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The Scope for Blockchain Ecosystem

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Abstract

As the up gradation in modern technologies has not only resulted in an eruption of huge data sets being captured and recorded in various fields, but also turn up to the security of records to avoid forge during depository, transportation, processing, updating and accessing. Transactions can be a commutation of an asset, the execution of the terms of a self-executing script-smart contract, or an updation into anecdote. Vital exposure of blockchain ecosystem and its comprehensive danger are entrenched in its ecosystem – the hub of miners, developers, suppliers, consumers, shareholders or stakeholders, and actors. Latterly blockchain technology is not limited to crypto currency but operating on financial and business applications. Decentralization, non changeable and clarity are the base on which blockchain technology working. This ecosystem is propagating with involvement from both sectors actors-public & private. This chapter deals with delineation of the foundation of the blockchain ecosystem in businesses, starting with the definition then blockchain act as a game changer and drilling down to a level of detail about effect of energy production from business ecosystem on the planet. In order to explicate the components of the blockchain ecosystem, this chapter provides examples of companies currently operating in different areas. However, blockchain companies (Bloq, Factom, Symbiont, Blockstream, PayStand, tZERO, Skuchain.) may function in more than one zone as they do not easily accommodate into one area of ecosystem, develop in capabilities and transition between areas over period of time.

Keywords: App-decentralized application, BCD-blockchain development, Baas-blockchain as a service, KYC—know your customers, actors—users

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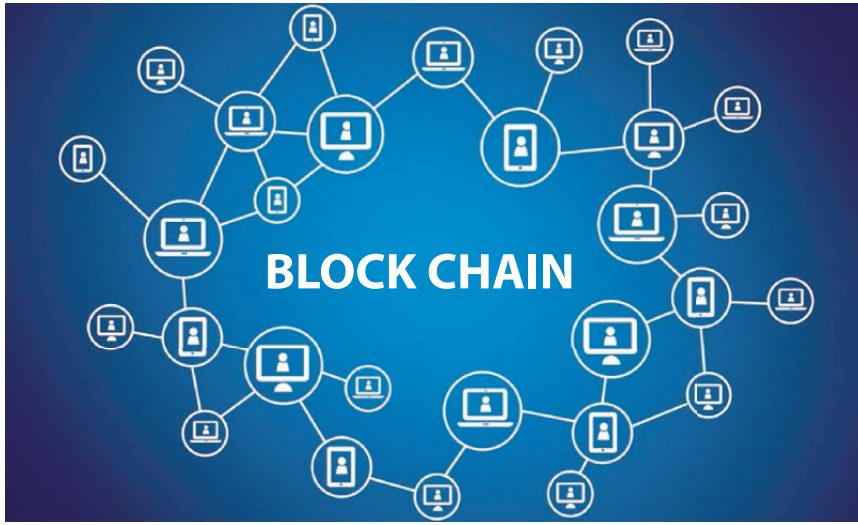
2.1 Introduction



Blockchain is a type of database that is shared across a network of computers, by allowing the transparency of transaction. Records containing information are added to the database, bundled together into what called as blocks. These blocks are then linked together to form a chain—hence blockchain. When we talk about blockchain ecosystems (a group of organisms interacting with one another within their surroundings), there are the groups of actors (users, miners, developers & researchers, etc.) interacting with each other within the world of blockchain and with the encompassing off-chain world. The core interactions between these actors take place in the form of transactions, but these transactions are almost entirely limited to the blockchain itself. In lay man language to understand blockchain-at present some of the countries already adopted an online ballot voting system which includes a voting registration database, electronic devices and software. For voting, firstly individual has to register himself which includes his identity number, name, phone number and personal information then it is stored in the software. From the cyber security perspective it is easy to disrupt the software by just attacking on the voter's registration database. Each part in the election process whether it is hardware or software is at major risk of hacking. When the software system is manipulated it can lead to the inappropriate election result. Not limited to that, after hacking the database of voters they can easily access their social media accounts. So, the sufferers at the end are the common people. To solve this issue the new technology blockchain can be used to provide security during voting time.

With its transparency, immutability and accountability properties this can be attained up to some exact level. It ensures that digital data must come from the trusted source by using cryptography.

Blockchain's property once data is entered can never be destroyed enables it to store individual's identity records such as biometrics, iris scanning and many more for authentication voters and to record their records in the tabulation format. Blockchain technology is like having public key—visible to anyone, can help each individual voters and election conducting officials in counting number of votes without any malfunctioning in the system and which tends to a fair election outcome. Basically, this new technology has completely eradicated the third party i.e. electronic devices (Hardware), hence does not involve disturbance in the entire system. Moreover it enhances the security level of the entire system by providing copy of data to other nodes existing in the network. If hacker tries to modify the record of one node then it has to manipulate the data on the other nodes too on which same information exists which is quite complicated. Thus blockchain acts as a shield for preventing the system against cyber-attacks. Fraudulency can be minimized as the data has been copied to more than one place.

Like in Crypto currency, its ecosystem is based on Blockchain and has four parts or elements: the users who use crypto currencies to receive and send currency, crypto currency miners who produce the crypto currency, investors who buy crypto currency and the developers who write programs related to this system and network and develop it. No part of this system can continue working each without the other.

An ecosystem comprises entities that collaborate along perpetuity of consumer's needs to deliver greater value and bolster the addressable retail market. An ecosystem is defined by constructing a ring around organizations, individuals, and things that share or complement a set of interests. This circle will be defined by the mindsets of the stakeholders and whether they would want to create efficiencies, curate new markets, and improve collaboration.

