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Abstract

The promise - and ability - of blockchain to drive business impact is massive, but how publicized is it and how much is reality?

The blockchain will touch, if not disrupt, every major industry and even change the way people and societies interact. It is a technology that increases efficiency, reduces costs, and promotes transparency and can have significant implications for areas that are dedicated to tremendous impact. The ability to change existing processed and systems and decentralized infrastructure / ownership may enable solutions that were not possible before.

But the even bigger question is, are we at the pinnacle of a future-defining technology that will drive massive business impact, or is the latest technology's blockchain --- noisier than substance?

The report is the result of an analysis of more than 6 organizations, initiatives, and projects that are impacting the business to leverage blockchain. The report also features a first-hand analysis of the world's first blockchain-based supply chain financing solution designed and implemented by me. This work is captured by mapping the landscape of such blockchain applications, which blockchain applications have already begun to demonstrate the proven impact that industry use cases are more or less advanced, and We must learn from various test cases, proof of concepts, pilots, and experiments that are using blockchain for commercial impact in the supply chain and payment industry.

1. Introduction

Blockchain enables real-time settlement of transactions, thus reducing the risk of one party not paying for the transaction. The blockchain is distributed, highly available and ensures that a secure record of transaction evidence is maintained.

The blockchain economy is a scenario and potential environment in which cryptocurrency replaces current monetary systems, possibly on a global basis. Because P2P transactions through blockchain do not require the help of an intermediary, it reduces the cost of each transaction and increases it faster than traditional methods.

Many of the things required for reliability and integrity in the supply chain are provided by the blockchain. The blockchain provides consensus — there is no dispute in the chain regarding transactions because all entities on the chain have the same version. Everyone on the blockchain can see the chain of ownership for the property on the blockchain. Records on the blockchain cannot be erased which is important for a transparent supply chain.

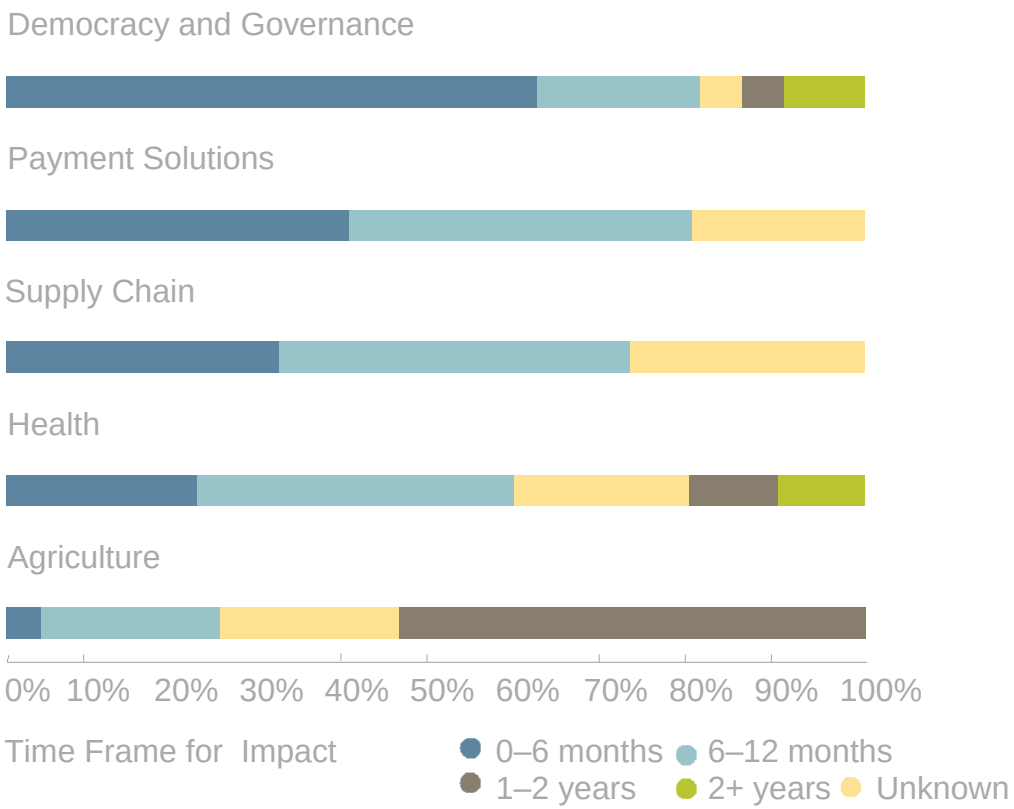
Ultimately, blockchain can increase the efficiency and transparency of **supply chains** and positively impact everything from **warehousing to delivery**.

Due to the complexity of our current supply chains and lack of transparency, there is interest in how blockchain can transform the **supply chain** and **logistics industry**.

A steady boom in new projects, organizations, and platforms, began in 2013 oriented towards the use of blockchain technology and has grown at a rapid pace. This research has identified several new ideas on how to use technology for business impact reflecting several new ideas each month, with many more currently in stealth mode.

Blockchain enables solutions that were not possible before. Blockchain initiatives were researched, with 20% providing solutions to a problem that otherwise could not be solved without the blockchain, and 86% bringing forward solutions that are physical improvements.

It has the second largest reshuffle with supply chain and payment initiatives, with 62% of projects expected to demonstrate impact in the last 2 years.



The Estonian government's early adoption (in 2008) is the most advanced example of government leveraging blockchain technology to enhance government services, with 99% of the country's government services available as e-services through e-Estonia. These services distributed LiDAR databases to increase security, efficiency, and access.

2. Inefficiencies in current Supply chain and Payment industry

Businesses have changed globally but the technologies used in supply chain and payment are immense. In today's era of custom products, the easy shopping experience and transparency is where the goods come from. Such demand is a challenge for the supply chain, as it struggles to provide data transparency over the entire flow.

As the manufacturing process becomes more complex, the supply chain always becomes extremely complex and inefficient. In fact, if you really think about it, the supply chain management system, as we know it, is broken.

