**Presentation of the Chosen Study**

**Uses and Functions**

Due to blockchain's capabilities and potential, it can be applied in various areas, including financial services and administering voting systems. The following are some of the areas where blockchain is used:

1. **Cryptocurrency**

The Global Financial Crisis 2008 significantly impacted trust in traditional financial systems and institutions. In response, Bitcoin emerged as a prominent cryptocurrency, offering an alternative independent of central banks and traditional financial institutions. This event ignited curiosity and interest in cryptocurrencies, leading more people to explore digital currencies like Bitcoin and Ethereum. As the usage of cryptocurrencies increases, it paves the way for the wider adoption of blockchain technology (Rodeck & Curry, 2022).

Cryptocurrencies are digital currencies that facilitate peer-to-peer transactions, including buying, exchanging, and spending. At the heart of cryptocurrency is blockchain, a decentralized and distributed ledger that records transactions across multiple computers or nodes. Each transaction is grouped into a block and added to a chain of previous blocks, creating a chronological history of all transactions. The decentralized nature of blockchain ensures that no single entity or central authority has complete control over the system, making it resistant to manipulation and censorship.

Cryptography, which involves secure communication in the presence of third parties, plays a crucial role in blockchain technology. The term "crypto" in cryptocurrency highlights the significance of cryptography in securing transactions and protecting user information from malicious activities.

The growing acceptance and utilization of cryptocurrencies and participation in blockchain networks by individuals contribute to the expansion of blockchain technology. As the user base continues to grow, it strengthens the foundation for broader adoption and integration of blockchain across various sectors and industries.

1. **Banking**

Blockchain technology offers significant advantages in the world of financial transactions. With its decentralized and transparent nature, transferring fiat money, such as dollars and euros, through a bank or financial institution becomes faster and more efficient. Transactions can be quickly verified and processed, even outside normal business hours.

One key advantage of blockchain is its elimination of third parties (bank companies), enabling direct and peer-to-peer transfers. This reduces costs and enhances the speed and efficiency of transactions.

Additionally, blockchain provides an additional layer of security. Transactions are recorded on a distributed ledger, where each transaction is encrypted and linked to the previous one, forming an immutable information chain. This ensures transparency and safeguards against fraudulent activities.

1. **Asset Transfers**

The concept of ownership has expanded to encompass digital assets in the online world. Digital ownership refers to the rights and control one has over digital assets. As the internet and digital economy have grown, the importance of digital ownership has become more prominent. Blockchain technology enables secure and decentralized digital ownership, revolutionizing how we manage our digital assets.

Blockchain, smart contracts, and digital signatures ensure a secure and transparent record of ownership and asset transfers. The blockchain serves as a decentralized ledger for recording ownership, while smart contracts enforce agreements between parties. Digital signatures provide proof of asset ownership.

*Fractional ownership* becomes possible through blockchain, as assets can be divided into digital tokens. This introduces benefits such as transparency, security, liquidity, and accessibility, simplifying the process of buying and selling.

Blockchain technology tracks and facilitates the transfer of ownership for non-fungible tokens (NFTs), which represent ownership of digital artwork and videos. NFTs are assets tokenized through a blockchain (Sharma, 2023).

NFTs create unique digital certificates recorded on a decentralized digital ledger or blockchain. Each NFT has a distinct digital signature that establishes ownership. NFTs can be traded and exchanged for money, cryptocurrencies, or other NFTs, depending on their value, market conditions, and the preferences of the owners. The immutability of the blockchain ensures a secure and transparent record, enabling seamless transfers of NFTs between owners.

Various NFT platforms and marketplaces have emerged, offering a space for artists and creators to showcase and sell their digital assets. Platforms including OpenSea, LooksRare, and X2Y2.io provide a marketplace where NFTs can be bought, sold, and traded. These platforms use blockchain technology to ensure transaction transparency, security, and the uniqueness and ownership of the NFTs.

**Fungible Tokens vs Non-Fungible Tokens**

Fiat currencies and cryptocurrencies like Bitcoin and Ethereum are interchangeable and have equal value. Fungible tokens are identical and can be divided into smaller units without losing value. For example, exchanging one bitcoin will always have the same value as any other. The same principle applies to Philippine currency, exchanging a 100 peso bill for another 100 peso bill will have the same value since both bills are identical. Each 100 peso bill is worth the same amount and is interchangeable. The value of each individual 100 peso bill is the same, so it doesn't matter which one you have.

On the other hand, non-fungible tokens (NFTs) are unique and indivisible. They represent ownership of a specific item. Each NFT contains a distinct item or piece of content stored on the blockchain, providing proof of ownership and authenticity. In the actual world, the intellectual property rights for artistic and creative works relate to owning digital assets. Each original artwork is unique and possesses its own intrinsic value. Just as an artist can create a one-of-a-kind masterpiece that cannot be replicated, a non-fungible token represents the ownership and authenticity of that artwork. In a similar way, NFTs can show ownership and authenticity for digital assets like music, artwork, or other kinds of intellectual property, guaranteeing its individuality and value.

