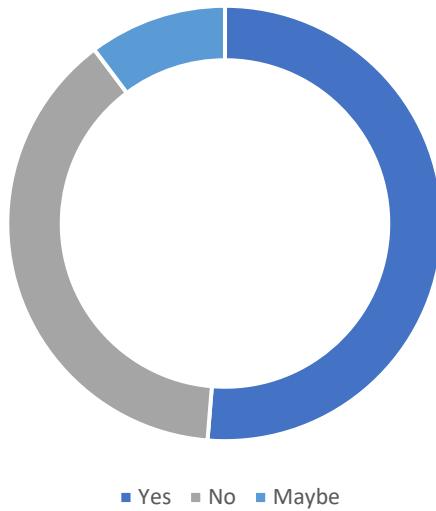
4. Do you know anything about blockchain & smart contract?



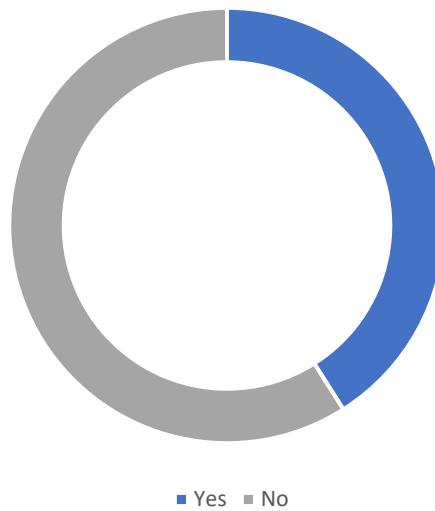
5. Are you a crypto holder or trader?



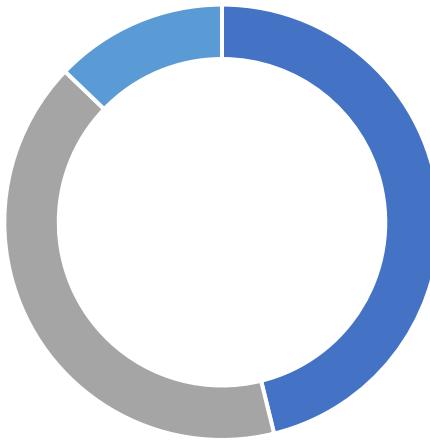
6. Do you know about ethereum blockchain?



