Application of Blockchain technology in COVID-19 pandemic and other disasters

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Abstract: COVID-19 Pandemic like disease emerging suddenly in world not only gives health crisis but also brings no work, no food, and no shelter like situations. In an emergency way, Government may have to take some action plans like lockdowns. This sudden lockdown announcement makes people scare of situations like starvation of food due to strict restriction from Government for staying at home. Even if Government has declared some relief measures in terms of food, money and other benefits, many people are missed in the count of getting any relief which leads them to death due to hunger. As the people were categorized in 2011 through last Census report a proper calculation of below poverty line people in this 9 years gap is somehow giving false estimation of poor people due to which certain amount of people are not going into any categorization. Blockchain an emerging distributed technology may help in this situation in securing poor people by giving a trusted identity management system with proper categorization as well as a well organized system of food and fund distribution by the Government. By using Blockchain in association with Cryptography can resolve the issue of any mismanagement or fraud in the food and fund supply chain during such type of epidemic cases in India. In this paper, we are going to trace out and resolve some problems related to COVID-19 like pandemics where not a single poor or needy people will be excluded from the beneficiary list and each misfortune poor who is suffering from food crisis must not be a victim of mismanaged food and relief supply chain management.

Keywords: Blockchain, Cryptography, Food supply, Relief fund, COVID, Census Report

1. INTRODUCTION

In India many types of natural calamities and disasters are happening almost regularly which brings a lot of present and post crisis on the people. Recent ongoing Pandemic COVID-19 spreading rapidly and having uncertain predictions results in Economic slowdown and food starvation. No one knows when this COVID is going to end, so whatever problems appearing due to COVID will also continue in uncertain way. So in control of this fast spreading disease Indian Government has announced a continuing Lockdown since March 2020 which is still continuing till 31st May .Lockdown may be controlling in spreading of this disease somehow but it is bringing other major issues in the country. A larger population is being affected by the economic lockdown in control of COVID epidemic which has no income to buy food.

In INDIA a major category of people are suffering from hunger already and in Global hunger index India ranks103. Another group of people who are totally dependent upon daily wages are going in No Work No Food category. Report says around 300 million of children missed their Mid-Day Meal due to closure of school due to lockdown worldwide. According to Indian survey about 350 lakh school going children are having their food through mid day meal of school. So now these many poor children also became a victim of this pandemic and come in a category of No Food. So we can clearly estimate here what is the current situation of poor in India as well as worldwide in this miserable situation of COVID.

Thankfully, Indian Government is not unaware of this critical situation of jobless and hungry people as it has already taken many relief measure steps in terms of supply of food, distribution of money and other benefits. But unfortunately, despite of providing many different types of relief scheme some portion of people are deprived of this help. Out of many issues for such type of mismanagement, one important point is categorization of poor based on Census report which is calculated in 10 years of interval. Last Census report was given in 2011 and next survey to be held in 2021.Due to various untold reasons many people may have missed their existence in the previous survey report and new born after the survey of 2011 are also not having any record in the accepted Census report. Due to this 9 years back survey report exact calculation of poor people may not be happening. So just by following not so latest population report proper distribution of relief may be a question to the Govt. and also to the society. If the Central government is using updated population figures instead of 2011 figures, all these applications

could be accommodated within the Central quota. Updating state wise report of population change is not happening due to ignorance of Centre which leads to improper figuring of Population.

Another issue related to mismanagement of relief is unsecure distribution and transaction of food and fund supply chain management system which is lacking mainly in collecting right and proper evidence report of people receiving the relief. As the relief distribution scheme is purely dependent upon Ration card system which is not using any advanced technology of online data management or data transaction it is not resolving issues related to fake ration cards, fake beneficiaries etc. leading into some of real needy people excluded from the list.

Addressing the above identified problems some solutions can be given by advanced Information Technologies like Blockchain and Cryptography. Using the Cryptography concept we can have encrypted and secure identity of each and every people and by distributed and non centralized Blockchain technology we can have safe records of transaction details of food and fund supply to the poor and needy people. Supply chain management system when uses Blockchain can help in smooth flow of relief to the real needy people and any middle way fraud can be identified easily.