The collaborator-stakeholders defined ecosystem as a scope from creating economically broad and sustainable markets aligning with emerging customer preferences and leveraging open source development for complex problems. These interests can include intercommunications within and cross wide organizations, different sectors of the economy, and industries. A blockchain ecosystem is said to be developed if it allows the interconnectedness not only with producers or sellers but also with the consumers. Its aforementioned correlativity permits to build systems that can selectively take profit of the blockchain—in its trustworthiness, clarity,

and decentralization. The Blockchain ecosystem is helpful to maintain the environmental sustainability as it is having potential to verify the transparency of the transaction records—data which has to be transferred and the person having the data at present can both be verified by blockchain technology. This can be implemented by the decentralization and digitalization of the conclusion. Blockchain ecosystem also promises to improve the existing governance environmental models which are progressing at steady rate and intermediaries associated with the models taking sweat equities charging high by empowering broader people of stakeholders. Moreover, Blockchain are public—records are visible to everyone but none have permission to delete those records or destroy them. Basically Blockchain are of three types: public-like decentralized organization, private-degree of openness is limited to specific users like in Audit companies, Consortium—refers to an agreement between the organization and actors. In nature, ecosystems tend to arise naturally. To ensure the ecosystems fulfill their purpose, they're often controlled by the creation of applications, integration with external systems, added on by the creator also. There are Self-fulfilling agreements, the smart contracts which can manage the system automatically, by the members of the ecosystem just in case.

2.2 Blockchain as Game Changer for Environment

Transformation in the existing environment ecosystem can be imported by the blockchain technology by adapting decentralized, efficient energy resources and water systems. Data like—how much water used at household level, how much energy required per area, etc. Eradication of the species from earth seems like becoming the trend, as the lessening of biodiversity at its peak. The ocean is becoming more acidic day by day as its plants are consuming greenhouse gases. As predicted by scientists by 2050 we will be having fall of 30–35% water as the water's demand is increasing by 1% every year. Along with that, the Earth's atmosphere circular system and climatic changes, deforestation rates, are also calculated that approx 7.5–8.5 million tons of plastic are present in the sea water which is effecting the food chain.

All these records can be maintained on the blockchain environment system with the help of smart sensors. The data which can't be collected manually if collated contains partial information base on which decision makers of centralized organization and retailers make their conclusions. This inadequacy has been improved by blockchain technology by providing more informed decision making and transforming the centralized

into the decentralized one. With the help of blockchain ecosystem we can easily trace and verify the renewable energy resources, P2P transaction, make value as dynamic plus to that balance of the demand side economy. This technology can be used as a base to make people aware of the natural calamities—it prepared the communities in advance for upcoming disasters. Through smart contracts it ensures the transmission of important information among the large range of users at the time of natural mishap. The role of the blockchain resembles that of a wild card for the already existing ecosystems which does not disturb and is effective for climate change and other environmental challenges, known to be as game changers can be stated as follows:

1. Supply Chain Management: See Through Chains
   Whenever the customer buys the product a trust factor is associated with that brand like Johnson's, Maggi, or Lakme. The information that consumer keenly is looking for is that the manufacturing of that product should be fair which is not available and sometimes it becomes difficult for them to verify whether the product is genuine or fake. For the product to reach the store it has to travel through many intermediaries—producers, suppliers, retailers, in-between reconstruction or remodeling can be done with the product's brand—chemicals can be added, basic materials can be changed or replica of the product can also be made with low quality constituents. At the end it is the customer who will be suffering. Here comes the savior for consumers i.e. blockchain. Blockchain enables tracking of the path of product beginning with manufacturing, traveling till its destination

like a GPS of product's route. Customer can get all the answers of the four questions:

a. Where the products are produced?
b. How efficiently is it produced?
c. Where they dispose their waste?
d. How much biasness is involved?

Blockchain has the potential to make the supply chain transparent which can help the buyers buy more environment-friendly products. To track the path of food also seems to be benefitted in cutting down the carbon emission as the consumer will avoid traveling long distances. It brings all the stakeholders-investors, developers, workers, producers, suppliers, retailers, the consumer under one roof by interconnecting all of them which makes this platform a unique one. Blockchain technology also assures that the sea food must be coming from the sustainable fisherman. For food tracking Dapp has developed Foodtrax; Provenance is one of blockchain's project helping actors to see through supply chains.

2. Incentivizing Circular Economies via Recycling
   Various efforts have been made to carry out the recycling programs in separate cities which often led to failure and sometimes not being able to track & compare the impact of the recycling plans .These reusing program give rewards for submitting plastic containers or bottles in the form of a token. With the help of blockchain technology we can easily track the location where this recycling program is implementing. It is also helpful in increasing incentives as for depositing each plastic article participants are getting in return crypto currency which overall is good for the circular economy. Blockchain keeps the record of the volume of the material that has been deposited which is value and profit for evaluation. In coming years we will be using plastic money as plastic bank is a project which aims to convert plastic into currency in exchange of plastic materials by setting up collection centers at different locations. Dapp Recycle to coin also enables communities to receive tokens in return of plastic bottles.
3. Energy
   It's a common problem faced by all the commoners' or businesses covering the world and not an issue for some

particular human beings. During the breakdown of natural calamities, poverty or extreme climate changes, interruption of electricity is a very common problem encountered by every citizen not accessing to power which ultimately leads to blackouts. Blockchain environmental ecosystem prepares for this kind of situation if it ever takes place. To decrease the requirement to transmit the electricity to far places it has P2P blockchain which is based on blockchain energy system. This can help in transmission of the electricity from local areas where it's originally generated to the areas where it is required. This also supports in reducing the energy storage. A platform which can solve this problem working on the blockchain is a Trans active Grid which is a combined legal agreement between two blockchain companies, ConsenSys and LO3 Energy. If someone wants to get return or want to gain profit there is a way provided by the blockchain environment ecosystem. You can simply invest in the renewable energy installation through blockchain platform and get returns as a token seeking how to invest where to invest which can be done by dapp-EcoChain. For solar energy–renewable energy, sun contract is a blockchain which bases on P2P trading platform. Solar coin app aims to maximize solar installations is based on an electric chain i.e. a blockchain platform.