7. Do you know about Solidity program language?

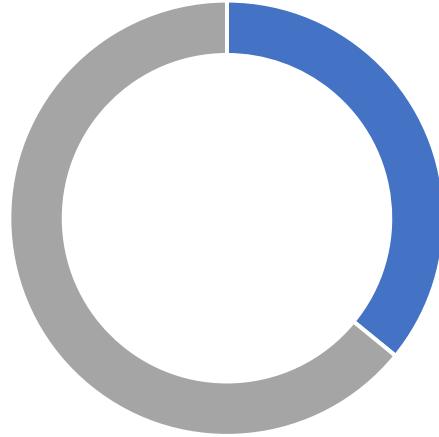


8. Do you know about Proof of Work (PoW)?



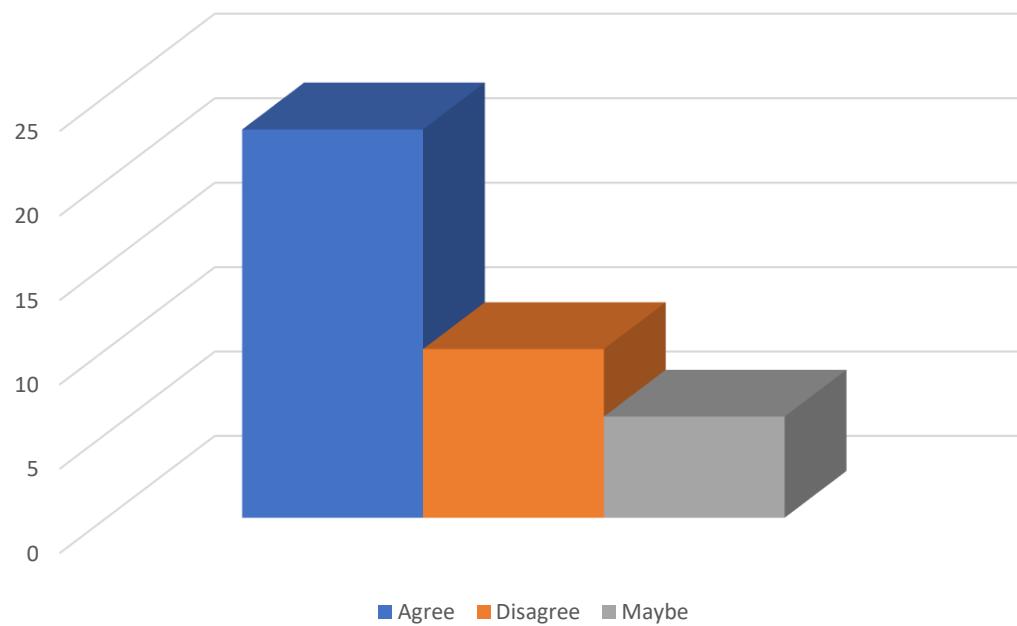
■ Yes ■ No ■ Maybe

9. Are you heard about gas fees, Nodes, dApp, hash, ledger, DAO?



■ Yes ■ No

10. Are you agreed with Utilizing blockchain & smart contract can helps physical works?

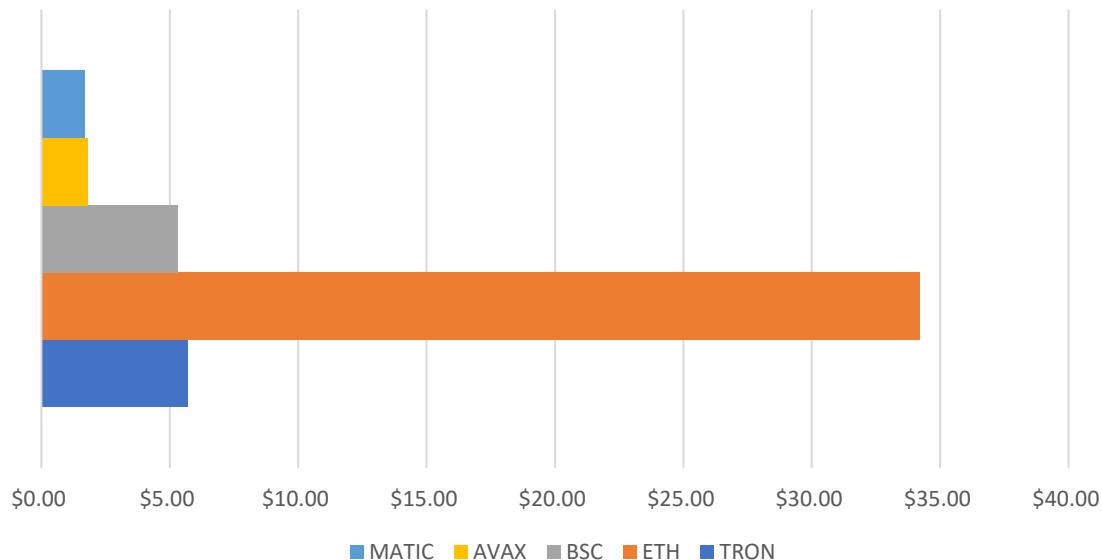


Method 02

[17][36]