2.1 Major Issues in Supply Chain

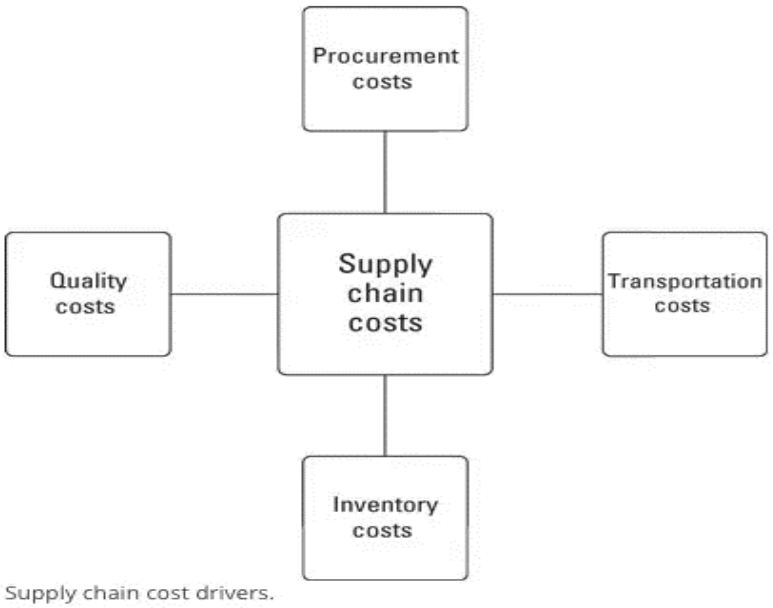
International trade, and supply chains that support global commerce, are still based on highly inefficient and outdated processes and technologies that facilitate the movement of goods and related payments from suppliers to consumers.

- **Difficult to Track Down**
  Lack of transparency is a major issue in modern supply chains. If your phone has a faulty component, it is absolutely impossible to know where this faulty piece came from and who is the person responsible for it.

- **Corruption**
  The problem with running a complex supply chain is that you have to rely on all the participants to do their work. You need to rely on them to provide quality while adhering to standard safety standards. However, humans are not really reliable and are victims of corruption.

- **Costs**
  There are four main factors that shoot down costs in traditional supply chains:

  a) Procurement Costs
  b) Transportation Costs
  c) Inventory Costs
  d) Quality Costs



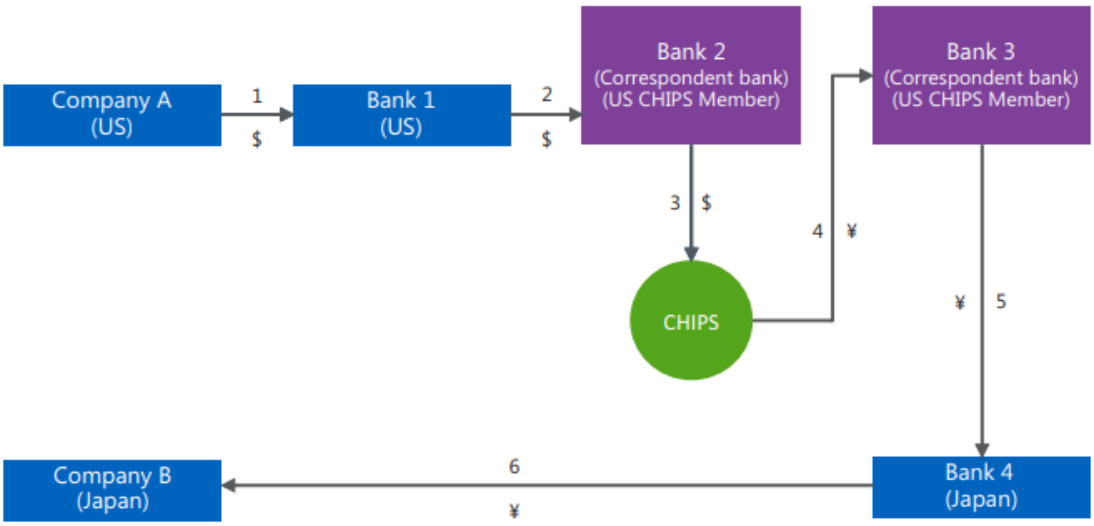
Supply chain cost drivers.

- **Globalizations**
  Most companies have to run their supply chain through multiple countries to procure different parts of their products. However, this brings with it many more problems. Remember that your suppliers are in very different geographical locations, which makes it really difficult to coordinate and collaborate.

2.2 Inefficiencies in today's payment industry

Remittances and money laundering cause the loss of trillions of dollars. Every year $ 2 trillion is lost in money laundering which is about 2–5% of global GDP. Cross-border transactions take time and money, with an average of 7% sitting according to the World Bank report.

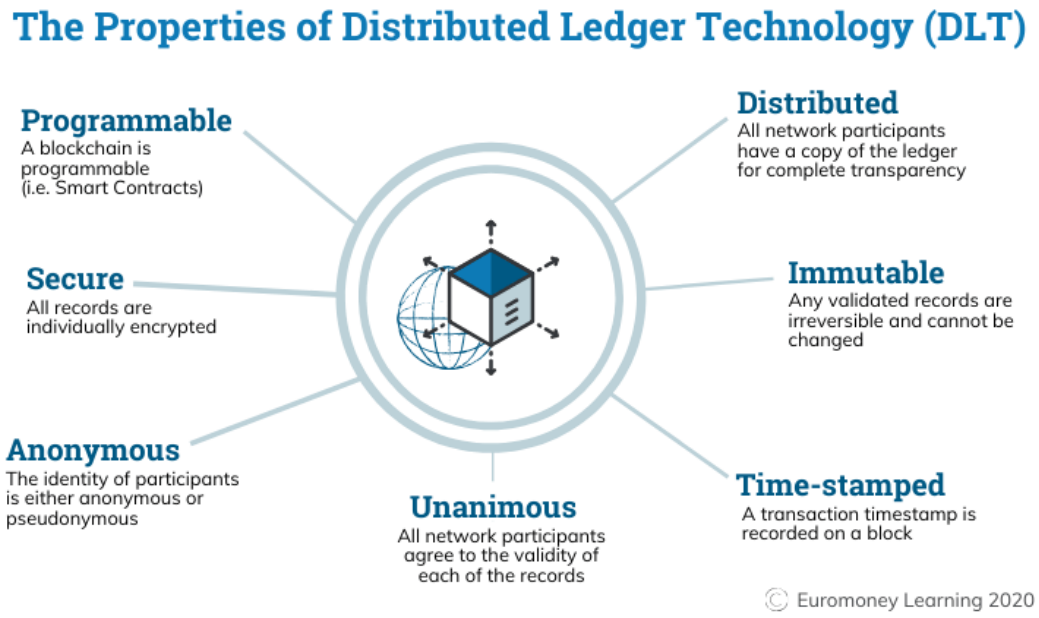
Compared to domestic payments, cross-border payment processing is quite complex. For example, if Company A in the US wants to send a dollar payment to the current payment to Company B in Japan, it will rely heavily on correspondent banks in the respective geographies, resulting in processing delays, increased transaction costs, and Customer experience will be poor.



To address this issue, the bank will develop common technical standards to enable interoperability and broad adoption of blockchain, improve network scale efficiencies and adopt a standardized mode of communication as part of its overall strategy Will need to concentrate.