4. Environmental Agreement
   If we talk about the promises made by the leaders sometimes left incomplete as we are able to judge by itself or the agreement between two companies had been cancelled due to not completing the task assign to it .But what about the environmental agreement is that visible to all of us or are we going to observe itself only? Are we going to measure the impact of these agreements how much completed—how much left out? It is not possible for an individual to do all these things. For tracing the real impacts of environmental treaties there's a blockchain platform. In the long run the government and authorities are also not interested in keeping their promises. If data is presented it presents two main concerns: one is scamming, other is molding. To eradicate this problem, a centralized system-blockchain makes the whole system crystal clear by allowing the tracking of environmental data and peeking at every instance of all the commitments that were

fulfilled or not. Not only does it do transparent tracking its job but also in reporting the progress made at what location and by what quantity Blockchain could dampen associations, business companies and governments from taking u-turns from promises related to environment. Blockchain has the potential to remove the fraud and manipulation by storing legalized records. Approximately 980 million per annum has been spent to administrate the blockchain system which is under scheme of global carbon credits.

5. Profitless Contribution
   In India if we say the south region, it's common to have typhoon or flood. In 2007, there were terrible series of floods that occurred called as south Asian floods in which 30 million people suffered so that all citizens gathered to provide monetary help of which they donated very huge amounts. But have you ever thought that the amount we do donate for charity whether online or offline is reaching the proper recipients. Many people have donated money for Covid-19 (a viral disease)—though they have been provided IFSC codes. But one question that remains in our mind is will the amount really reach the affected people. If not, then how will it be spent. Looking at today's scenario, corruption has been inserted deeply into the roots or as they say to the tip of the roots where osmosis begins. Blockchain technology assures that the money which is intended for this purpose will help the affected people or for specific programs and will not be filling unintended pockets. The money can undoubtedly target its correct audience if it is based on blockchain platform (crypto currencies). Some rural areas are still lacking banking infrastructure and when there will be a natural hazard, in going to the bank or ATM for withdrawing, Blockchain technology has the potential to transfer the amount directly without making interruptions from the centralized system or any middleman. Two charities working with crypto currencies are Bit give and Bit hope.
6. Carbon Tax
   The factors which have adverse impacts on the environment initiates from the automobiles, household items and so forth. Nowadays, sources include those that have to do with a lavish lifestyle whiuch directly or indirectly affects the environment, but by how much? Can you determine how much every

product is making an effect on the environment? It can be calculated if we are aware of the carbon imprints. When planning to buy a four-wheeler petrol, diesel or CNG vehicle, which one would you prefer apart from monetization point of view? Obviously, that one which has less carbon emission so that global warming will not go beyond its alarming rate. Carbon tax is the tax which is applied at the time of extraction of fuel which is an indirect strategy to control emission of greenhouse gases produced when burning hydrocarbon (carbon compounds). The private sector imposed tax on the carbon with aim of lessening the emission of Co2 in the environment which results to degradation of forests. When these taxes are collected they should be used in the afforestation program but due to the many political winds the funds collected are used somewhere else. Blockchain technology has driven towards afforestation and degradation. It directly transfers the funds to the environmental ecosystem not in the pockets of intermediaries. In this context, the blockchain keeps the transparency between all the participants so that the funds obtain by depositing carbon will be applied in forest conservation program only. Considering the effect of CO2, manufacturers and producers also join hands by giving incentives to those companies who are selling products with low carbon footprints and a little piece of cake to the consumers also who are following this trend. Blockchain acts as a game changer as it is provides the tracking of carbon imprints of every product. However some companies are producing products which have high carbon footprints so that Blockchain technology will compel them to change their supply chain as well as customers to buy products that have less adverse effect on the environment. The score based on the carbon footprints of the products sold by each company is determined by the blockchain-based system. Thus by adapting blockchain, there will be more transparency and termination of practices which are harmful to environment. The main Interest of this technology is to construct a global market of carbon trading for communities and businesses.

7. Earth Management Platforms

   Telecom companies (such as Voda, Airtel or Jio) have to face new problems each day in order to increase the customer satisfaction and revenue. The perspective of the organization is the expansion of the network which involves the choice

of location which requires a geo platform—a platform which conveys information about the location. Similarly Earth's natural system also needs attention which are under unknown stress due to the boundation of the planet. The New Blockchain Geospatial platform interprets geographic data and helps to understand the new patterns not only on the surface of the earth but deeper in the sea as well, i.e., it traces the data of the ocean. This platform analyzes, visualizes and manages the data of the earth in a ledger of geospatial platform. After the scaling the data blockchain technology ensures transaction across the globe and environmental domains are verifiable and trustful. This technology helps in protecting life not only on land but also the live of sea animals by improve their health. By removing the unbiasness and providing proper visualization to the water resources, blockchain enables to secure fishing rights whereas on land it strengthens the property rights of the participants and all the actors. The Geospatial Blockchain environmental ecosystem has the potential to observe the weather conditions and monitor the performance of the forecast required with the help of Internet of Things.

The above-mentioned game changers provide the power to structure the sustainable future with the collaboration of upgrading technologies. The blockchain environment ecosystem should target the right problem in order to empower the communities.

2.3 Blockchain in Business Ecosystem

By 2025, global investment in blockchain technology in energy markets is set to reach $34.7 billion. Although $35 billion seems high, it's exceeding by the net worth of $1.85 trillion for the energy market as a whole. Key actors using blockchain and DLT in the field include Accenture, AWS, Bigchain db, Deloitte, IBM, Infosys, Microsoft, Nodal block, Oracle, SAP, Enosi, and Electron.

Blockchain is used within energy markets for data management, financial tracking and interactions. Drivers for adoption include reducing operational costs and capital expenditure. Increasing automation will see blockchain employed for data security and integrity. On top of the list are banking and financial applications whereas the Medicare businesses,

regulators and retailers are progressively speeding up in this blockchain market. Interest in this technology is increasing rapidly which drives its route towards the business ecosystem. New entrepreneurs have started to look for the business solution within the blockchain business ecosystem.

2.3.1 Business Ecosystem

A business ecosystem comprises of a huge number of participants, which can either be business organization or actors. They are linked in such a manner that they can affect each other. Interrelation enables assorted interaction among the members. Interaction can be competitive or cooperative. Together with interconnectedness they proportioned consequences between the organizations. The members are reliant on each other—the downfall of one organization result in failure of other firms.