I. Cryptocoupe

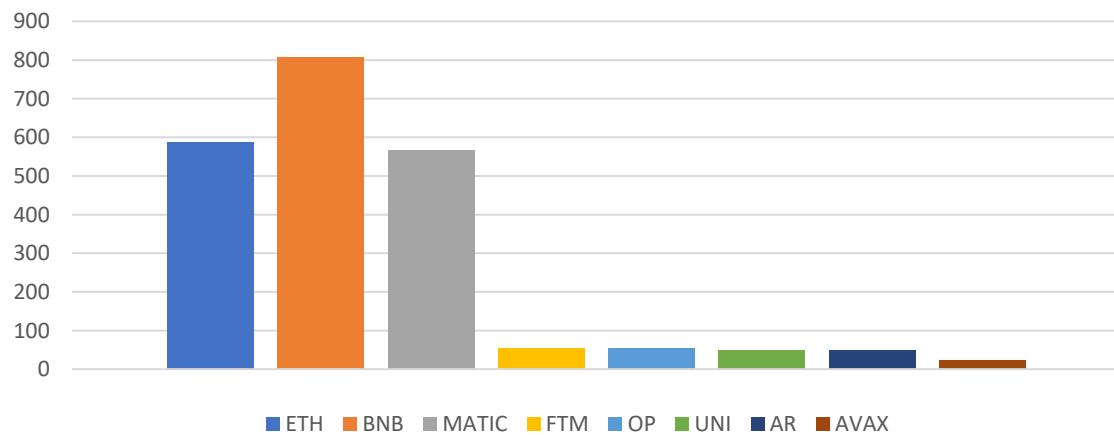
Top Blockchain by total users values



*All rates are billion dollars

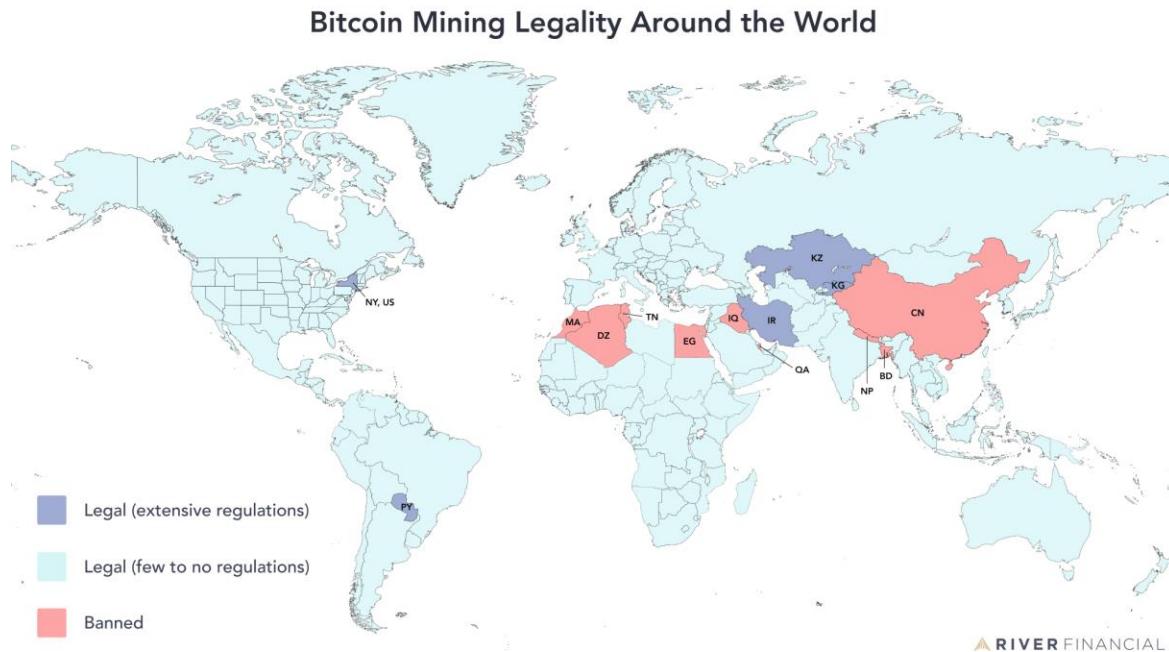
II. Crypto exchanges

New active users in various blockchain



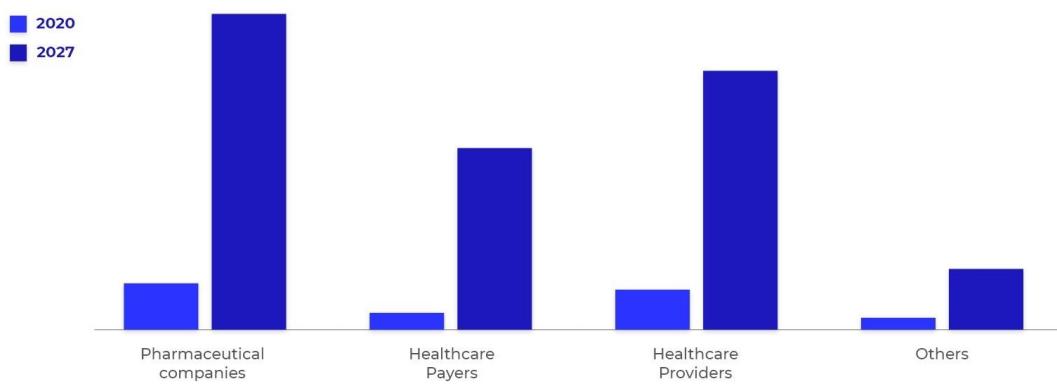
Method 03

- 1) Source: Bitcoin mining legality around the world Research by River finance



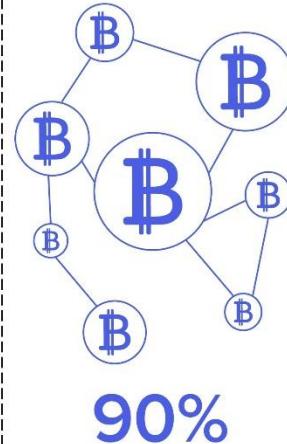
- 2) Source: How to use blockchain technology to banking, healthcare? by appinventiv[02][03][04]