3. Introduction to Blockchain

Invented by Satoshi Nakamoto in 2008, the blockchain is known as distributed ledger technology, which is duplicated and distributed across the entire network of a computer system. Each block contains a number of transactions and each time a new transaction occurs on the blockchain.



Blockchain consists of three important concepts: blocks, nodes, and miners

Blocks

Each block consists of multiple blocks and each block has three basic elements

1. The data block
2. A 32-bit whole number called nonce
3. 256-bit number wedded to the nonce.

Miners

Mining creates a new block on mining through a chain called mining. Use special software to solve an incredibly complex hash problem with an unrecognized hash that produces an accepted hash. There are roughly four billion possible non-hash combinations that must be mined before being corrected. When this happens, the miners are said to have found a gold sign and their blocks have been added to the chain.

Nodes

No computer or organization can own a chain. Instead, it is a distributed ledger through nodes connected to the chain. Nodes can be any kind of electronic device. Each node has its own copy of the blockchain. Since blockchains are transparent, every action in the book can be easily checked and viewed. Each participant is given a unique alphanumeric identification number that reflects their transactions.

There are different types of blockchain networks and they are

1. Public blockchains
2. Private blockchains
3. Consortium blockchains
4. Hybrid blockchains

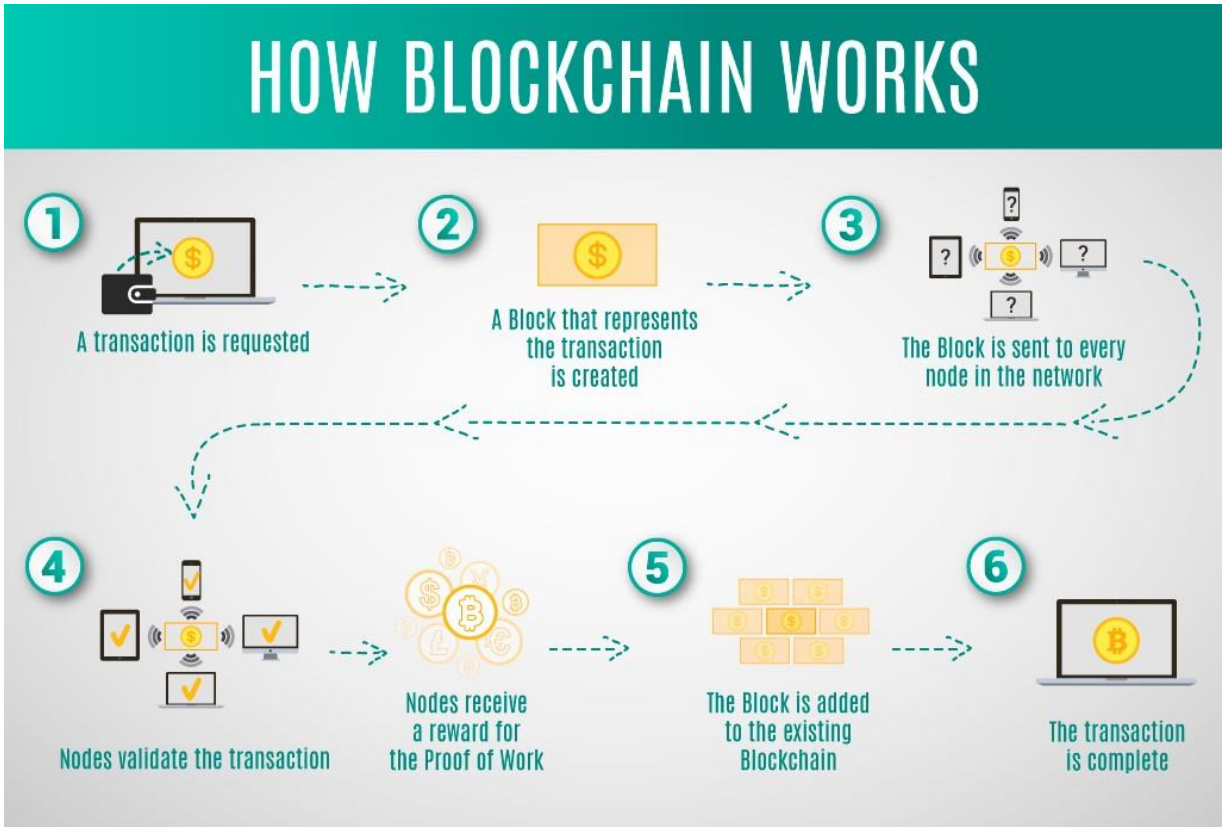
Multiple types of blockchains are

1. Permission less
2. Permissioned

Different core components of blockchain are

1. Node
2. Transaction
3. Block
4. Chain
5. Miners
6. Consensus

How Blockchain works



Important characteristics of Blockchain

1. Cryptography
2. Immutability
3. Provenance
4. Decentralization
5. Anonymity
6. Transparency

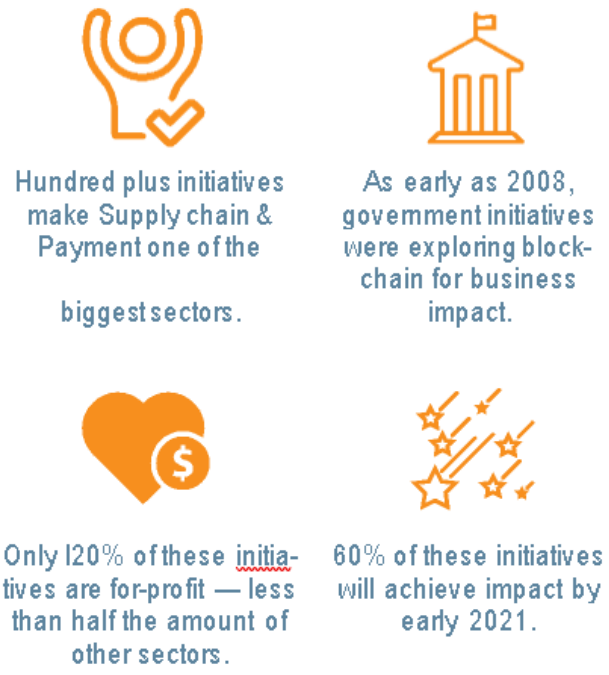
4. Blockchain Initiatives

Blockchain technology has huge potential to overcome various limitations and infancies and improve transparency in almost all areas. Having tremendous advantages and scope for this cutting-edge technology at least more than 200 companies and government organizations have varieties of initiatives in last 2 years.

In India Central Government, Telangana and Bangalore local authorities including Major banks like ICICI, HDFC, SBI have invested in blockchain technology to ease the pain, improve transparency, and lower cost in the existing systems.

Karnataka government in collaboration with PwC has announced the creation of a marketplace for intellectual property rights using blockchain

Telangana has developed a Blockchain District near Hyderabad. West Bengal has started a pilot project on issuing birth certificates on the blockchain.