2.3.1.1 What Is Business Model?

A model which provides an overview of how the organization is going to make maximum profit in which field, whether in selling services or producing products or selling businesses without any intermediate to the right choice of consumers. It can be online or offline mode. This model includes a plan of all the expenditures arising initially on the manufacturer side, marketing and finally reaching to the customers.

2.3.1.2 Business Model—Traditional

In this type of model the consumers are physically present for purchasing the goods from the market. It is just like buying products from the local store. This model is a purely centralized one which is controlled by some regulators. Different businesses exist which are centralized by different regulators, controlled and managed by the authorities which includes:

a. The organization,
b. The stakeholder or owners,
c. The workers, and
d. The consumers.

Traditional business model are divided into the following types:

1. Manufacturer
2. Distributor

3. Need of customers fulfilled
4. Franchise.

1. Manufacturers
   They are the ones who make products from the raw materials; they can also assemble the components to make the products. Common examples are computer & automobiles. This model can directly sell products to the customers, i.e., B2C or they can outsource to other businesses, i.e., B2B also. For example, dye manufacturers sell to the retailers which then sell them to the customers.
2. Distributors
   The organization with the distributor model purchases the products directly from the manufacturers and they supply to the wholesalers then to retailers or to the customers. The main responsibility of this model is to set the value which in return provides profit to the company. Adding on to that, it makes marketing strategies which can bring more sales of the products. In general, its role is an inter-mediator between the manufacturer and the local users.
3. Need of Customers Fulfilled
   The companies which are having retailer business model have the function to sell products directly from distributors to the customers. Retailers can supply products both via online and offline mode. Online retailers like those selling products on e-commerce website include Amazon, Flipkart, Myntra & Shopclues. Offline retailers are similar to those departmental stores, local shops which exit physically.
4. Franchise
   This model comprises of other business models which are mentioned above. The purchaser of franchise is called franchisee for e.g. Pizza Hut.

A traditional business model provides services or products and gains profit from them. Consumers purchase the product or service at the recommended rate. This price is set correspondingly and it also has the description about the earnings and other expenditures aroused by the business while providing the goods or services.

2.3.2 Are Blockchain Business Models Really Needed?

The Blockchain business models provide an opportunity to the centralized platform to upgrade their businesses into decentralization. It turns the individual elements, transactions, profits, and also assures growth. This technology has the potential to give benefit to both—actors and centralized employees. Before switching to the Blockchain models certain points should be memorized about it:

- Entrepreneur or startups or already established organization can implement the blockchain in their businesses.
- Not easy to delete records which are already on Blockchain.
- Blockchain's main uniqueness is its transparency which helps in uplifting of the functioning of supply chain.

An application of this technology can be seen in the fourth industrial revolution where many firms have developed their own decentralization of Artificial intelligence model.

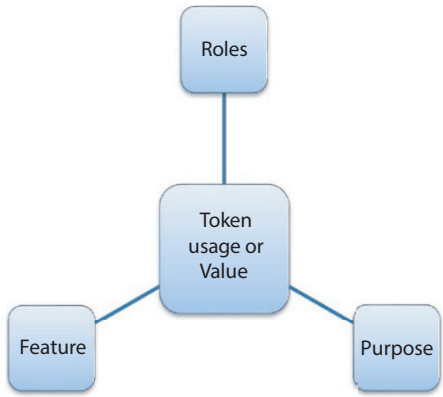
2.3.2.1 Blockchain Business Model

2.3.2.2 Model 1: Utility Token Model

A token can be regarded as a value, stake or representation of anything functioning in a particular ecosystem. Unlike crypto currencies, they are not dependent on some platform but tokens (golem) are used for a specific platform within the ecosystem called as native token. The utility token provides products and services to the users. The tokens have the potential to promote more functionality in the business. Examples of these kinds of

models are Ripple and Stellar. The utility tokens power the network and expedite the network activities. A part of the utility tokens is held by businesses and the rest is liberated for the functioning of the network. The stake of utility token changes because it works according to the supply–demand criteria; if the demand of the product increases, its supply decreases which tends to increase in value. This way, this model provides benefit to the businesses. It involves properties such as:

a. Role
b. Features
c. Purpose.



Crypto Token Usage and Value

Roles	Purpose	Features
1. Right	Bootstapping Engagement	Using Products—voting Authentication—Product access Contribution—Ownership
2. Value Exchange	Economy Creation	Rewards for Work-Selling some product Purchasing—Active/Passive work Expenses-Manufacturing product
3. Toll	Skin In the game	Running smart contracts Security Deposits Usage Charges

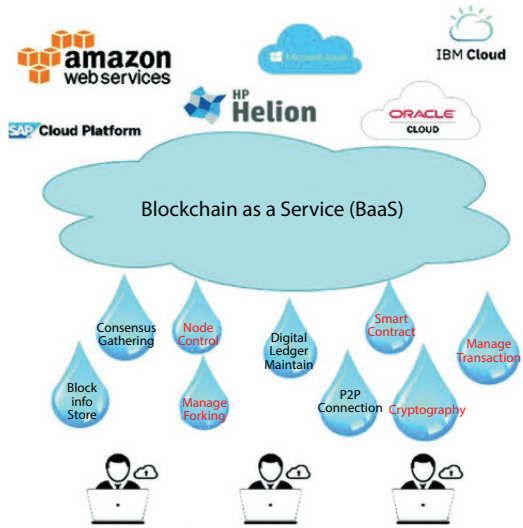
(*Continued*)

(*Continued*)

Roles	Purpose	Features
4. Function	Enriching User experience	Network joining Users Connectivity Usage's Incentives
5. Currency	Frictionless transaction	Payment unit Transaction unit
6. Earnings	Distributing profits	Profit sharing Benefit Sharing

To make the work more effective the token can take many roles as possible.

