

ECONOMIC IMPACT OF BLOCKCHAIN TECHNOLOGY

Nishtha Ahuja

Department of Economics, Lady Shri Ram College for Women University of Delhi

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ABSTRACT

In today's world, where information is the most useful and dangerous commodity, with all online activity being tracked and our preferences as consumers being sold to the highest bidder, blockchain technology helps provide a secure way of storing information. Blockchain is the present and the future. The purpose of this research paper is to define blockchain technology, elucidate its history, its benefits and drawbacks, then discuss the economic impact of blockchain technology on the global economy, with discussing its impact on various sectors and the growth opportunities it brings for these sectors followed by analysing its impact on the Indian economy. The conclusion summarises the meaning and potential of blockchain technology in reforming various sectors and moving towards a truly decentralised economy.

Keywords : Blockchain technology, economic impact, decentralised economy.

Introduction

Bitcoin, blockchain, Ethereum and cryptocurrency are some of the hot topics nowadays. The concrete concept of bitcoin and blockchain were first conceptualised in 2008, where it was described how cryptology and an open distributed ledger could be combined into a digital currency. Fast forward to the present, blockchain is a game changer for the global economy and offers great potential to all sectors, from banking to sharing information to communications. Blockchain provides a secure way for communicating and sharing information. Before the advent of blockchain, no-one could even imagine that money could be transferred safely without a financial institution monitoring that exchange. But blockchain has made this possible, transactions processed over blockchain are more efficient and secure. Bitcoin was the first implementation of blockchain technology. Bitcoin and blockchain have changed the financial

world a lot as well. Since all transactions are recorded from manufacturer to buyer, it helps provide more clarity in the process.

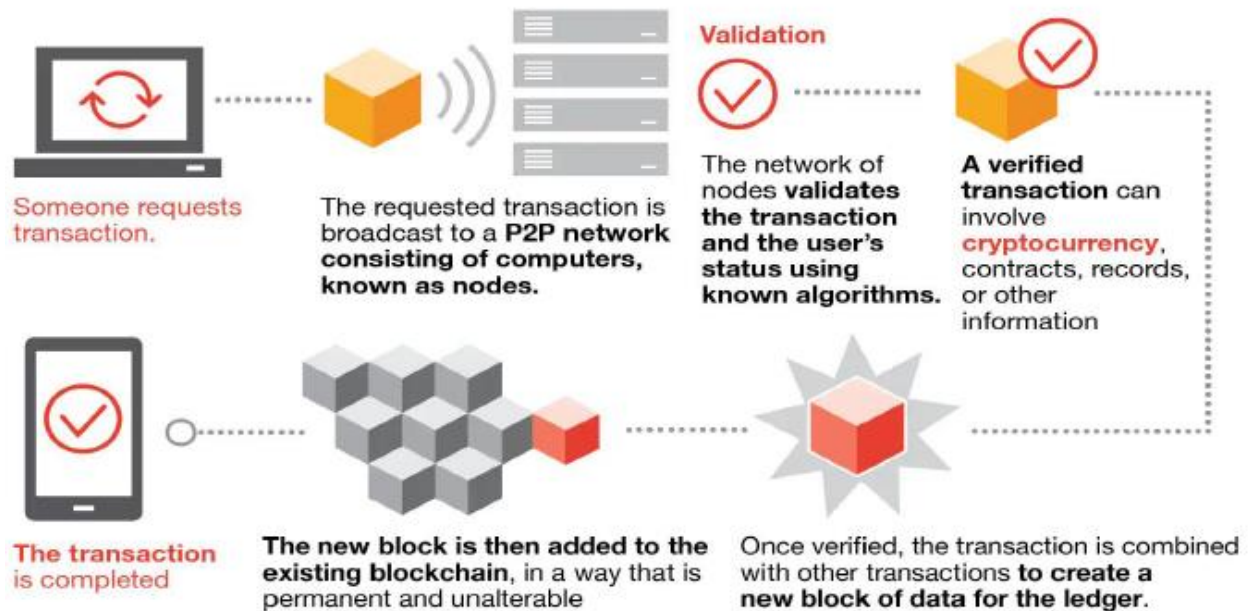
IBM defines “Blockchain as a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network. An asset can be tangible (a house, car, cash, land) or intangible (intellectual property, patents, copyrights, branding).