1. **Smart Contracts**

Smart contracts are computer programs that automate and facilitate the transfer of digital assets based on predefined conditions. They function as digital contracts, using code instead of legal enforcement. Initially used in the Bitcoin network, smart contracts gained greater capabilities with platforms like *Ethereum*, enabling the creation of customized contracts using a language called *Turing-complete.*

Blockchain technology is crucial for the operation of smart contracts. It provides a secure and decentralized system where contracts are stored and supervised by a network of computers. Smart contracts possess key features such as distribution to all network nodes, deterministic execution, and immutability once deployed. They operate without intermediaries, allowing customization and ensuring transparency for participants. These contracts offer advantages such as accuracy, automation, speed, backup, security, cost savings, and information management.

To operate, a smart contract relies on the secure coding of the blockchain. It contains predefined rules and conditions that trigger agreement when specific events occur. Each contract possesses a unique address on the blockchain for interactions.

1. **Supply Chain Monitoring**

Supply chains handle vast amounts of information as goods move through various places. However, traditional storage methods can be inefficient and make identifying the source of problems easier. Utilizing blockchain, a decentralized storage solution makes tracking and monitoring the supply chain easier.

Blockchain technology can transform the supply chain by enhancing efficiency and transparency. Companies like Maersk and IBM already utilize blockchain to streamline processes and improve visibility. Acting as a distributed ledger, blockchain securely records transactions, enabling the traceability of products from their origin to sale. This reduces delays, costs, and errors.

Moreover, by eliminating the need for intermediaries, blockchain reduces the risk of fraud and enables comprehensive record-keeping. Shared blockchain ledgers allow companies to synchronize logistics data, track shipments, and automate payments while ensuring data privacy. Direct transactions and integration with RFID tags further enhance efficiency, while the immutability of blockchain records fosters transparency, accountability, and the mitigation of illegal activity.

1. **Healthcare**

Blockchain is a decentralized and transparent digital ledger that records transactions. Blockchain has reached the healthcare industry with a rising acceptance rate (Haleem et al., 2021).

In healthcare, it serves various purposes and offers multiple benefits. It helps facilitate the preservation of product integrity, the prevention of counterfeit pharmaceuticals, and the confidentiality of patient records. Blockchain increases data security, enables accurate treatment and research, and promotes health information transmission. It also improves supply chain management, enhances transparency in the prescription process, and gives patients control over their medical data. By adopting Blockchain technology, healthcare could optimize efficiency, accuracy, and confidence in service delivery. It also helps to reduce financial failures and prevent theft and illegal record transfers.

1. **Voting**

Blockchain technology can enhance the voting system's openness, safety, and reliability. A blockchain-based voting system records each vote as a transaction on distributed ledgers. This decentralized approach protects voters' identities while allowing anyone to verify the vote count (Jafar et al., 2021).

Blockchain technology offers several benefits to the voting process, including transparency, security, trust, fraud prevention, and accessibility. Transparency is achieved by making all transactions visible, enabling easier detection of fraudulent activities. The cryptographic techniques employed in blockchain make altering votes nearly impossible, ensuring their security. These techniques involve complex mathematical algorithms that protect the integrity of each vote.

In addition, the absence of a central authority in blockchain fosters trust among participants, who can independently verify their votes. Blockchain's consensus mechanisms, such as Proof of Work or Proof of Stake, make it challenging to manipulate votes, thus preventing fraud.

Furthermore, blockchain enables secure remote voting, increasing accessibility for individuals unable to visit polling stations.

**Importance**

Blockchain technology is straightforward yet constantly evolving, expanding the network of blocks to meet the specific needs and characteristics of various industries (Haleem et al., 2021).

As a distributed ledger, blockchain ensures transparency, security, and immutability across sectors. In the digital currency world, it offers trust, transparency, and resistance to manipulation, providing an alternative financial system. Eliminating intermediaries enables faster and more efficient transactions while maintaining an immutable record in banking. Blockchain also revolutionizes digital asset ownership through decentralized record-keeping, fractional ownership, and seamless transfers of assets like NFTs.

Moreover, blockchain ensures secure and transparent smart contract operation, offering benefits such as accuracy, automation, speed, security, and cost savings. It enhances supply chain efficiency, transparency, and traceability by securely recording transactions, reducing fraud risks, and streamlining processes. In the healthcare industry, blockchain improves data security and product integrity and prevents counterfeit pharmaceuticals, enabling accurate treatment and research. Additionally, it enhances supply chain management, prescription transparency, and patient control over medical data. Utilizing blockchain-based voting systems fosters openness, security, trust, fraud prevention, and accessibility through transparent and tamper-resistant vote records, enabling secure remote voting.