2.3.2.3 Model 2: BaaS



This model provides the link between the organization and the companies with blockchain platform. For example when a singer records a song, all the backend materials need consideration by the music director including mike, lyrics, recording room and bass volume, maintenance of software records, etc. which tend to be time-consuming and expensive. BaaS works as similar type handles, all the backend things so that the music director gets only focused on song without concerning himself about the infrastructure, costing and maintenance. It enables the client to focus only on the frontend instead of backend stuff. An agreement has been made between the organizations in which BaaS

agrees to be responsible for all the blockchain technology including monitoring of the system, management of bandwidth and providing security of system against hacking attacks. By making contract with the BaaS partners the startups/entrepreneurs transfer the load of infrastructure and system performance allowing them to focus on their main business and competitive strategies. BaaS enables customers to develop their own blockchain applications by using cloud-based services, ensuring its functioning, hosting and usage which resemble that with the web hosting providers.

Apart from this if entrepreneur manages to get blockchain up, then he/she has to deal with all the maintenance. The can be overcome by making smart contract with the organizations with blockchain technology platforms.

In the market there are some famous existing BaaS providers such as: Oracle, IBM-blue mix, Google Firebase Microsoft-Azure module and Amazon-AWS. It includes providing businesses with an ecosystem to help manage their blockchain system. The costing varies while using Baas services. It depends on multiple factors like how much transaction has been done, how many simultaneous transaction made at what rate. It implies pay according to the units of the services that are in use.

2.3.2.4 Model 3: Securities

The security which is provided on the blockchain is called as securities. Many of the convenient businesses have moved towards new technology including finance and stock market. Another name for security tokens are equity tokens, which are regulated by the government in comparison to the utility one. They provide more speed and soothe blockchain to the traditional businesses by ensuring security against any bug or fraudulent activities.

Security Token is Equal to Investment Contract
Assets like four-wheeler, real estate or stocks of organizations—which contain some value. For these assets, security tokens are the bonds (smart contracts) containing fragment of amount. This token ensures the freehold of any strong suit that is stored and secures on the new technology platform. After verification of the proprietorship the people who hold security token can:

- Be beneficial for other investment.
- Be used as an assurance for sanctioning of loan.
- Can be put in distinct pocketbook.

2.3.2.5 Model 4: Development Platforms

The blockchain is a space where many entrepreneurs and startups are landing with the agenda of solving their problems in a different manner. Most of them are developing decentralize applications.

As stated by Metcalfe's Law, the more networks in use, the more will be its value. Like with two telephones, you are only able to make a single connection, if there's single phone it is useless, by using the formula

$$n(n - 1) / 2$$

$$2 * 1 / 2 = 1.$$

However, when there are 5 phones, you can make 10 connections. Involvement of enormous people makes the network more in use. That's why most fortunate networks can enjoy severe aggressive hike.

There are three models which are specific:

- Charging Fees for using network.
- Recruiting Auditors.
- Other Services.

a. Charging Fees for Using Network
   Ethereum requires gas for producing fuel which is helpful in running of blockchain 24 days and 7 nights. Anyone who develops dapps on this platform pays an amount similar to toll tax payable in the form of gas fees. The charges depend on the completion of the transaction, how much complex it is varies accordingly. Gas tokens are used in NEO for creating dapps. The tokens which can be purchased and sold are Golem Network Tokens. GNT is a method of payment for computation of the resource providers. One pays what for the service is measured by GNT.
b. Recruiting Auditors
   If in case it was found that transaction record on blockchain is illegal or not authorized or classification is not done correctly then this led to the need of an auditor to carry out its procedure on management's estimates. Even if we say blockchain does not require a third party but when it comes to check whether the product was solely delivered and does

not require an auditor to go through the transactions process. When the organizations make business with other parties, they prefer auditors to verify smart contract as these contracts are for automation of the process of business. Decentralized applications consume a very big amount for the working of the code appropriately. If there is a minor bug it will lean towards the failure of the entire system. A recent example of this is a DAO smart contract which led to the split of Ethereum community into Ethereum and Ethereum Classic.

This model can work in two ways:

- The smart contract needed to be checked—developers need to hire the auditing company.
- Independently auditors and developers check the code and look for defects if they found any in the code. Also, the developers put up a premium on their contract.

c. Other Services

A blockchain startup needs lots of work. The startup first requires a website with good content and frameworks. These startups either recruit freelancers or agencies to save both time and money including taking care of these services for them.

2.3.2.6 Model 5: Blockchain-Based Software Products

This includes small scale businesses which sell to the higher scale businesses in return for reasonable amount for the applications based on the technology. Apart from getting a reasonable payment upfront, exposure of blockchain technology to the organizations is beneficial to them. They will also need to provide support post-implementation. Media Chain blockchain being sold to Spotify. To resolve royalty issues prevalent in the music industry. As companies don't want to bear the load of tedious procedure—acquiring talent is another reason for acquiring this business model.

2.3.2.7 Model 6: Blockchain Professional Services

This model offers services to the entrepreneur, corporate or startup businesses to make their hands on practice on this new technology. Some companies like Deloitte and IBM are already making projects on blockchain

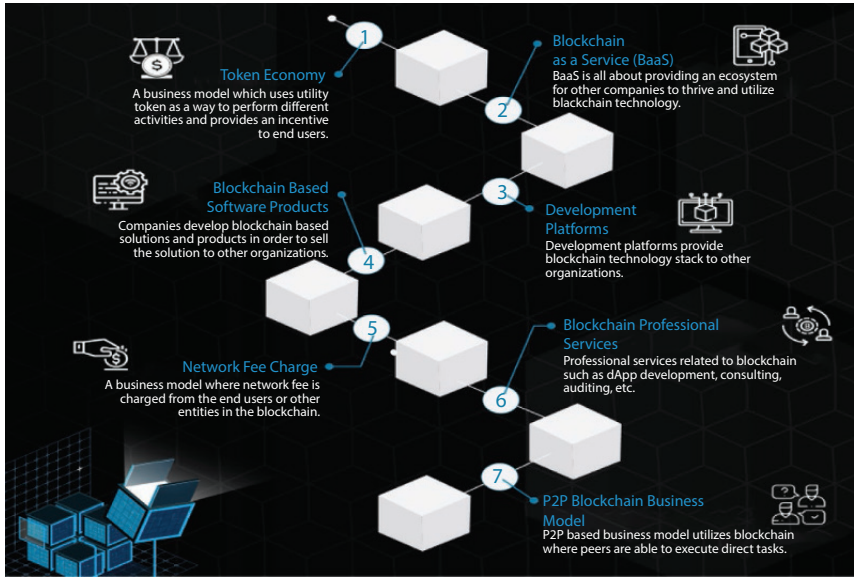
technology that can be contacted for completion of project by other businesses. There is no need to put money in the h/w or s/w—connecting directly to the services offered by these companies.