Virtually anything of value can be tracked and traded on a blockchain network, reducing risk and cutting costs for all involved.” Blockchain is not owned by a single entity, i.e. a business or any single person. It is decentralised, distributed and information is stored across a system of many personal computers so there is no middleman and no one person can take it down or corrupt it. But, anyone can use the blockchain system and help run it, as it is protected by cryptography.

Blockchain collects information together in groups, these groups are known as blocks, and they hold sets of information. Investopedia defines blocks as data structures within the blockchain database, where transaction data in a cryptocurrency blockchain are permanently recorded. A block records all of the most recent transactions not yet validated by the network. Once the data is checked, the block is closed. And a brand new block is created for new transactions to be entered into and validated. A block is a permanent store of records that, once written, cannot be changed or removed.

Blocks have a certain limit to their storage, once filled a block gets linked to the previously filled block forming a chain of data, thus the name blockchain. All new information would now get stored into a new block which will then be added to this chain once filled.

Blockchain is a distributed database, the difference between a database and blockchain is how data is structured in both. A database structures its data into tables whereas, as explained above, blockchain structures its data into blocks that are chained together. In simpler words, since blockchain is decentralised i.e. not one person or business controls it, now when a block gets filled the information stored in it is permanent and it becomes a part of this timeline. Thus, each block in the chain is given a specific exact timestamp of when it gets added to the blockchain. In short, the aim of blockchain is to allow digital information to be recorded and distributed but not edited. Therefore, blockchain technology is used to record transactions that cannot be altered, destroyed or deleted.



Literature Review

There has been extensive research done on the potential and applications of blockchain technology.

Author Philip Boucher published a paper, in 2017, titled ‘*How Blockchain technology could change our lives*’. The paper outlined various applications of blockchain technology and anticipatory policymaking for each application like cryptocurrency; its meaning and how it worked in the real world, impact of blockchain on digital content and digital rights and how they can be managed using this technology, how blockchain could help improve the patent

system, give way for transparent e-voting systems, introduction of smart contracts, supply chain management through blockchain, reforming the public sector etc. This paper explained how blockchain can be applied to all these sectors, and its potential impacts on these sectors. It concluded by saying that though its biggest applications are currently in the finance world in the form of cryptocurrencies, its true potential can be achieved outside the finance sector. In addition, it also highlighted that the decentralised, cross boundary nature of blockchain raises jurisdiction issues, and raises a need for a harmonised regulatory approach at the transnational level more important as compared with a local or regional one.

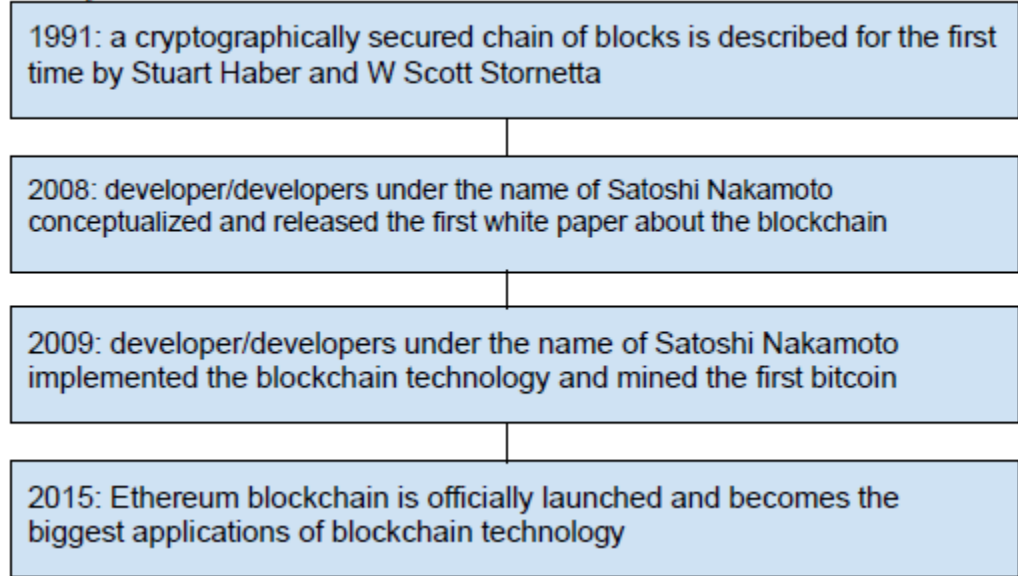
Another paper written by Dr. Burcu Sakiz and Prof. Dr. Aysen Hic in 2019, explored the emerging landscape for blockchain technology focusing on economics. Their paper elaborated on the history and evolution of blockchain, and its benefits to the global economy. It concluded with outlining the opportunities and impact that rapid revolution of blockchain technology could bring to the economies, with the finance sector being on the forefront.