Maersk the shipping solution giant and IBM together Introduced TradeLens Blockchain Supply chain solution.

Globally tech giants like Facebook, Barclays Bank, Ripple, IBM, have heavily invested on R&D and have several pilot projects.

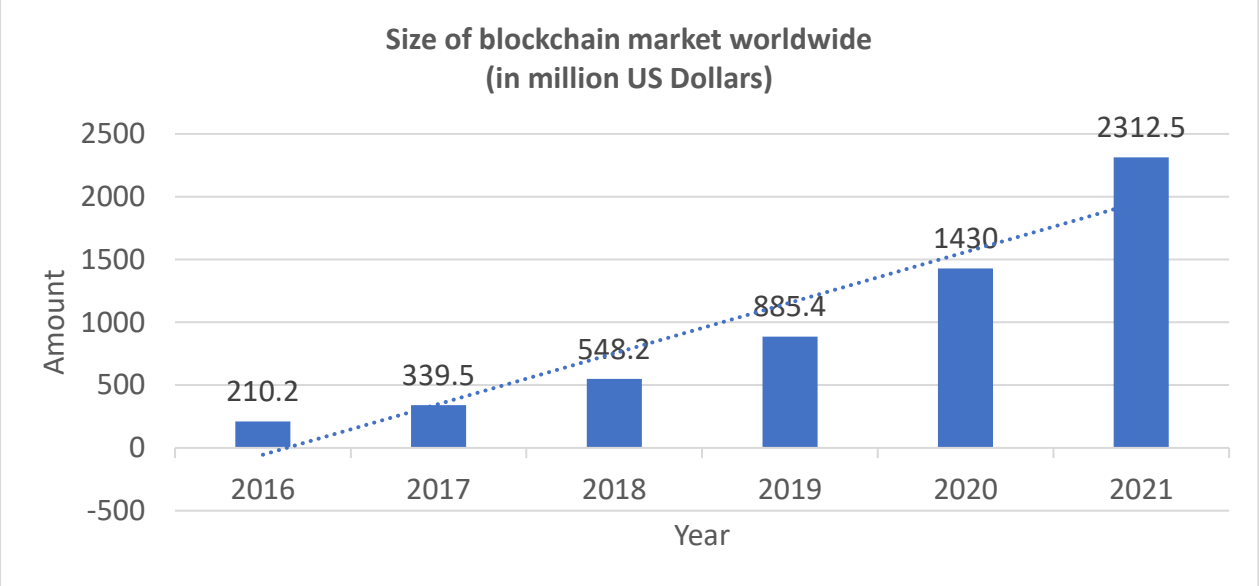
Dubai has implemented 24 different use cases on blockchain including finance education, real state, tourism, healthcare, security, and transportation.

4.1 Payment Industry

Blockchain has many applications in the payment industry including international payments, card-based payments, foreign exchange, trade settlements and many more.

The payments industry has rapidly adopted new technologies to grow at an accelerated speed. The payment landscape has changed over last few decades, resulting in a more stable, real-time, and almost any payment ecosystem. Banks have put lot of effort, time and money exploring new technologies such as web and mobile applications in order to change payments.

Banks are now considering using blockchain for faster payment processing. Some banks in India including HDFC, SBI is already working on several proof of concept (POC) and pilots.



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4.1.1 Blockchain Adoption in the Payments Industry

Blockchain adoption for a cross-border payment processing will also necessitate banks to shift to a new business model, which comes with elements of risks.

- Technical Standards

  To address this issue, the bank will need to focus on developing common technical standards to enable interoperability and accelerate broader adoption of blockchain, improve network scale efficiencies and adopt a standardized mode of communication as part of their overall strategy.

- Regulatory and Compliance standards

  In order to enable greater transparency and ensure fewer risks for customers, regulatory agencies have mandated numerous new regulations on top of the

existing established frameworks like the Dodd-Frank Wall Street Reform and Consumer Protection Act, the General Data Protection Regulation and so on.

- Governance Standards

  Banks are currently facing issues around the accountability and ownership of the distributed ledger that stores the transactions as well as transaction reversal. Since transactions processed using the distributed ledger are immutable and cannot modified or cancelled.

- Security Standards

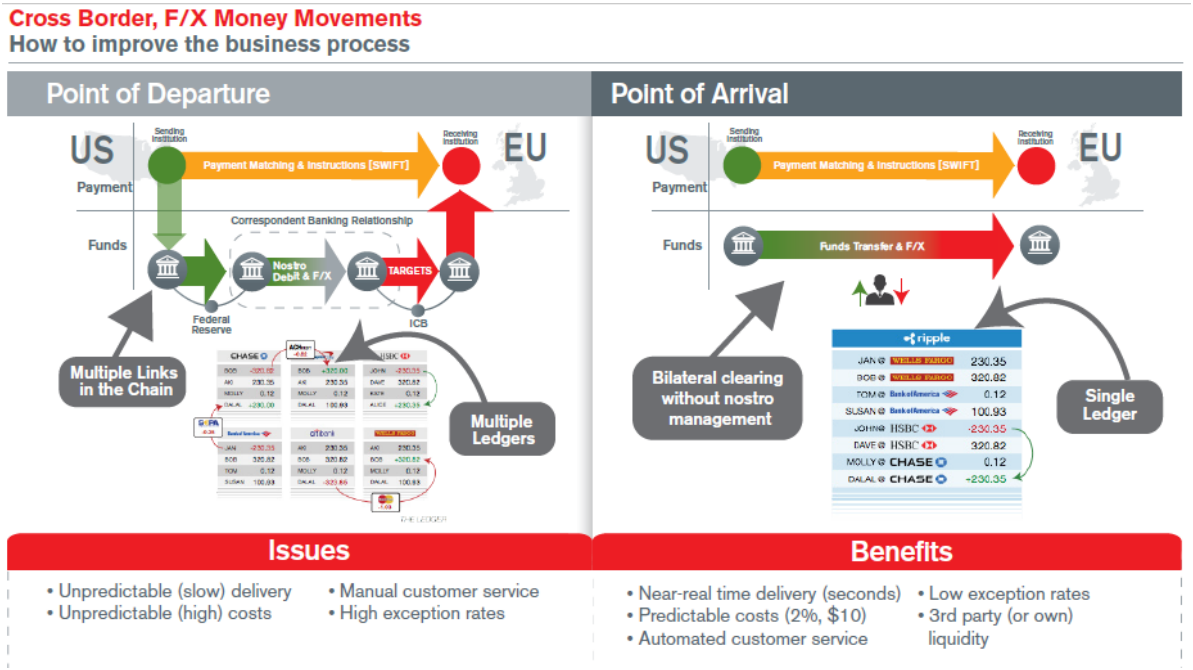
  Use of blockchain for storing the information is one of the security concerns for participants as all the information will be visible within the network. The bank must lay down stringent security standards and educate users about maintaining robust user credentials, installing anti-virus software, and ensuring periodic scan of computer etc.