Global Blockchain Technology in Healthcare Market, By End-use, 2020 & 2027 (USD Million)



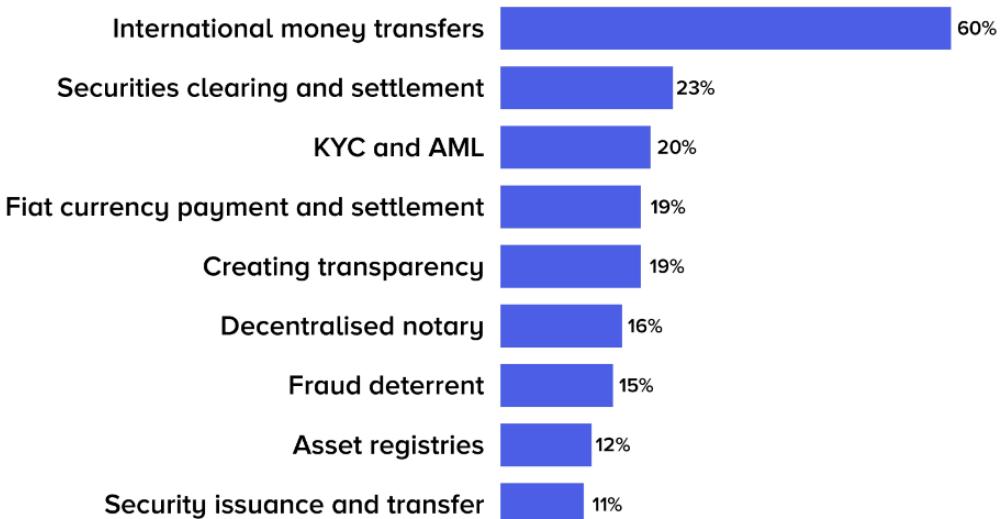
POTENTIAL OUTCOMES OF BLOCKCHAIN IN BANKING

Global annual cost savings would equate to US\$12 billion

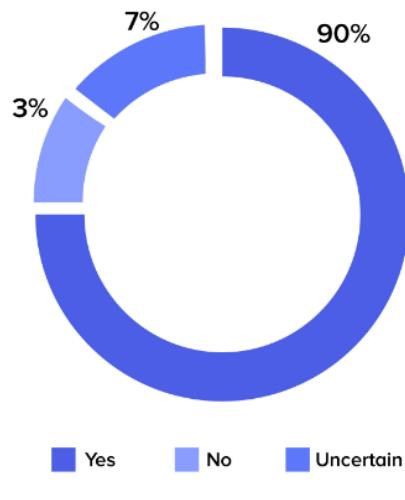


90%
of bankers worldwide
say their bank is
exploring the use
of blockchain

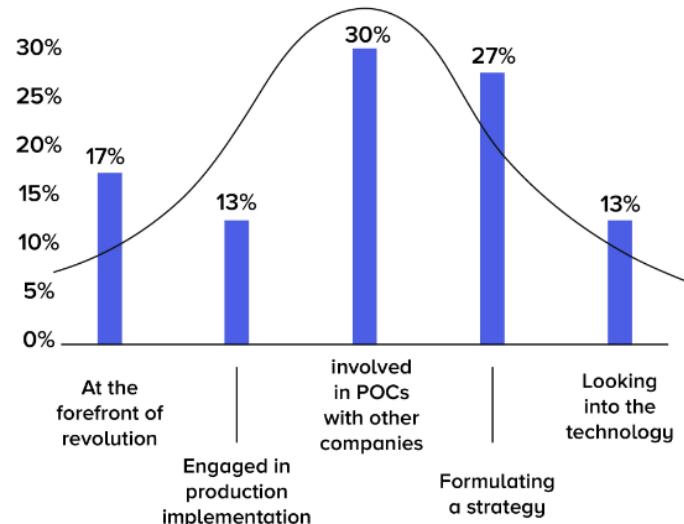
Top Bank Initial Use Cases For Blockchain