Another paper published by PwC in 2020, a multinational professional services network of firms providing advisory and tax services, titled ‘*Time for Trust: the trillion dollar reason to rethink blockchain*’. This research paper gave projections of global GDP growth by 2030 due to blockchain technology. It also briefly discussed sectoral benefits of efficiencies due to blockchain technology.

Another report published, in 2021, by crypto and digital asset exchange CrossTower in partnership with US-India Strategic Partnership Forum (USISPF) gives projections of growth in GDP and growth in sectoral contribution to GDP due to adoption of blockchain by 2032. It mainly talks about the benefit of web 3.0 and estimates that the contribution of digital assets, like bitcoin, ether etc, to India’s GDP will be \$1.1 trillion over the next 11 years, by 2032. This paper is an extension of previously done research and answers the question of why blockchain could be the new big thing for India and the growth potential it brings for various sectors.

Discussion

History of Blockchain



Types of Blockchain

1. **Public Blockchain-** As per IBM “A public blockchain is one that anyone participates in, such as Bitcoin. Drawbacks could possibly include substantial computational power required, little or no privacy for transactions, and weak security. Which might be important considerations for an enterprise who might make use of blockchain.”
2. **Private Blockchain-** As per IBM “A private blockchain network, similar to a public blockchain network, is a decentralised peer-to-peer network. However, one organisation governs the network, controlling who is allowed to participate, execute a consensus protocol and maintain the shared ledger.”
3. **Permissioned Blockchain-** As per IBM “Businesses who set up a private blockchain will generally set up a permissioned blockchain network. This places restrictions on who is allowed to participate in the network. Participants need to obtain permission to join.”
4. **Consortium Blockchain-** As per IBM “Multiple organisations can share the responsibilities of maintaining a blockchain. These pre-selected organisations determine who may submit transactions or access the data. It is ideal for business when all participants need to be permissioned and have a shared responsibility for the blockchain.”

Benefits of Blockchain Technology

- **Enhanced security:** since blockchain creates an unalterable and end-to-end encrypted record, it helps prevent fraud and unauthorised activity. Privacy issues can also be addressed through anonymizing personal data and using permissions.
- **Greater transparency:** as blockchain is distributed i.e. it records transactions and data identically in multiple locations, all network participants with permission can access these transactions and information thus providing transparency.
- **Instant traceability:** Blockchain creates an audit trail that documents the origin of an asset through every step of its journey.
- **Increased efficiency and speed:** Traditional paper-heavy processes are laborious and time-consuming, prone to human error, and often require a third-party. Blockchain helps streamlining transactions and make this entire process a lot more efficient.

- Transactions can be stored on the blockchain along with all the details of those transactions, eliminating the need to exchange paper.
- Greater trust: since blockchain is decentralised, i.e. no one person or entity has control over it and thus no one person or entity can take it down or corrupt it, it is more trustworthy. In addition, since permission is needed to access data

Drawbacks of Blockchain

1. High Implementation cost: for users blockchains are cost efficient but involve high implementation cost for companies, this delays mass implementation.
2. Private keys: if someone loses their private key to access the blockchain, they wouldn't be able to access the blockchain anymore. Thus, this increased security and privacy might also backfire.