2.3.2.8 Model 7: Business Model—P2P

P2P model ensures direct interaction between end-users. It allows the end users to use the technology (blockchain) for building software that makes the whole internet as non-authorized. Casting of this can be done by BaaS, tokens, and charging from network. Tools which based on this model are File coin, Sia, Etheria and IPFS. Like Wikipedia, is open to everyone—anyone can make changes in the contents or can revise the contents. Its serve as a medium for true P2P exchange.

1. IPFS
   This system works as a replacement of http—it is developed in such a manner that it can hold the transaction in outer space even i.e. the pending issues of http are solved by this web applications.
2. File Coin
   This is a monetary based system developed for storage of information and having its own crypto currency. In exchange of user's not used storage space they provide them some value.
3. Sia
   This tool uses the new technology for transaction aim towards replacing of Dropbox, Google Drive.
4. Etheria
   This protocol focused on the blockchain gaming properties by building blocks in the upgrading ecosystem. Some games like Beyond the Void and Spells of Genesis are built on blockchain gaming platform.

What makes blockchain business model different from the traditional one is that it assures P2P interactions, removing all the middle man. By creating a trustless system, vanishing mediator for verification of records and fasten the faith. In Pvt Ltd companies, in this platform board of director and owners are absent. However they are present in the blockchain model theoretically and their interactions methods are changed dramatically.



2.4 Is Blockchain Business Ecosystem Profitable?

As for blockchain entrepreneurs and developers to make profit is a straight path—in the hope that their project will work out and value of their assets will increase by keeping some parts of the token as equity share combined with liquidity of their tokens as return of their reward. It's not simple to understand though how they cover the costs. At the initial stage, the investors get the crypto assets at low prices. Many of the crypto assets developers and entrepreneurs hold an Initial coin offering to crowd fund their project. In this way, developer gets sufficient amount to cover the costs.

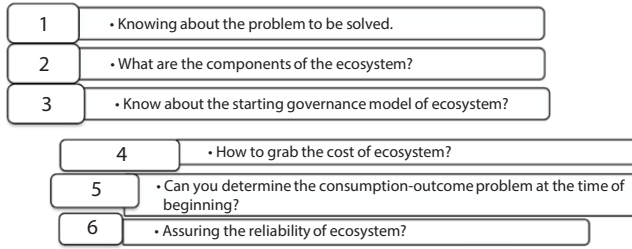
Revenue can be earned by any one of the following:-

1. By charging network fee for using network or gas fee.
2. Value of dapp increases with the increase in the number of users implies token may up in price. A utility token can be traded within the network. For example, in video games digital currency which help in accessing the game is taken to be as utility token which helps in buying game materials, and can be traded.
3. By selling technology to a higher business like previously mentioned media chain blockchain acquired by Spotify.

2.5 How Do You "Design" a Business Ecosystem?

Where Traditional business model is related to planning and planting a flower, designing an ecosystem is far like growing a whole forest: more complicated, with extra players to interact & unexpected coming results. Certain challenges also exist resembling that of a consumption–outcome problem or like chicken–egg problem.

However, business ecosystems, analogous to construction of forest, can't be entirely planned and designed—they also come up. For ecosystem designing the following steps should be kept in mind which are interconnected:



1. Knowing about the problem to be solved.
2. What are the components of the ecosystem?
3. Know about the starting governance model of ecosystem?
4. How to grab the cost of ecosystem?
5. Can you determine the consumption–outcome problem at the time of beginning?
6. Assuring the reliability of ecosystem?

Step 1: Knowing about the problem to be solved?
Initially, problem should be defined clearly which the ecosystem is going to solve so that it can convince the high business investors and right actors for participation. If someone has ever thought 20 years ago that businesses like YouTube and Instagram could be built on taking selfies, then posting photos of your meals, and animals clips.

- Is ecosystem the best choice?
  Ecosystem–blockchain business includes everything that a physical ecosystem (servers, clients, h/w, s/w) contains. The following are key points in what scenario ecosystem might be preferred:

- Need for decentralization, transparency and immutability of records.
- When Gateways are more expensive and time consuming like Expedia or Airnb.
- Need for more security among users and developers.
- When the speed of the new data is increasing anonymously as well as previous record is also mandatory to be stored.

What type of ecosystem you required?
Since all business ecosystem functionalities are not same, some business ecosystems work on the project completion—as small level players in the market and then handing over the project to the higher players. Some work on the transaction ecosystem by linking the providers and the requestors. Some work on the solution ecosystem which combines all the elements of the solution of the problem. As a startup business in this technology, one needs to know about the type of ecosystem, as they all differ in their construction, purpose, monetary mechanism and most importantly, success factors.

Step 2: What are the components of ecosystem?
Different participants get roles on the basis of the value prototype. A solution ecosystem can be understood by the examples of chorus having many mentors, suppliers and middleman.

In transaction ecosystems, the band director guide's (who teaches chorus) role is played by the owner of the business ecosystem whose role is to tie a bond between manufacturers, suppliers and customers. The director guide constructs the ecosystem, inspires to join the system, describes about regulations, standards and rules. The success of the ecosystem depends on the responsibility completed by the assigned role. Also equating investment needed for the longevity of ecosystem is sustained. The failure of the ecosystem or we can say dissociation of the system is because of the Band director guide not being able to fulfill the duty assigned to him.

Step 3: Know about the starting governance/authority model of ecosystem?
Determining Degree of Openness

Authority required balancing two requirements for the business ecosystem to get success: amount creating & sharing.

Main governance query for business ecosystem which is emerging-what is the degree of its openness. Queries in 3 areas having solution:

- Admittance: In the business ecosystem that are going to be as partners? In order to get entry to the ecosystem and its resources what conditions do they have to fulfill?