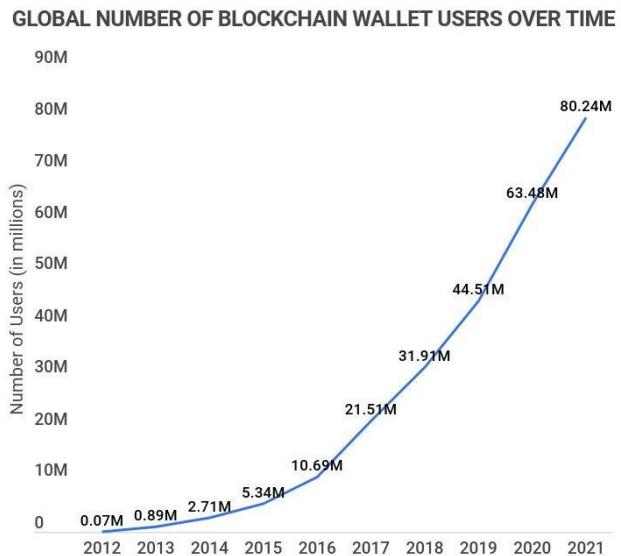
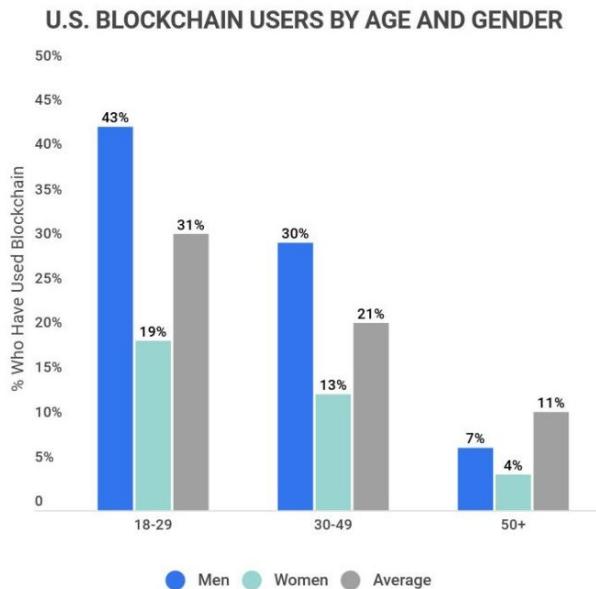
Are you currently exploring the use of blockchain/distributed ledger technology in payment?



Bank's current stage in blockchain adoption



3) Source: Global data for blockchain technology and DEX wallet users, by IBM [10][13]



Method 04

Creating a complete blockchain from scratch is a complex task that involves multiple components, including networking, consensus algorithms, cryptographic operations, and data structures. [16] Writing a full-fledged blockchain implementation is beyond the scope of a simple code snippet. [18] However, this steps involved in creating a simple blockchain in C++. Keep in mind that this is a simplified version for learning purposes and may not include all the robust features of a production-level blockchain. [29][31]

```

● ● ●
1 bool Blockchain::is_chain_valid() {
2     for (int i = 1; i < chain.size(); ++i) {
3         Block current_block = chain[i];
4         Block previous_block = chain[i - 1];
5
6         // Validate the hash of the current block
7         // In a real implementation, you would use a cryptographic hash function
8         if (current_block.hash != current_block.calculate_hash()) {
9             return false;
10        }
11
12        // Validate the previous hash link
13        if (current_block.previous_hash != previous_block.hash) {
14            return false;
15        }
16    }
17    return true;
18 }
```

This is example for blockchain. Also smart contract for ERC-20 token running on ethereum blockchain. [27] Click the link below for full simplified version of creating blockchain and smart contract [28]

[blockchain.cpp](#)

[smart contract.sol](#)

4. Discussion

After more than a month of research, the results were obtained according to the research topic. Research is mainly aimed at surveying and derive conclusions from research done by others. Our survey mainly focused on showing that blockchain technology & smart contract can be applied to various tasks in normal life. Such as healthcare, business, banking. [05][07]

The research used data from 39 people in Sri Lanka and drew conclusions from data from nearly 1,000 people of all around the world. It is important to find out whether the people of Sri Lanka have any understanding of this technology or not. Blockchain technology is a very difficult thing to learn and develop within cryptography and computer/data science. Then people don't pay attention to them. A large number of people in Sri Lanka have no idea about cryptocurrency, which is a primitive element of this technology. It can be said that people who have no idea about them are not interested in using them because they are not aware of technology like blockchain.