Impact of blockchain technology on the Environment

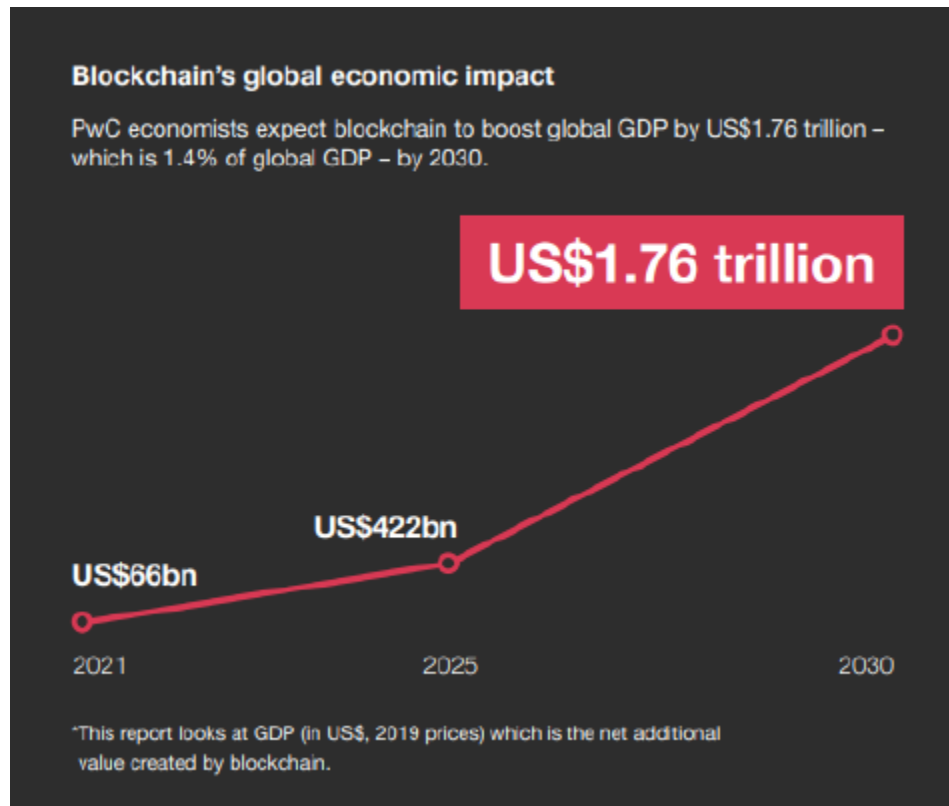
With all its benefits, blockchains technology does have a significant impact on the environment. And with the growing adoption of blockchain, these impacts also get more severe. Blockchain processes are extremely energy consuming, i.e. they require massive amounts of computing power. Nowadays, studies show that just the process of mining bitcoins consumes an exorbitant amount of energy. NFT's are responsible for millions of tons of carbon dioxide generated while buying cryptocurrency. Thus, there is a need for blockchain technology to evolve to become more energy efficient and foster environment sustainability.

Economic impact of Blockchain

Sectoral Impact of Blockchain

- Banking and Financial sector: Blockchain is poised to transform traditional financial services by enabling global, autonomous capital markets that operate 24/7. It makes peer-to-peer financial services, such as trading, borrowing, and lending, possible, and creates efficiencies by cutting out intermediaries. It can also help make various financial services access to anyone with an internet connection. Moreover, blockchain enables triple-entry accounting, which brings greater transparency for all stakeholders. In addition, through cryptocurrencies like Bitcoin and ethereum, blockchain technology eliminates the need for a central regulatory authority, reduces risks and eliminates many transaction and processing fees.

- Healthcare: As we are aware that blockchain technology provides tamper-safe security.
- Thus, through blockchain technology it is easier for organisations to share data i.e. patient records which not only increases the probability of accurate diagnosis but also makes the entire process more efficient.
- Education: With blockchain technology, the records of certifications are more secure, can be verified quickly. Blockchain technology has helped students maintain a permanent, verifiable record of their certificates which they can directly share with employers.
- Public: According to a study by Deloitte, the impact of blockchain has already begun to take hold in the public sector. With pilots running in various countries, the study predicts that the technology will dominate in years to come. Maintaining property records, land registration, identity management, payments and currency etc are all examples of pilot projects being conducted.
- Real Estate: blockchain technology has made authentication of digital transactions easier, reduced the number of separate databases, increasing trust in the process of property buying and selling.
- Trading and hedging: Blockchain technology has the potential to impact how investors look at hedge funds as it makes it way easier for investors to keep track of hedge funds' performance in a more transparent manner. In addition, blockchain technology can also improve the efficiency of how these hedge fund companies operate. As far as trading is concerned, blockchain can help accelerate the settlement of trades. It has the potential to make stock trades substantially more proficient because of their automated and decentralised nature.
- Supply chain management: Blockchain also improves the scenario of Logistics and Supply chain management domain. The technology lets companies record every transaction and process – right from manufacturing to sales, storage, and shipment – in decentralised blocks. They also lower down the risk of time delays, human errors, and associated costs.
- Politics: the technology comes with better infrastructure for casting, tracking, and counting votes. It would also be more transparent and the chances for fraudulent practices would decrease.