What Bank Must Do

1. Identifying fintech partnerships and define strategic blockchain driver and framework for processing international payments.

2. Utilize cryptographic networks to ensure data security and establish required levels of access to sage guard the network.

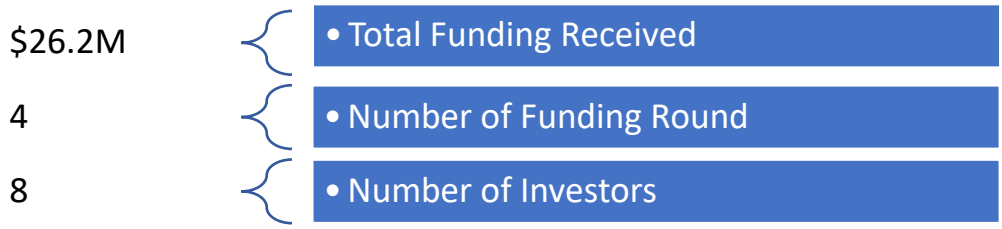
3. Ensure the scalability of the blockchain framework to handle growing traffic, banks can store a part of the transactional data on the main net and sensitive information on side chain to ensure data privacy.



4.1.2 Companies Using Blockchain Payments

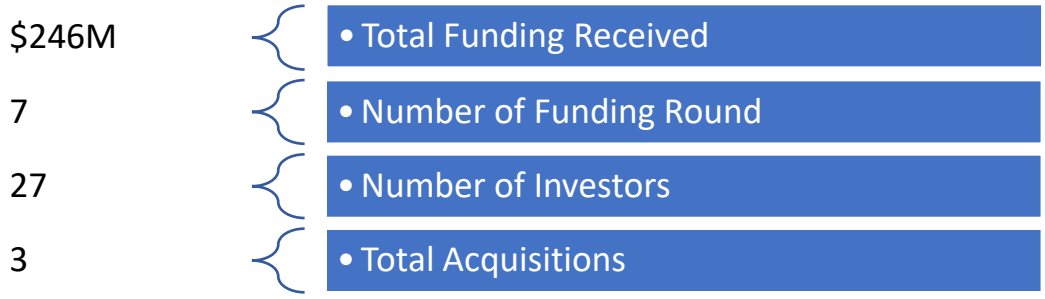
- **Airfox**

  Airfox is a blockchain based decentralized platform that allows those in underbanked regions of the world make payments, receive small to medium loans, and send money all over the world. This Ethereum -based platform uses the company's **AirToken** to provide peer-to-peer payments for utility bills, goods, and services.



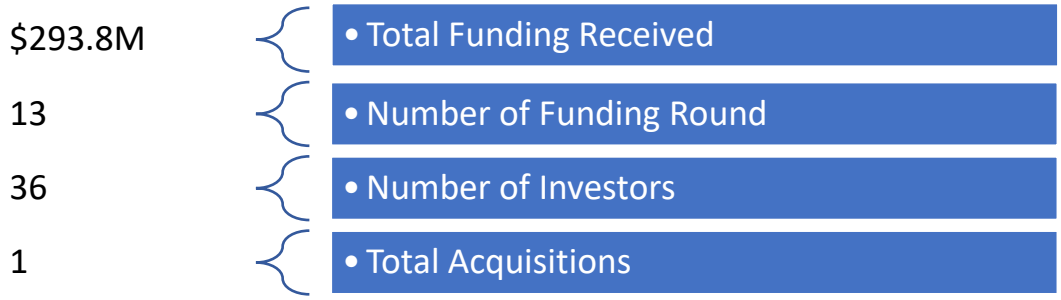
- **Circle**

  Circle Pay blockchain allows for the safe transfer of money between different individuals, currencies, and countries. The Circle Pay function is available in 29 countries and in U.S. dollars, Euros and British Pounds. Each money transfer or payment is encrypted on a blockchain to ensure a safe transaction

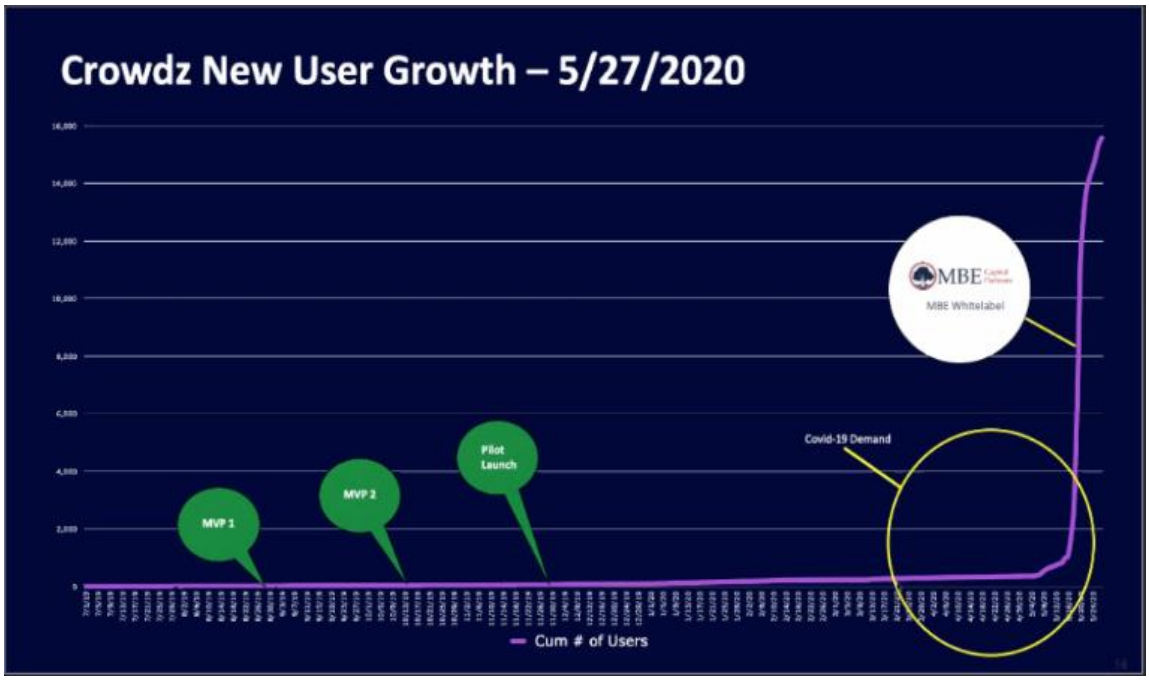


- **Ripple**

  Ripple's blockchain lets users send money and make payments across the globe. The company's RippleNet platform facilitates the quick transaction of payments and requires lower capital amounts for cross-border payments. The company boasts a network of more than 175 banks and commercial platforms that use RippleNet for cross-border payments.