- Partners: To structure the business ecosystem at what extent are participants invited? What are the capacity, fine points, and severity of the rules allowing this? Who's going to decide the distribution of the value among the various participants?
- Assurance: Are the participants permitted to opt for multi-mode in competing with other businesses? In few sectors, they battle for their own degree of openness. If we have a look Android broke the superiority of Apple iOS by providing connectivity of openness, Facebook conquers the fragility of MySpace's open model by providing the icon of accepting request or deleting i.e. providing property in friend's feature. From the monetary point of view open ecosystem grows faster as compared to the others at the time of execution. It also encourages decentralization and allows variety of developers and partners.

However, to authorize the open ecosystem is not easy though, therefore it iswell adapted for goods and services with finite drawback and less cost of deterioration. Growth v/s quality, decentralized v/s interconnectedness, and speed v/s flexibility are various individual factors on which the exact degree of openness for business ecosystem will rely on.

Step 4: How to grab the cost of ecosystem?
For what charges are applicable?

The main question of the ecosystem "chorus" is the value i.e. money should be distributed equally among the participants and keep share of profit for its own. Also, the amount should be enough to be assigned among the participants. Apple takes itself 30% from the app that it sold from its application store. Similarly the businesses create ecosystem that can be sold as a service to higher businesses in order to capture value.

Step 5: Can you determine the consumption-outcome problem at the time of beginning?
What conditions led to its failure?

The failure of the ecosystem at the time of execution is because the authority was not able to calculate the size of the participants—how many buyers will be there? How many sellers will be there? Due to this, they are not able to protect the network which results in crash of the ecosystem. Sometimes they overestimate the profit and is negligent towards the importance of network effects. This race is not coming at first position but first with complete solution. For example, Apple iPod was not first in the

digital market but it was first with a combination of software iTunes with hardware. Another very important factor is to get to know about the number of transactions by the number of participants. Being aware of network density is an important driver of amount for the actors.

Lastly, the selection of participant is important. It doesn't matter how many participants are there but their quality matters. For example in Uber, there are equal numbers of riders and drivers so it is a balanced one.

Step 6: How can you assure the reliability of ecosystem?
Is scaling can be possible?

Yahoo search engine initially started as a hierarchical database edited by employees and WebPages are classified based on tree structure. Yahoo gained popularity for a very small time with the advent growth in internet—at that time it was not scalable and ultimately taken over by Google with the scaling page rank algorithm. So, if you desire to have long term viability of the ecosystem, it is important to get best knowledge of the scalability position, design and strategy of the developing business ecosystem. Among the three, scalability is the main step for the availability.

How expansion of the ecosystem takes place?

Expansion. Let's have a look on some examples—Instant change in technologies and customers preferences Microsoft still manages to defend Windows as an operating system over the three decades. Uber initially started its ride services but extended to the food delivery and bike riders services. When LinkedIn started, its aim was to establish a link with the professionals but at present it serves as an online recruiting and publishing contents. Therefore, for the expansion of ecosystem, it should be having two features: stability and flexibility so that new functionalities can be added to the system accordingly. In reference to this, we can say expansion of ecosystem takes places by:

1. New products can be added in to an existing system.
2. Expanding the services in the same market (Uber).
3. Creating advantage after the success of one ecosystem (Apple iPods).

How can you protect against adverse reaction?

Large business ecosystem has experienced adverse reaction from the customers and managers. On the top of list is Amazon who was recently criticized for not collecting sales tax in order to come first in the race of competitors similarly with eBay. Also, Uber was blamed for security,

violation of the rules of transportation, insurance and rights of the drivers and worker's rights that are applicable to taxis. Last on the list is Facebook which was criticized for not securing the data of the users. Hence, the ecosystem should be designed in such a manner that it should not only verified legally but also socially for its longevity. Business ecosystem can only thrive in future if it tries to persistently adhere to concrete value for their consumers and disseminate equal value to all its contributors.

To design an ecosystem is a main attempt so the above-mentioned six interconnected steps are helpful in designing a business ecosystem. Any entrepreneur or start up can be structured if the design is followed wisely or it can bring transition in the existing organization. It is also important to understand that any business ecosystem cannot be completely designed as well as planned like in the case of a forest they also emerge.

Those ecosystems that want to gain profit in the future will have to be flexible, ready for the up gradation in technologies—both hardware/software, unwanted happenstance and also working according to customer preferences.

2.6 Redesigning Future With Blockchain

To sum up, for someone to excel in new technology is not enough for Blockchain business ecosystem, but what is required is to reconsider the market role, existing industries ecosystem and their financial worth. Many elements have to be (re)designed in this composite system.

2.6.1 Is Earth Prepared for Blockchain?

Blockchain technology adaption whether in the environment ecosystem or in business ecosystem are having bundle of advantages but with the

adoption of new technology there are many unintended outcomes also in the coming years—the blockchain can really become a burden that planet earth has to bear with. The technology require energy to keeps its longevity so in the blockchain technology the energy released by using the crypto currency are of very high intensity. Crypto currencies are bitcoin, litecoin, doge coin, bat, Ethereum, neo, ripplexrp, cardano and many more. Whenever in use, it require a significant amount of energy, although not all of them. Some operate on less amount of energy. Transaction of crypto currencies—Ehereum, Neo and Cardano—require 13 times lesser than the energy needed to transact bitcoin. This is an additional feature that blockchain solution is adding to the next gen computers to be as energy efficient directed with the increase in power and computational speed but keeping the low usage of energy. Many organizations are constructing energy bare blockchain framework which will be operating on PoA. In order to make earth a better planet, Building Blockchains so that the blockchain energy usage can be applied in the appropriate direction i.e. the incentives arising from the uptake of renewable resources and de-carbonization must be used for the reforestation. If the transaction of single Bitcoin can consume power almost one fifth of the country's houses per day then it can be predicted how much there is a need for blockchain solution as an energy savior. Moreover to that, for every 11 min a new Bitcoin transaction takes place. This is the need of an hour for the Blockchain technology which is at its beginning state that will be beneficial for many sectors if used appropriately in both technology protocols and its applications parts.