2. BLOCKCHAIN

Blockchain technology can be defined as a distributed technology without centralized authority for secure computing. This is a peer-to-peer network in an open network system. Without a central authority a cryptographically secure digital ledger system that is distributed can be implemented by Blockchain.

Blockchain the decentralized, time stamping framework gives a non centralized storage structure that keeps data across different sites that protects data without any teasing with the data. Being a distributed ledger any transaction taking place has a safe storage in many servers and websites instead of a single server.

Easy identification of people tempering and manipulating with data can happen in Blockchain and high trust label is maintained among the participants in Blockchain transactions. Meanwhile during the entry of data into the distributed ledger care must be taken for correct timely entry of data. Replication and alteration of data is prohibited in the digital storage of data through Blockchain by maintaining transparency and trust.

An innovation in Digital Cryptocurrency for digital transfers of money helped the process of development of Blockchain during 2008. Blockchain is a distributed ledger that has many digital currencies such as Litecoin, Ethereum, Ripple, and Bitcoin.

Being a reliable and transparent framework Blockchain now days finding its importance in various fields like Health sector, Electronic Voting Systems, Identity Management, Digital money transfer systems etc. Blocks are nothing but cryptographically signed ledgers. New blocks can be added to the existing block through a link after proper validation. So a chain is formed containing blocks and it makes the old blocks more secure and unbreakable. So new blocks give more strength and security to the existing old blocks in the chain. Whenever a block is added in the Blockchain all ledgers get a copy of it. So any loss of data or any fraud is strictly minimized if any transaction takes place by Blockchain.

Public Blockchain and Private Blockchain are two ways for making digital transaction in a safe and secure way. Computers that are under public internet are allowed to add blocks in Public Blockchain system. These public computers can add proper and valid transaction blocks into the ledger. But if we want to perform a business network of private members we can go for a private Blockchain system which helps in creating a trusted Blockchain of only permitted members. Private Blockchains are more secure and it is having a control in its use and access. Bitcoins used mainly in Private Blockchains that is containing cryptographic ledger data.

Smart contracts can be included in Blockchain which are used for enforcing rules between parties involved in the transactions. Intermediaries in the complex process of transaction can be eliminated by the use of trusted third party smart contracts. Smart contracts are also responsible for building trust, giving accuracy and speed in transaction process while using Blockchain.

3. CRYPTOGRAPHY

Cryptography is a major concept in Information Security that plays an important role in providing security to data and information. Basically it is used in user authentication process but in a broader way it can be used in many applications that need data to be protected and saved in an encoded format. The basic feature of cryptography is it stores the plain text in an encrypted format that becomes unreadable until some key is provided to decrypt the data. A given plain text is encrypted by following any of the available techniques of cryptography and stored. So stealing or manipulating any sensitive data in storage or in flow through a network is very much difficult. This brings security of data over a network or internetwork so that people can get benefits of distributed applications without worrying for protecting their data.

There are 3 types of techniques in cryptography which are used for securing data. They are:

- Cryptography with Symmetric key or Private key
- Cryptography with Asymmetric key or Public key
- Hash functions

In symmetric key cryptography a single private key is used both by the sender and receiver for encryption and decryption. The sender sends encrypted data along with

the secret key and once the receiver receives the data which is in unreadable format takes help of the private key to decrypt the data into a readable format. The secret key may be in the form of numbers, words or letters. By maintaining a single key both sides encryption and decryption becomes easy.

In public key cryptography or asymmetric key cryptography uses paired keys one is public key and other is private key which are mathematically related. Sender uses the public key for encrypting the message and sends to the receiver. The receiver than uses private key for decrypting the encoded data. The asymmetric encryption is used in Bitcoin and other cryptocurrencies for securing data.

In hash function way of cryptography instead of any key a hash algorithm is used that gives a hash code for any plain text that is unreadable and hard to understand .A fixed string of bytes is returned from a given input in this technique. The alphanumeric text given through hash function is very difficult to calculate. In authentication, digital signature, message integrity checks these hash functions are very much useful.