- **Crowdz**
  Crowdz is an application that makes the supply chain easier and faster and with their **invoiceXchange** - invoicing auction platform where vendors can get paid faster. Crowdz protects and manages data on the blockchain. It provides invoice-financing opportunities to companies in global supply chains - a $ 9 trillion market that has traditionally been excluded from SMEs. The need for such financing is greater than ever. Some 93% of all supply-chain participants are SMEs, and half of these suffer from cashflow shortages as they wait 60 to 120 days or more to pay. Crowdz's global invoice auction directs SMEs to competitive, low-cost financing, while offering higher returns to funds seeking better investment.



During covid-19 pandemics, the platform gained tremendous traction and user based increased by 3200% in just a month (As per internal report)

$6.9M	• Total Funding Received
7	• Number of Funding Round
24	• Number of Investors

4.2 Supply Chain

The supply chain consists of a complex network of suppliers, manufactures, distributors, retailers, auditors, and consumers. Blockchain's shared IT infrastructure will streamline workflow for all parties, no matter the size of the business network. Additionally, a shared infrastructure will give auditors greater visibility into the activities of participants along the value chain.

As the supply chain becomes more complex in nature, diversified stakeholders are involved, and rely on a number of external intermediaries, de-tangling all the data / document / communication exchanges happening with the blockchain supply chain ecosystem Emerged as a strong contender.

Top 5 most important areas of supply chain management that can be improved with blockchain

- **Transparent and controlled transactions**
  Blockchain results in faster and more transparent settlements, automatically as a book in updates. Payment terms can be pre-programmed so that it is only visible to authorized participants

- **Waiver of transaction fee**
  When cross-border payments use SWIFT, transaction fees are deducted only after completion of the transaction. Where like blockchain, you already know the fees

- **Auditability**
  All transactions are immediately visible to authorized parties, meaning that no one can tamper, delete, or hide information.

- **Reliable**
  As blockchain is distributed in nature, blockchain does not have a single point of failure. Furthermore the transaction in blockchain is irreversible and irreversible, eliminating the risks of fraud.

There are three properties of the blockchain technologies that would truly disrupt the existing supply chain management systems and they are as follows

1. **Decentralization**
   This basically means that any data stored inside the blockchain is not owned by a centralized entity, but shared by everyone, which is part of that blockchain's network.

   The problem with the current supply chain industry is that all suppliers and purchasing executives inadvertently become their silos of information. There is nothing that is going to tell us with 100% assurance that the information these people are sending is 100% authentic or not.

2. **Immutability**

   Immutability simply means non-tamperable. Any kind of data that you put in to the blockchain cannot be tampered with.

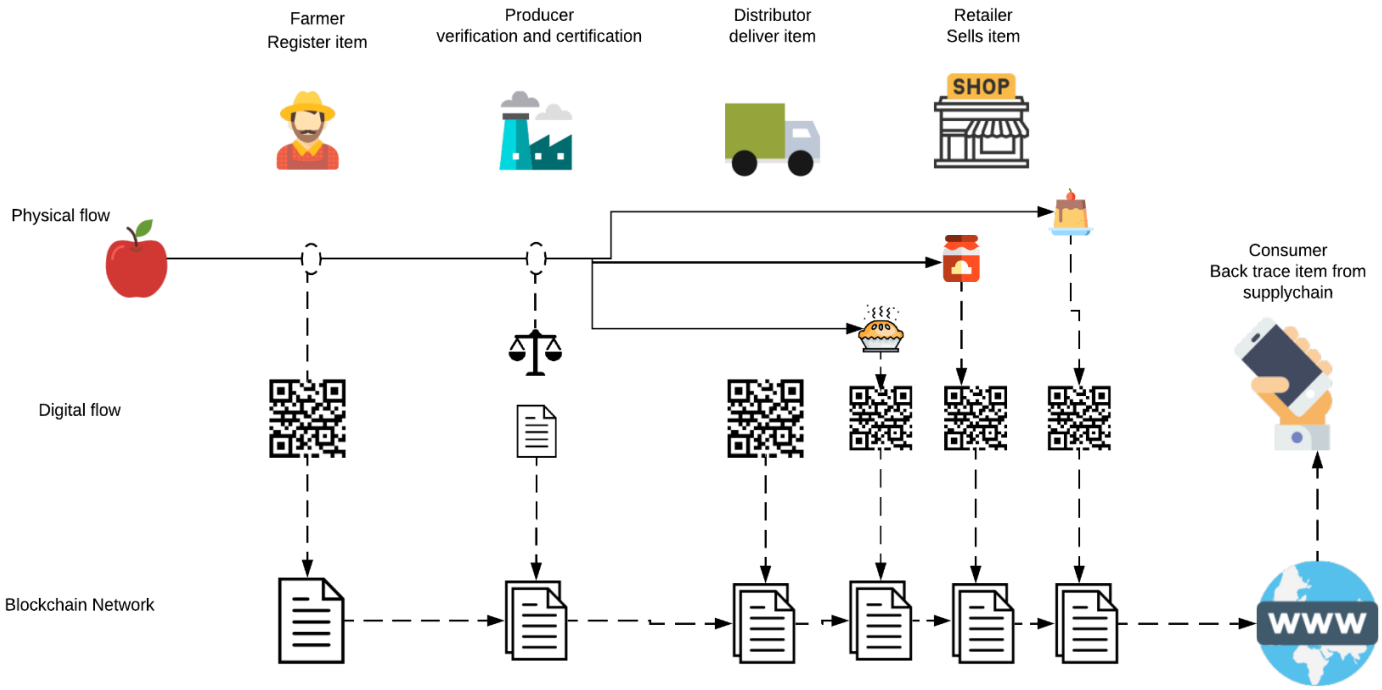
   After entering the data inside the blockchain it is impossible for anyone to tamper with financial records and justify the additional payment. The reason why blockchain gets this property is cryptographic hash function.

   In simple terms, hashing refers to taking an input string of any length and giving an output of fixed length. In the context of a bitcoin-like cryptocurrency, transactions are taken as inputs and run through a hashing algorithm (Bitcoin uses SHA-256) that returns an output of a fixed length.