From the data obtained in this way, 60% of the people of Sri Lanka say that this technology can be used in the normal life, and 30% of the people say that the technology does not help people. 10% of the people say that it can sometimes help. In terms of age, there are more people under 20 years and 80% of them are male. Also, 62% of the people know some amount about this blockchain technology and 38% of the people do not know anything about this technology. Also, 51% people know about ethereum blockchain, which is a modern revolution in blockchain technology, and 49% people do not know about that ethereum blockchain. [36]

Considering all the factors, the people who know something about this technology in Sri Lanka are under the age of 35 and the older people have no knowledge about it. Therefore, most of the older community says that they are not suitable to use this technology, while the people under 35 years of age say that they can use this technology in their normal life with some interest and willingness.

Globally, about 700 new people in every country are looking for this technology per day, while in Sri Lanka it is limited to 2 people. It can be said that the reason for this is that there is less knowledge about that technology in Sri Lanka and the people who know about it have not shared it with others. Also, a large number of countries globally have legally allowed cryptocurrency and bitcoin mining, but it is still prohibited in Sri Lanka, which may be the reason why people in Sri Lanka do not want to use these technology. So in the year 2012 there were about 0.07 Million people globally who used this technology to make online transactions and by the year 2022 it has increased to about 90 Million. It can be said that day by day people are gaining confidence in this technology. [20][21]

A good news about blockchain, Polygon co-founder Sandeep Nailwal has announced that the Firozabad police has launched a complaints portal powered by the polygon blockchain. The complaints portal will be a valuable tool for the police in the fight against crime and corruption within the local administration. The move is significant as it marks the first time law enforcement in India will be using emerging technologies such as blockchain. In a statement on Twitter, the portal will help the police register complaints and aid them in criminal investigations. [30][32]

Here are some Quotes about this web3.0 blockchain technology [15]

“Blockchain is the biggest opportunity set we can think of over the next decade or so.”

-Bob Greifeld, Nasdaq Chief Executive

“Whereas most technologies tend to automate workers on the periphery doing menial tasks, block chains automate away the center. Instead of putting the taxi driver out of a job, blockchain puts Uber out of a job and lets the taxi drivers’ work with the customer directly.”

-Vitalik Buterin, Co-Founder of Ethereum

“Anything that can conceive of as a supply chain, blockchain can vastly improve its efficiency- it doesn’t matter if its people, numbers, data, money.”

-Ginni Rometty, CEO IBM

5. Conclusion

For more than a month, by asking whether blockchain technology & smart contract can be used to make simplify, easier and more secure lifestyle, by preparing a questionnaire through google form and collecting people's opinions online and studying research reports related to this by others. The advantages and disadvantages obtained by studying the related channel reports that inform people in this regard are presented below. [20]

Several points can be mentioned according to the results obtained.

- a) Compared to other countries globally, this knowledge group in Sri Lanka is very less and such technology has been used in other countries, but it is still not used in Sri Lanka.
- b) Regarding the use of this technology in normal life, we cannot get a very good positive response from the elderly community, but the young community has a somewhat positive opinion about this.
- c) By giving the young community a very good knowledge about this technology (how to use it, job opportunities, what they get), there is a chance to use this technology in Sri Lanka. [19]

Finally, popularizing this kind of technology in a country that is still developing is very difficult to do. Teaching this technology from the beginning using the youth community has the potential to make this technology an essential process for Sri Lanka. This technology can be used for actions such as reduction of cyber-attacks & cyberbullying, personalization of diseases, online banking, distributed ledger money payments, healthcare, crypto legality, Blockchain Wallets, and it provides very high security and this technology can also be used to make everyday life easier.[05][21]

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special thank goes to my parents for helping me consistently right to the end to make things possible and I also thank to all other parties who helped me to make this research a success.

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