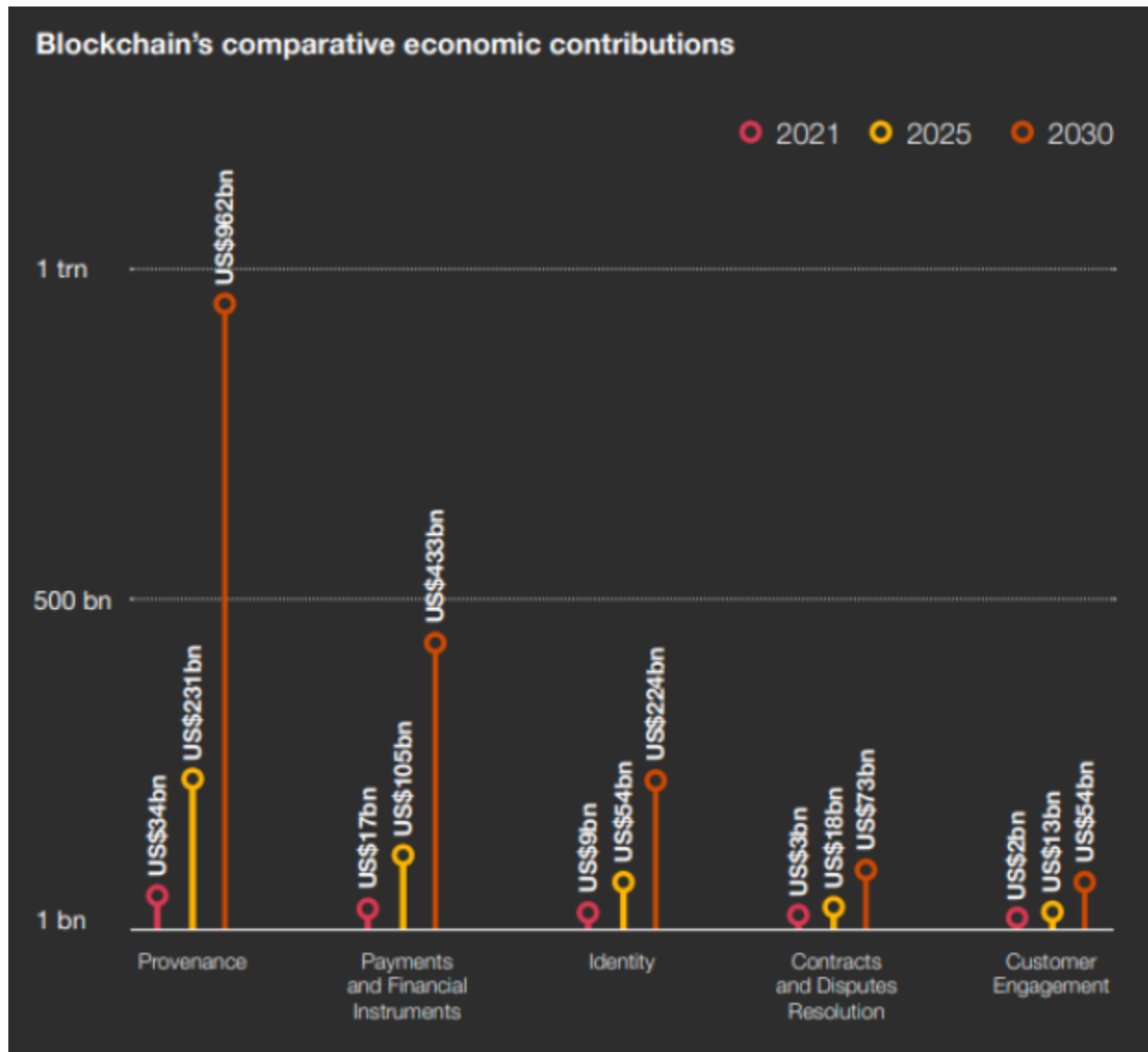


Source: PwC's report- 'Time to Trust: the trillion dollar reason to trust Blockchain'

According to a report published by PwC in 2020, titled 'Time for Trust: the trillion dollar reason to trust blockchain', blockchain has the potential to boost global Gross Domestic Product by USD 1.76 trillion till 2030.

As we have seen above, the impact of blockchain in transforming some of the sectors.

According to PwC projections, it expects sectors like education, public administration, healthcare to benefit USD 547 billion by 2030, by capitalising on the efficiencies of blockchain. Meanwhile, sectors such as retail, business services, communications, media etc will benefit from using blockchain as it makes peer to peer transactions easy, reduces the interference of third party intermediaries and increases transparency.