3. **Transparency**

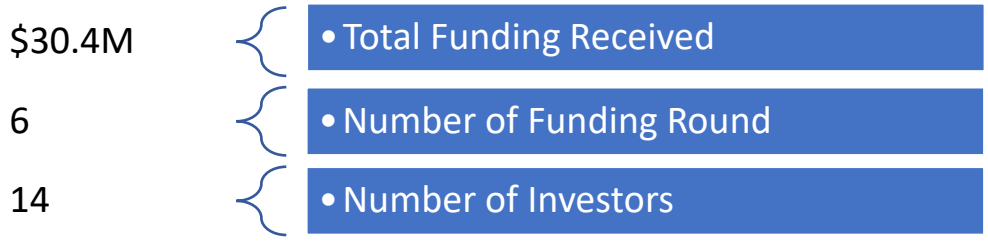
   If you know the public address of one of these big companies, you can pop it into an explorer and see all the transactions that they have engaged. This forces them to be honest, something they have never had to do before.

   The transparency of the blockchain helps in careful documentation of all the suppliers of a product from its point of origin. This increases trust between different parties in the supply chain as all data appears for everyone to see.



4.2.2 Companies Using Blockchain in supply chain

- **Everledger**
  Everledger is a global technology enterprise specializing in addressing real-world economic, environmental, and social challenges through its solutions that build an ecosystem of trust. It is an ecosystem of trust where all stakeholders within a network are able to collaborate through a reliable data protocol. This trust is built through the ability to locate and manage assets during their lifetime journey, across individual touchpoints within the ecosystem.
  The company's successful solutions use the latest in emerging technologies including smart contracts, machine vision and IoT, along with their proven and scalable blockchain-enabled platforms. They combine a rich forensic approach to identify and track asset identities to provide confidence in the driven transparency in global supply chains. This confidant brings stakeholders with the trust that has been built.



5. Government Policies

Governments around the world have been shaken by the rapid wave of disruption purchased by blockchain technology. They cannot stay away from the fact that the adoption of blockchain is the key to moving forward. Policymakers and legislative bodies at the federal and central levels have felt the need to adopt emerging technologies to reclaim the benefits of innovation.

The Berkeley Research Group in London believes that one of the main barriers to implementing blockchain in the public sector is a low level of understanding.

Awareness and competence of the jurisdiction and the political leaders and senior civil servants who run them. Particularly there is a strong civilian sentiment towards advanced technology (AI, and blockchain among them). This will eventually have negative effects in regulation.

Governments that do not invest themselves in upscale, and provide a clear policy direction, and the regulatory framework will eliminate future victimization, not its architects.

5.1 Should we regulate blockchain?

The blockchain of value presented in the public sector will vary from place to place. In countries such as the UK, blockchain would like to be implemented first to improve the speed and efficiency of processes that require multiple parties to trust each other and yet rely on older, more complex installation systems.

Blockchain can help solve the problems government faces in addressing agricultural issues. Land records can be digitized and stored on the blockchain and by utilizing the variations in digital ownership of land ownership can be greatly reduced. Therefore, it is important for governments to have a policy of blocking the disabled so that technology is affected to solve governance problems.

5.2 Examples of globally led approaches to enable blockchain and decentralized technologies through policy

- **United Arab Emirates**
  The UAE has launched a comprehensive and multidimensional blockchain-themed initiative called Emirates Blockchain Strategy 2021. The strategy aims to transition 50 percent of government transactions applicable to blockchain by 2021. As part of this initiative, Smart Dubai has launched. A blockchain platform as a service to host government use cases and has over 30 blockchain projects under development. Through this policy, government entities are encouraged to establish integration channels aimed at improving the functioning of services, which cuts across many institutions' areas of responsibility, and increasingly digital integration with the private sector Enable The Abu Dhabi Global Markets Financial Services Regulatory

Authority (ADGM FSRA) has initiated a regulatory sandbox and issued guidance for the regulation of crypto assets with the aim of establishing rules to govern the safe operation of cryptocurrency-related finance businesses, Whereas the Central Bank of UAE has warned, confirming that cryptocurrency is not considered as a valid / recognized currency under the existing rules / legislation, and to use it in the context of commercial transactions Is banned from. In addition, the Emirates Authority for Standardization and Metrology (ESMA) is one of twelve members overseeing ISO / TC 307 (ISO Blockchain Standards).

- **Malta**
  Malta's approach is highlighted by their regulation of blockchain and DLT through technology certification, which has been performed with the aim of not stifling innovation. In particular, the MDIA Act establishes the Malta Digital Innovation Authority, which is entrusted with certifying blockchain and DLT platforms via a system auditor that reviews and assesses the technology arrangement and provides assurance on the solution's quality and characteristics. This has been developed to enhance the community's trust in the technology by creating a form of regulation through certification in a sector that is currently lacking such measures.

- **Liechtenstein**
  Liechtenstein has focused on regulating the token economy, making its blockchain act focused on the creation, storage, and transfer of tokens, along with protection for the enforcement of rights associated with each token, thus a token economy. Construction takes place.

- **United States**
  In the United States, many different policies can be considered. The coalition government has taken a proactive approach, enabling the governments of countries to create and implement their own policies and policies. In an effort to attract new attention, some states have taken the approach to remove the legal barriers to blockchain adoption by building blockchain-friendly law. For example, the state of Illinois has published a law called the Blockchain Technology Act, outlining blockchain-approved uses for conducting business and prohibiting Blockchain local government restrictions or smart contracts. Another state that took the lead in creating a policy approved by Wyoming. The state has passed a set of 13 blockchain and cryptocurrency friendly rules. Among them is the introduction of a new type of bank that can hold crypto assets to its customers beginning in 2020. New York State took a proactive approach by building a Bit License, issued by the New York State Department of Finance. Services.

- **European Union**

The European Union has taken a limited approach to introducing blockchain-related policies or legislation, adopting an enabling environment with broader understanding given the member countries. The first move allowed in 2015 by the EU was to allow the cryptocurrency standard currency exchange to exempt VAT from its operations, effectively allowing cryptocurrencies to function as currencies. As a harmonizing prohibition, the EU also authorized the KYC and AML mechanisms to be used interchangeably under the Fifth Money Laundering Directive (5MLD). In addition, the European Parliament is requesting that the European Commission and other EU authorities take various steps to increase the capacity of Blockchain and DLT in the EU, and that any regulatory mechanism towards the DLT must be innovative, must delegate power, and be guided by the principles of non-compliance. technological neutrality and business neutrality.

6. Current Market Trends towards blockchain

Blockchain has the potential to be more secure, streamlined, and faster processing. Technology has made its place in various industry verticals ranging from the retail sector to healthcare and pharmaceuticals. Blockchain technology is a subsidiary of integrated computers that operate independently of any central authority. Businesses are using this technology to solve innovative problems to ensure transparency.