4. BLOCKCHAIN WITH CRYPTOGRAPHY

Cryptography when implemented with Blockchain makes the digital ledger more powerful. Identity of people can be very well protected by the authentication of encrypted message in Blockchain. No intermediate tampering of data is possible as once data is saved in encrypted format is unbreakable without public or private key information. Blockchain when uses cryptography all digital transactions are also stored securely in encrypted way. Confidentiality, integrity and availability of data can be achieved in Blockhain through Cryptography. Cryptography imposed Cryptocurrencies like Bitcoin, Ehereum is more secure as data storage is decentralized with encrypted format.So any applicational field that is using Blockchain can be digitally secured through the algorithms of cryptography leading into a secure environmenental operation. Supply chain management systems, Health sectors, Identity management systems, Business organizations can go for this new technique of linking blocks in encrypted format and be benefited saving time and effort.

5. PROBLEM

The existing system of categorization of people under poverty in India is not properly justifying to the poor because many people are not in the Census Report due to unidentified reasons. So in a view with COVID epidemic we are finding out that many people are missed in getting any relief money, food or other benefits announced by Central and State Govt. of India due to non-existence in any record due to negligence. So a new proposed system of Categorization and Identity management is required that can store valid and secure identity information of people of all categories.

Another major problem is proper distribution of relief in terms of food, money, gas etc. is not happening .There is a long unbreakable chain in supply and distribution of this type of Relief. As supply chain systems like Public Distribution System (PDS) are following the old techniques rather than upgrading, they are not accurate in people calculation and having flaws in supply chain management. Due to this many needy poor people are going under food starvation and death and even the Government is unaware of the real fact. So a new system of Food and Fund supply management is also required for proper distribution of these type of help by Government without fail. If new internet technologies are included then may be somehow the Government can address each and every citizen.

6. PROPOSED SOLUTION

A new scheme of identification and categorization may help this type of situation in India. The best technique of digital identity storage for all category of people of India based on their income slab that will be benefited in easy analysis of lower, middle, upper class people .This digital data out of tempering and manipulation will also help in finding a most accurate measure of below poverty line people. It can also define some people in the beneficiary list of middle class family who are also going under food crisis during COVID like situations as they may be dependent on house rents, private tuitions, saloons, auto driving etc. These people may earn a handsome amount of money in normal times but situations like lockdowns worsens their lives by putting them into food crisis. If unfortunately any middle class people bears loss and goes into lower slab by reduced income he can also be updated in its category and will manage to survive in COVID like epidemics.

If people can be categorized keenly into fine groups by taking these types of concerns we can make every people fall into proper group that can be suitable in crisis situation. By this method effected people of both middle class and lower class can be benefited in present epidemic situations like COVID.

A proposed solution for proper food and fund distribution in a secured way can be done by using the emerging non centralized distributed technology Blockchain in the field of Supply chain management. This can resolve the issue where we can store people's identification in a secure way in digitized form and maintenance of distributed ledger of any supply transaction. In this way while distributing relief Blockchain may help in any type of injustice to poor and needy people during COVID like situations. Through Blockchain we can also distribute any relief money to people in a justified way by secure transactions that stores encrypted data. This can help in any middle level frauds as well as missed people list. Blockchain in collaboration with Cryptography can secure people's identification and each people can hide their personal data to public. This advanced Blockchain with cryptography solution can improvise our poor system of

Supply chain management by proving India to be a better country that can protect Indian citizen's lives in disasters.

We can categorize people by taking their important data related to property, annual income, family members and according to the category people will have an identification category wise so that in major crisis people will not die of hunger just because they don't have proper identity. Food and Money distribution can be done by Blockchain and each single people in need can be addressed by the Government in COVID and COVID like future epidemics.

7. CONCLUSION

Blockchain technologies are having a great future aspect in solving many issues related to COVID-impacted scenarios. It is having a great potential in solving issues related to Supply chain management system of India by using which distribution of food, fund can be done in a proper and secure way during COVID like epidemic. Identity management and categorization through digitization and maintaining privacy through Cryptography can give a clear path of identifying people depending upon requirement and income status without loss and fraud in data. New way of identity management, categorization of people and improved Food and Fund supply chain management systems proposal by the use of Blockchain with cryptography can be accepted and implemented once the COVID pandemic eases.

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