To develop Effective Blockchain solution:

1. Tackle blockchain for environmental value
   Construction of international bank shared between two countries and multiagency blockchain initiative led to a number of profits that can be seen in different fields such as ocean health, plastic articles, electronic machines and management of the natural resources. If the actors want that blockchain will meet the expectations of the global environment then again interconnections are necessary for the international organizations in order to receive the reward of this technology.
2. Combine blockchain with AI & IoT
   The traditional method that we were using for sharing information whose privacy is not confirmed has transformed into the new blockchain technology which has given a transparency factor in sending or receiving data. Combining with

IoT, this technology has completely converted the centralized regulatory into the decentralized one due to the environmental problems of the natural system of the third planet which can be monitored, analyzed deeply adding that climate changes can be well-observed and how much energy usage per crypto currency is making adverse effect on the environment. To date, cloud computing and big data have been profitable by IoT and now it's blockchain's.

3. Collaborate for interdisciplinary solutions
   It is clear now that blockchain builds the system as crystal clear providing transparency of data, but this technology can meet the expectations of the planet if there exists cooperation between all the participants. Different sectors can collaborate and interconnect in order to enable blockchain's applications to run smoothly. Shareholders, miners, domain specialist and actors are required to interact with each other for optimizing the services provided by this new blockchain technology.

   To make earth a better planet, interconnectedness among NGO, non-profit sectors, private and public are needed. A successful digital infrastructure has been developed by various efforts by the energy companies and the finance organization which is openly helping towards decentralization and de-carbonization the energy system. To implement the interdisciplinary approach—combining data scientists with environment and industry practitioner—is possible by working together in a research institution. Thereby, how can this blockchain technology can be of use? What are its impacts if used excessively? And what are risks that the environment has to face?

   The answers to the above-mentioned three queries can be possible if all the experienced technology scientists are researching together to ensure the sustainability of blockchain technology.

4. Prediction of challenges and unintended consequences-political economy
   New technology has the power to change the existing system-industries into the authorized one. The regulators must be concerned about if these changes take place how will it affect the economy rate and the participants of the

existing systems. Stakeholders worry more about handling of trust factor of data privacy and security.

5. Deliver "responsible blockchain"
   While focusing on the reduction of energy consumption and increasing revenues for the developers and the participants, if the strategy becomes out of plan then the blockchain technology looks in to privacy rights and clarifications of the accountability. GDF organization works together with other companies for governance, so that stakeholders involve themselves directly within blockchain ecosystem in a systematic manner.

   Making important arrangements required by governance.
6. Development of rapid approach to governance and regulation
   In present scenario we are having the centralized system—having management to control the system if any harm occurs in the technology where the regulators play an important role in monitoring the developments and taking action if they found any malfunction in the technology. If the differences occur between the authorities is at the greatest level then it will become a major challenge within the distributed system.
7. Frame more globally coordinated solution
   The global interconnected architecture can be structured by the blockchain technology as it has spread its roots in all the fields. Following are the points on how the blockchain ecosystem is governed:
   a. Making organization to be self-regulated

      Without worrying for the formal regulations proceedings—blockchain provides new choices to this system; financial freedom and self-sovereignty are underpinnings of self-regulation. A global code which is a supplement for regulations can be identified by global good practice. Some of the self-regulating processes already running in a few countries—U.S.(EQWITY), Japan(Last roots), Philippines (startups), and Singapore(TBD). To make relations with the environment, the self-regulators can be compromised and central regulation can develop the set of requirements.
   b. Government policies which makes nations to be regulated

      Recently, this is the best method to command blockchain with local managers who are responsible to maintain area of authority in order to battle if any recognized fault arises.

Greener protocol can be adopted by the blockchain communities. The funds which are received by government can be used for blockchain research which looks for scaling public-private projects.

c. Regulations comprehensible globally

To run blockchain technology at an international level—The international authorities and global managers are facing challenges in to order to understand the regulations globally. If small firms are having difficulty with blockchain, global organization will look into it, will establish a relation with environment along with harmony crosswise jurisdiction.

2.7 Challenges and Opportunities

In this chapter we discuss about the blockchain as a game changer, technology in both environment and business ecosystems. No doubt, this technology is better in every field for providing the transparency, saving energy usage and is far better as compared to the traditional models. But whenever some technology comes in the market it brings some challenges along with it. The technical issue that blockchain technology address is limited with is scalability because of foreordain in terms of the size of blocks and energy used by the crypto currencies. Though blockchain technology is decentralized, distributed and based on cryptographic techniques, it is not totally exempted from security issues as rising of cloud computing and quantum computing combined with the physical, digital and biological areas with the increase in speed and intelligence can prove dangerous to the blockchain ecosystem.

The challenges can't be avoided—they also concur with the 4th industrial revolution i.e., AI, IoT, where an autonomous vehicle is able to generate opportunities for global development and creation of value. These technologies also have the power to speed up the environment's degradation.

No doubt that these challenges need attention as the technology is upgrading day-by-day. Soon there will 6G technology, though China has already launched 6G phones, Japan announce the startup of 7G technology. As the advancement of revolutions is at its peak, blockchain developers have to cope-up with these technologies. Nevertheless, the opportunity window not be open forever.

The opportunities offered by the responsible blockchain ecosystem need to be authorized sincerely and regulators should be ready for not expected outcomes and failures. Just in case things go wrong, a variety of rules are

required assuring an agreement with privacy rights to improvising security issues. Shareholders willingly share all these duties. The demand of the present time has compelled all the actors, miners, developers, producers, suppliers and retailers to use the blockchain technology for solving everything. For this requirement, a structured approach can help the practitioners on how to use this technology.

In the end, the future of blockchain is ready for time being, aware of the commitments and going through the facts and data. There are far more companies and people with data and views on the immediate and future of blockchain. Covering everything is not possible so creating a list of more forecasts on the future of blockchain in the real world versus the virtual one need focus on the practical—the real instead of the promises, the applications and the industries.

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