Top 10 trends that will dominate blockchain technologies in 2020

- **Blockchain As a Service**
  One of the most promising blockchain products in 2020 is BaaS, short for Blockchain as a Service. It is a new form of blockchain that is currently integrated with start-ups and businesses. BaaS is a cloud-based service that enables users to develop their digital products through blockchain operations. These digital products can be smart contracts, identified applications (DApps), or other services that can operate without the need for a complete block-based infrastructure setup.
  Other companies building blockchain that offer BaaS service are Microsoft and Amazon

- **Federated blockchain moves to limelight**
  Blockchain networks can be classified as: Private, Public, Integrated or Hybrid. The name Federated Blockchain can be called one of the most recent trends in the industry. It is simply an advanced form of the basic blockchain model, which makes it very convenient for use in many specific cases. In this type of blockchain, instead of just one organization, many authorities can control pre-selected blockchain locations. Now, this selected group of different nodes will validate the block for further processing.

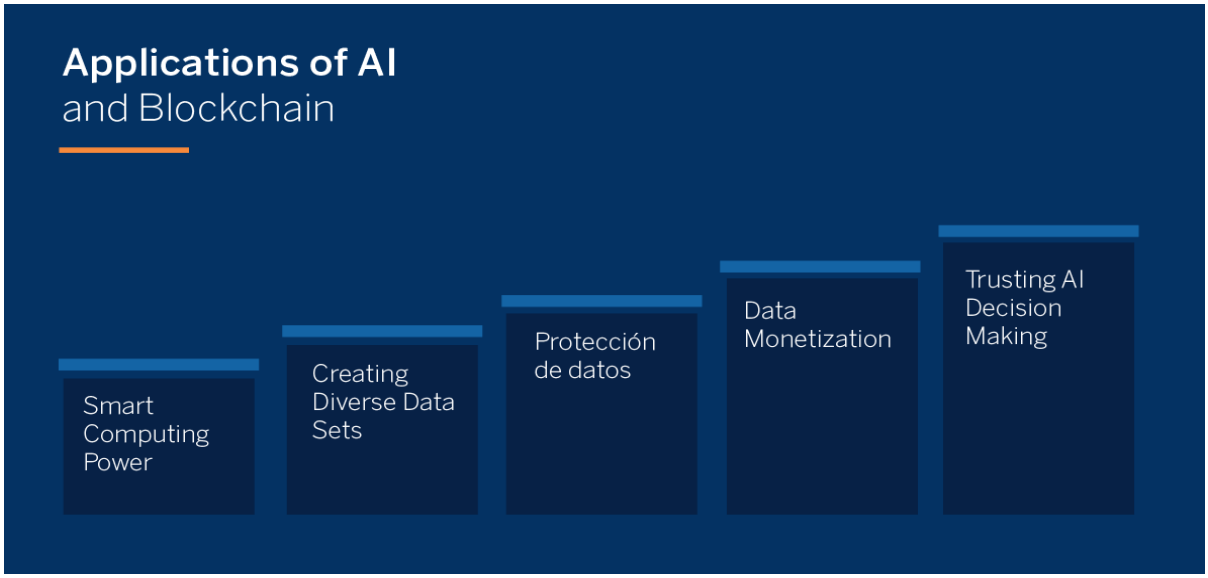
- **Social Networking Problem**
  By using blockchain in social media, will shall be able to solve the problems of notorious scandals, fake news, privacy violations, data authenticity, and content relevance. Hence, the blockchain comfortably blending in the social media platforms and domain is emerging technology trend in 2020.
  In May 2019, Facebook announced their own blockchain framework and crypto currency named **Libra**.

- **Economy and Finance**
  Unlike other businesses, the banking and finance industries do not necessarily need to introduce huge transformation to their existing processed for adopting blockchain technology. However, blockchain will give opportunity to banks to reduce excessive bureaucracy, do faster transactions at lower costs, and improve the security. A blockchain prediction made by Gartner was that the banking industry will have 1 billion dollars of business value by adopting blockchain-based cryptocurrencies by 2020, which in fact is partially true at current times but we are seeing considerable amount of changes happening in global payment industry.

- **Government adopting blockchain**
  The idea of the decentralized and distributed ledger is also very useful and attractive to government authorities as they have to administrate very large volume of data. Currently each government agency has its separate databases some of which are centralized in a manner, however the implementation and application of blockchain technologies for better and effective data management will certainly improve the operations of such agencies.

- **Blockchain Combines with IOT**
  The IoT has already gained popularity and we see tremendous use cases already implemented in real life. Smart health monitoring bands, Smart watches, smart fridge, TV, Lock irrigation system, household utility machines etc. are few examples of how IoT has already gained access in our day to day life. The number of **Internet-connected devices** has already reached up to 26 billion.

- **Blockchain and AI**
  Integration of artificial Intelligence with blockchain technology is gaining popularity in current situation due to huge demand of AI based solutions in the market. This integration will demonstrate a level of improvement in blockchain technology with huge amount of use cases and applications. The International Data Corporation suggests that global spending on AI will reach $57.6 billion by end of 2020 and 51% of businesses will be making the transition to AI with blockchain integration. Latest IDS report says that worldwide spending on AI based system will be $98 Billion in 2023 (Ref 12)



- **Demand and potential for blockchain experts**
  Blockchain is a new technology that got traction in last few years and there are only few percentages of professionals who are skilled in this technology. As blockchain technology becoming a fast-growing and huge potential, this will create situation for many to acquire and develop new suited skills and experience of blockchain technology.

  Even though the number of professionals and experts in blockchain fields has been seen increasing, there is not enough blockchain professionals to cater the demand in the technology market.

7. Conclusion

We are already seeing tremendous market traction and lot of economic reforms and happening around world. This emerging technology has been globally identified and we know there is immense opportunities and capabilities to unlock solutions that otherwise would not be possible with existing technologies.

As I am personally engaged with world's first supply chain financing solution on Blockchain and seeing how it is transforming the way payments are done and invoice auctions take place. Time taken for cross border payment has been drastically decreased from months to days and in some cases even to hours with least cost and significant amount of transparency and security at the same time.

Crypto currency plays very important role in payments, however various governance and regulations need to be in place, which countries like Estonia, United States have already in place. India is slowly moving towards accepting crypto currencies and even several bans on crypto has been lifted in last year.

It is estimated that Most countries sooner or later are going to adopt blockchain technology in their system process and operations. Where Asian countries like India, China, Dubai have already taken various initiatives in right direction.

We are already starting to see impact in sectors like democracy and governance, Supply chain financing, peer to peer payments, remittance, logistics and shipping industry where 50% of such initiatives are expected to change the way existing systems work. There is long way to go, but as blockchain applications get more adoption and creates larger impact, we will learn more about whether blockchain can actually change our systems, processes and thus our lives and unlock solutions that otherwise would not be possible.

8. References

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