Source: PwC's report- 'Time to Trust: the trillion dollar reason to trust Blockchain'

As from the above projections, it is clearly visible that the benefits of blockchain technology are not going to be reaped by just the banking and financial sector. These benefits range all across sectors and growth in these sectors will stimulate general economic growth.

Now as we know, the pandemic caused disruption of all manufacturing processes, supply chains and economies all over the world. The need and demand for cloud based solutions increased drastically. Technological progress and advancement in blockchain technology are one of the

key factors that helped overcome the problems that arose due to the pandemic. Charities, supply chain disruptions, secure transactions, distributed and decentralised ledgers were all made possible due to blockchain.

What's in store for India?

As we are aware, blockchain eliminates the need for intermediaries, and is also decentralised and distributed. We have discussed above that blockchain has the potential to disrupt various sectors other than banking and finance. While India has been slow to warm up and accept blockchain technology, it also has immense opportunities to harness the abilities of this technology.

India is globally known to be a hub of talented software engineers but due to its late response and scepticism towards adopting blockchain technology has seriously impeded India's chance to get its professionals ready to handle and utilise this technology. According to a study by Belong, a Bengaluru-based hiring solutions firm, only 0.25% of India's software workforce is blockchain-ready. But the country is trying to bridge this gap, and various leading institutes have started providing certificate courses and post graduate diploma courses on blockchain technology.

Digital assets like Bitcoin, Ether, stablecoins, and other blockchains are the basis for the future financial ecosystem and Web 3.0. According to the report by crypto and digital asset exchange CrossTower in partnership with US-India Strategic Partnership Forum (USISPF), the digital asset economy's value to India's GDP will grow at 43.1 per cent CAGR (compound annual growth rate) -- from \$5.1 billion in 2021 to \$261.8 billion over an 11-year period, resulting in a \$1.1 trillion contribution to India's GDP.

Some sectoral projections mentioned in this research paper are: government related blockchain projects to bring in \$5.1 billion of GDP to India in 2032, healthcare industry is believed to bring in \$1.4 billion of GDP in 2032 due to blockchain driven efficiencies, it is projected that the payments and remittances alone can bring contribute \$21.7 billion to the GDP of India by 2032, supply chain efficiencies created due to blockchain, AI and machine learning can bring in \$68.6 billion in 2032. These are just some of the sectoral projections.

Recently, the Securities and Exchange Board of India (SEBI) asked depositories to create, host, and maintain a system using blockchain technology, to record and monitor the creation of securities as well as to monitor non-convertible securities, this comes into effect from April 1, 2022. As has been the case with the BFSI sector, it has started implementing blockchain technology and even healthcare regulators are willing to adopt and implement blockchain for the purpose of transparent regulation. The government has actively started using blockchain

technology for land title registrations, farm insurance, digitally certifying startups, electronic healthcare management etc.

Thus, it is fair to say that incorporating blockchain technology has significant benefits for India. It can make India's workforce more competent and blockchain ready, substantially increase efficiency of operations across sectors, and increase the GDP of the country significantly.

Limitations and Discussions for Future Work

No work is free from limitations and this paper is no exception and thus the limitations need to be highlighted for better critical appreciation.

1. More quantitative research is needed to back all theories.
2. Blockchain is a very diverse and dynamic topic thus further, in-detail research is required to provide a more extensive conclusion.
3. The environmental impact of blockchain is a very important aspect which hasn't been covered in depth in this paper.
4. Since this paper is a work of an undergraduate student it lacks the depth that can be found in other research papers of similar kind. Thus more expertise in the field of economics is required and should be the focus of further research.

Conclusion

Blockchain technology is a decentralised, distributed ledger of records, where information is stored in blocks and once filled these blocks get connected to previously filled blocks. All transactions recorded on this ledger are permanent, transparent and verifiable. It is widely accepted that Blockchain technology's future looks bright and attractive in part because of the way governments, developers, firms and investors are investing big as they seek to spur innovations and applications. Blockchain is the kind of breakthrough that has the potential to make and is making global changes. Its potential impact on the world economy has many countries and big companies gearing up for it.

For India, its implementation can be reflected in banking and finance, healthcare, public sector, education, retail sector etc. Therefore, adoption of this technology can open great avenues, make regulatory procedures transparent, increase accountability for the government and increase trust. In addition, it is cost efficient and will lead to an increase in GDP growth.

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